TABLE OF CONTENTS

DIVISION 00 - GENERAL REQUIREMENTS

SECTION 00005 - INFORMATION FOR BIDDERS
SECTION 00100 - INSTRUCTIONS TO BIDDERS
SECTION 00250 - NOTICE OF MANDATORY PRE-BID CONFERENCE
SECTION 00300 - FORM OF PROPOSAL & QUALIFICATION STATEMENT
SECTION 00410 - PREVAILING WAGE RATE SCHEDULE INFORMATION
SECTION 00420 - KPI REPORTING
SECTION 00430 - PAYMENT PACKAGE DOCUMENT REQUIREMENTS
SECTION 00440 - CONTRACTOR’S PERFORMANCE EVALUATION
SECTION 00500 - AGREEMENT BETWEEN CONTRACTOR AND OWNER FOR CONSTRUCTION
SECTION 00510 - FORM OF GUARANTEE
SECTION 00700 - GENERAL CONDITIONS (A.I.A. A-201)
SECTION 00800 - WSU SUPPLEMENTARY GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION
SECTION 00850 - DRAWINGS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 011000 - SUMMARY
SECTION 014200 - REFERENCES
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

DIVISION 03 - CONCRETE

SECTION 033000 - CAST-IN-PLACE CONCRETE

DIVISION 4 - MASONRY

SECTION 042200 – CONCRETE UNIT MASONRY

DIVISION 12 - FURNISHINGS

SECTION 129300 - SITE FURNISHINGS

DIVISION 31 - EARTHWORK

SECTION 311011 - SITE CLEARING
SECTION 312000 - EARTH MOVING

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 321373 - SITE JOINT SEALANTS
SECTION 321813 – SYNTHETIC TURF
SECTION 329100 - SOIL PREPARATION (TOPSOIL)
SECTION 329200 - LAWNS

APPENDIX

TABLE OF CONTENTS
SME GEOTECHNICAL EVALUATION REPORT, DATED DECEMBER 14, 2018
PROFESSIONAL SERVICE INDUSTRIES, INC. GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT, DATED AUGUST 3, 2018
FIBERTEC PHASE 2 REPORT, DATED AUGUST 1, 2019
LIGHT POLE FOUNDATION DETAIL, DATED SEPTEMBER 19, 2019

END OF TABLE OF CONTENTS
PART 1 - GENERAL

1.1 SUMMARY

A. In the event of conflict between this specification section ONLY and the WSU Division 0 specifications, the WSU Division 0 specifications shall prevail.

B. The following General Requirements are in addition and supplementary to the terms and conditions stated in the "The Contract Agreement." It is the intent of these General Requirements to work together with the specified requirements of the Contract Agreement to define the terms and conditions agreed to between Wayne State University and the Contractor for the performance of the Work. In the event there are any conflicts or specific contradictions between the Sections, the terms set forth in the Contract Agreement shall take precedence. Unless specifically mentioned otherwise, all costs to meet the conditions and requirements of these General Requirements shall not be paid for separately but shall be incorporated into the Contractor's pay item pricing.

C. Work covered by Contract Documents is as stipulated within this project manual and as accompanied by drawings.

D. Interpretation of drawings and order of precedence

E. Specifications shall have precedence over all drawings

F. Larger scale drawings shall have precedence over smaller scale drawings

G. Schedules and Tables shall have precedence over detail drawings and sections

H. Detail drawings and sections, shall have precedence over smaller scale drawing

I. Definitions. The following terms are used throughout the Contract Documents. The work will be governed in accord with the definitions.

1. Owner: Shall mean Wayne State University

2. Owner's Representative: Wayne State University, Design and Construction Services Project Manager."

3. Professional Service Consultant: Shall mean SmithGroup. Note that any reference to Inspection or Inspector in Division 01 through Division 35 shall not be defined as SmithGroup, but shall mean the testing agent, inspector, permit reviewer, compliance officer or other as defined within each section. Coordinate with Owner's Representative.

4. Fabricated: Fabricated pertains to items specifically assembled or made of selected materials or components to meet individual design requirements.

5. Manufactured: Manufactured means standard units, usually mass-produced by an established manufacturer of the respective item.


7. Shop fabricated or shop made: Shop fabricated or shop made refers to items made by a Contractor or Subcontractor in their own Shop.
PART 1 - GENERAL

1.1 SUMMARY

A. In the event of conflict between this specification section **ONLY** and the WSU Division 0 specifications, the WSU Division 0 specifications shall prevail.

B. The following General Requirements are in addition and supplementary to the terms and conditions stated in the "The Contract Agreement." It is the intent of these General Requirements to work together with the specified requirements of the Contract Agreement to define the terms and conditions agreed to between Wayne State University and the Contractor for the performance of the Work. In the event there are any conflicts or specific contradictions between the Sections, the terms set forth in the Contract Agreement shall take precedence. Unless specifically mentioned otherwise, all costs to meet the conditions and requirements of these General Requirements shall not be paid for separately but shall be incorporated into the Contractor's pay item pricing.

C. Work covered by Contract Documents is as stipulated within this project manual and as accompanied by drawings.

D. Interpretation of drawings and order of precedence

E. Specifications shall have precedence over all drawings

F. Larger scale drawings shall have precedence over smaller scale drawings

G. Schedules and Tables shall have precedence over detail drawings and sections

H. Detail drawings and sections, shall have precedence over smaller scale drawing

I. Definitions. The following terms are used throughout the Contract Documents. The work will be governed in accord with the definitions.

1. Owner: Shall mean Wayne State University
2. Owner's Representative: Wayne State University, Design and Construction Services Project Manager."
3. Professional Service Consultant: Shall mean SmithGroup. Note that any reference to Inspection or Inspector in Division 01 through Division 35 shall not be defined as SmithGroup, but shall mean the testing agent, inspector, permit reviewer, compliance officer or other as defined within each section. Coordinate with Owner's Representative.
4. Fabricated: Fabricated pertains to items specifically assembled or made of selected materials or components to meet individual design requirements.
5. Manufactured: Manufactured means standard units, usually mass-produced by an established manufacturer of the respective item.
7. Shop fabricated or shop made: Shop fabricated or shop made refers to items made by a Contractor or Subcontractor in their own Shop.
1.1 SUMMARY

A. In the event of conflict between this specification section ONLY and the WSU Division 0 specifications, the WSU Division 0 specifications shall prevail.

B. The following General Requirements are in addition and supplementary to the terms and conditions stated in the "The Contract Agreement." It is the intent of these General Requirements to work together with the specified requirements of the Contract Agreement to define the terms and conditions agreed to between Wayne State University and the Contractor for the performance of the Work. In the event there are any conflicts or specific contradictions between the Sections, the terms set forth in the Contract Agreement shall take precedence. Unless specifically mentioned otherwise, all costs to meet the conditions and requirements of these General Requirements shall not be paid for separately but shall be incorporated into the Contractor's pay item pricing.

C. Work covered by Contract Documents is as stipulated within this project manual and as accompanied by drawings.

D. Interpretation of drawings and order of precedence

E. Specifications shall have precedence over all drawings

F. Larger scale drawings shall have precedence over smaller scale drawings

G. Schedules and Tables shall have precedence over detail drawings and sections

H. Detail drawings and sections, shall have precedence over smaller scale drawing

I. Definitions. The following terms are used throughout the Contract Documents. The work will be governed in accord with the definitions.

1. Owner: Shall mean Wayne State University
2. Owner's Representative: Wayne State University, Design and Construction Services Project Manager.
3. Professional Service Consultant: Shall mean SmithGroup. Note that any reference to Inspection or Inspectors in Division 01 through Division 35 shall not be defined as SmithGroup, but shall mean the testing agent, inspector, permit reviewer, compliance officer or other as defined within each section. Coordinate with Owner's Representative.
4. Fabricated: Fabricated pertains to items specifically assembled or made of selected materials or components to meet individual design requirements.
5. Manufactured: Manufactured means standard units, usually mass-produced by an established manufacturer of the respective item.
7. Shop fabricated or shop made: Shop fabricated or shop made refers to items made by a Contractor or Subcontractor in their own Shop.
1.2 SUBMITTAL OF SHOP DRAWINGS
   A. The Contractor shall submit the requisite shop drawings and catalog documents for any material or
equipment proposed to be utilized in the performance of the Work to the Owner's Construction
Engineering Inspection Consultant, which shall distribute the Submittals to the Landscape Architect/Civil
Engineer with a copy to the Owner. The Contractor shall transmit said submittals to the Landscape
Architect/Civil Engineer in a form and manner that would allow the Landscape Architect/Civil Engineer to
review the submittals in an efficient and timely manner. The Design Engineer will review each submittal for
compliance with the Contract Documents. If a submittal is found to be non-compliant, then the submittal
will be returned to the Contractor to be corrected. Finally, after the Landscape Architect/Civil Engineer
have reviewed and approved the submittals, the Contractor shall distribute the final submittal copies to the
Owner as part of the close out documents.

1.3 AS-BUILT RECORDS
   A. A set of Construction Documents shall be marked as As-Built Drawings and be maintained at the Project
site by the Contractor for the purposes of making all changes, revisions, relocations, reroutes, or variances
in the Work that differ from the Construction Documents. The As-Built Drawings shall be made
accessible to all of the Contractor's subcontractors for recording any changes, field sketches, revisions,
relocations, reroutes, or variances in the Work. The completed set of As-Built Drawings shall be
transmitted to the Owner upon completion of the Work provided in a timely manner and in AutoCADD 2010
version or later, to the County. Field sketches and installation records, other than shop, fabrication, or field
installation drawings, shall not be submitted separately but shall be recorded on the As-Built Drawing set
only.

1.4 PROJECT MEETINGS
   A. The Contractor shall arrange and conduct scheduled progress meetings determined by the Owner’s
Representative and prepare and distribute meeting minutes. Special meetings for the purposes of
coordinating and monitoring the work progress, identifying problems, informing subcontractor and Project
participants of project status, stressing safety, coordinating construction details and inspecting quality
conformance shall be conducted as required to assure the smooth and uninterrupted progression of the
Work.

1.5 FIELD OFFICE BUILDINGS, SHEDS, AND TEMPORARY STORAGE AREAS
   A. The Contractor shall provide all temporary field offices and storage area enclosures to conduct the Work
and properly administrate the Work. The Contractor may locate field offices and storage areas on site at
Contractor’s discretion, and subject to Owner Representative’s location approval, but Contractor will have
full responsibility to maintain access to the Work and the work of the Owner. Any relocation of the
Contractor's temporary facilities required to provide access for installation of utilities or the Owner shall be
done to maintain the schedule at no cost to the County. The appearance of field offices is subject to the
reasonable approval of the County.

1.6 TEMPORARY PROJECT SIGN
   A. The Contractor, may at its own expense design, fabricate and construct one (1) Project Identification Sign
for the purpose of advertising the Project. Contractor to coordinate with Landscape Architect/Civil
Engineer for rendered graphics of proposed site. The sign shall be constructed of exterior grade wood,
with weather resistant graphics and hardware and shall be a maximum of 16 square feet. The design and
content of the sign shall be subject to the approval of the County.
1.7 CONSTRUCTION SEQUENCING AND NOTIFICATION PLAN

A. The Contractor must submit to the Owner’s Representative, Landscape Architect and Owner a detailed plan, which shall delineate the sequence of the various construction activities that will occur on the Project Site, all road closure requirements (including closure time duration on a per block basis) and proposed measures to maintain reasonable and safe access for the stakeholders and business owners which may be affected by construction activities. The Construction Sequence and Lane closure plan shall be provided to the Owner’s representative at the time of the Contractor's first proposed Schedule submittal to the County, due within 7 days of the County providing the Contractor with a Notice to Proceed. The County at its sole discretion will determine the reasonableness of the Contractor’s plan to provide and maintain pedestrian and vehicular access. The Plan has to be approved by the Owner’s Representative, Landscape Architect and Owner before the Contractor will be allowed to commence work on the Project Site. Owner’s Representative to provide dates and limitations to site for Fairground events during the time of construction.

B. The Contractor shall designate only one (1) individual who will be assigned to the work throughout its entirety to be responsible for all communications with the stakeholders in the project area. The Contractor shall notify the stakeholders in writing at least thirty (30) days prior to the anticipated start of construction activities and again not less than seven (7) days prior to the actual start of construction activities. The Contractor may be required to fabricate and post signage in various locations on the project site advising the stakeholders in the project area of the forthcoming construction activity.

1.8 CONSTRUCTION PARKING

A. The Contractor shall be responsible for its employees' and subcontractors' vehicles while parked on or off the construction site. Any vehicle found to be owned by the Contractor's employee or an employee of the Contractor's subcontractor parked illegally may be towed away by the County and charged to the Contractor by Change Order. The County reserves the right to deny parking privileges on the Project site to any individual who parks a vehicle improperly or operates any vehicle in an unsafe manner.

1.9 WATER SERVICE

A. If required for construction purposes, the Contractor will arrange for, or otherwise furnish, and pay for water required for the Work. The Contractor shall be responsible to provide and maintain connections, backwater valves, valves, and pipe that may be required to supply water at a point convenient to the work area. The locations of the connections shall be acceptable to Water Department.

1.10 TEMPORARY POWER, LIGHTING AND PHONE SERVICE

The Contractor will furnish and pay for electrical power and telephone service necessary for the Work including labor, equipment and materials required to make connections to power sources and to provide and pay for any required temporary electrical power and light at location of work. Temporary equipment and wiring for power, lighting and distribution requirements shall be in accordance with applicable provisions of governing laws, codes and ordinances. The Contractor shall maintain temporary wiring and related equipment so as not to constitute a hazard to persons or property. County may possibly provide electric to site. Temporary electrical power may be needed for portion of work.

1.11 TOILET FACILITIES

A. The Contractor shall arrange for, provide (per OSHA guidelines) and maintain temporary on-site sanitary toilet facilities for use by the Contractor and County for the duration of the Work.
1.12 WEATHER PROTECTION
   A. The Contractor shall provide weather protection, including pumping water and temporary heat and ventilation as required during construction to protect the Work from damage due to freezing, frost, rain, dampness, excessive heat or other adverse elements and as required to maintain the continuous progression of the Work without stoppage due to the weather. This shall include hot and cold weather concrete placement protections recommended by the American Concrete Institute.

1.13 EXISTING SITE CONDITIONS
   A. The information in this Bid Package is intended to orient the Contractor to the site. The Contractor will be responsible to thoroughly evaluate the site conditions for construction requirements. It is the responsibility of the Contractor in conjunction with the utility companies to verify the exact types and locations of existing utilities. All damage to existing utilities, caused by the Contractor, shall be repaired at Contractor’s expense, in accordance with the standards of the applicable City department or private utility company.

1.14 UTILITY SHUT-OFF REQUIREMENTS
   A. The Contractor shall coordinate all utility shut-offs with the Utility Companies and departments to permit the proper and safe performance of the Work as scheduled. The Contractor shall have the full responsibility for contacting MISSDIG at least 72-hours prior to any subsurface excavation.

1.15 FIRE HYDRANT RELOCATION
   A. Contractor to coordinate with University Project Management, Fire Marshal and any other required University or City Department to relocate any fire hydrant. The Fire hydrant to be relocated shall move directly east, using the same water line. Relocation of the hydrant requires all University standard equipment that meets all necessary life safety codes. Adjacent structures and Athletic Facilities along pedestrian corridor do not have sprinklers. Fire hydrant relocation shall be coordinated to have the water service shut off for a minimum period of time. Max 1 day. Contractor to coordinate.

1.16 PROTECTION
   A. The Contractor shall provide site protection, traffic controls and barricades as required to secure the site from trespassers and the general public. The Contractor shall install, in conformance to the requirements of the governing road/street authority, traffic controls for all work performed in the rights-of-way including curb cuts and utility taps.

1.17 REPLACEMENT OF DAMAGED WORK
   A. The Contractor shall be responsible to pay all costs for the timely (within schedule parameters) replacement or restoration of any portion of the Facility damaged by fire or other cause during construction to the extent that such damage is a result of the negligence or a faulty installation made by the Contractor or its subcontractors.
1.18  EMERGENCIES
A. In any emergency affecting the safety of persons or property, the Contractor shall act at its discretion to prevent threatened damage, injury or loss, provided that the Contractor shall have determined that there is not sufficient time to advise and consult with the County prior to taking such action.

1.19  FIRE HAZARDS
A. The Contractor shall take all necessary precautions to eliminate possible fire hazards and to prevent damage to construction work, equipment, temporary field offices, storage sheds, and other property. During construction, the Contractor shall provide fire extinguishers and fire hose in accordance with the appropriate OSHA and construction industry rules and regulations.

1.20  FLAMMABLE HAZARDS
A. Gasoline, benzene, other combustible materials, oils, solvents, or chemicals shall not be poured into sewers, manholes, or traps. All casual spills shall be immediately cleaned up and all contaminated soil removed from the site and legally disposed. Tarpaulins and other materials used for temporary enclosures, coverings and protection shall be flameproofed. The Contractor shall comply with County, State and Federal regulations with respect to barrels and tanks containing flammable or hazardous materials, and shall remove any such materials immediately at the request of the County.

1.21  EXPLOSIVE CHARGES
A. Any fastening device, powder activated stud gun or any other device or system of any kind using an explosive charge for activation may not be used in performing work at the Project site unless it is specifically approved by OSHA or the County Health Department. It shall be the responsibility of the Contractor to secure all permits and permissions without extra cost to the County and to assure the safe use of any such devices by trained individuals.

1.22  FIRST AID
A. A completely equipped first-aid kit shall be provided and maintained by the Contractor at the site in a clean orderly condition and shall be readily accessible at all times to all the Contractor's employees. The Contractor shall designate certain employees who are properly instructed to be in charge of first aid. At least one such employee shall be available at the site whenever work is being carried on.

1.23  HOURS OF WORK
A. The Contractor shall conduct the work during normal working hours in cooperation with the existing property owners and occupants. At the beginning of work on this Contract, the Contractor shall notify the County, in writing, the schedule of the days and work hours proposed for a normal workweek. The Contractor shall be responsible for contacting in advance all involved parties whenever the Contractor intends to depart from the normal workweek schedule and resolve to the satisfaction of the County any reasonable objections made. All costs incurred, due to the failure of the Contractor to properly notify involved parties, shall be paid by the Contractor or deducted from the Contractor's contract amount.

B. The Contractor shall plan and conduct the Work so as not to create a public nuisance or disturb the peace specifically for any residents near or adjacent to the Project site. Should the Contractor be stopped by order of a public authority from working at such times that are contrary to or in violation of any law, ordinance, permit, or license, the Contractor shall not be entitled to an extension of time or additional compensation due to such stoppage.

C. In an emergency, requiring work to be performed outside the normal work week schedule to save or protect life or property, the requirements for the twenty-four (24) hour notification will be waived. The Contractor shall notify the County as soon as the Contractor determines that an emergency condition exists necessitating the change in or extension of the normal hours of work. However, the Contractor's determination of the existence of the emergency is subject to the review and revision by the County.
D. The normal workweek schedule and/or daily hours of work may be altered as directed by the County, when, in its reasonable judgment, such alteration is necessary to maintain the required progress of the Work.

1.24 SANITARY REQUIREMENT

A. Committing unnecessary acts of nuisance on the Project site is prohibited. Any employee who violates such provisions shall be promptly removed from the Project by the Contractor and not be permitted to work on the project site without the written consent of the County.

1.25 CLEANLINESS OF PROJECT SITE AND STREET

A. The Work and all public or private property used in connection with the Work shall be kept in a neat, clean and orderly condition at all times. Stored materials shall be safely stacked and ordered. Waste materials, rubbish and debris shall removed daily and shall not be allowed to accumulate. No burning of rubbish is permitted.

B. The Contractor shall remove unused construction equipment, temporary buildings and excess materials from the site upon the reasonable request of the EDC. The site shall not be permitted to become a storage yard for the Contractor’s equipment and materials not directly involve in the Work. Any stored equipment or unnecessary materials stockpiled shall be removed from the Project site upon the request of the County.

C. During the performance of the Work, the Contractor shall daily inspect and maintain the Project site in a clean condition including control of dust, picking up scattered construction debris, and removal of splattered materials from the surfaces of the new construction. Should the Contractor fail to maintain proper cleanliness or order of the site the County, upon 48 hour notice to the Contractor, shall arrange for the cleaning and removal of extraneous materials accumulated at the site and shall have the right to deduct the costs incurred from the Contract value.

D. Trucks hauling loose material from or to the project site shall be tight and their loads trimmed and tarped to prevent spillage on the public streets. This requirement likewise applies to suppliers making deliveries to the Project site. The Contractor will be held responsible to require compliance by the Contractor’s suppliers. The County shall have the right to deny site access to any subcontractor or supplier who refuses to comply with this requirement. The Contractor shall promptly (daily as a minimum) clean streets, sidewalks and alleys dirtied by any cause arising from the Contractor’s operations. Should the Contractor fail to maintain proper street cleanliness, the County, upon notice to the Contractor will clean any such public right of ways and shall have the right to deduct the costs incurred from the Contract value.

1.26 DEWATERING

A. The Contractor shall dewater and keep dry all trenches and other excavated areas at the site by evenly grading the surface drainage to eliminate standing water. The Contractor shall be responsible to protect structural bearing subgrades and materials from ponding, standing water or erosion. Dewatering operations shall not be permitted to discharge water to any other private properties. The Contractor shall be responsible for securing Water Department permission prior to discharging any water from the site into public sewers.

1.27 SECURITY

A. The Contractor shall secure and protect from theft, loss or damage all materials and equipment used for or relating to the Work until final completion and acceptance by the County.

1.28 WORKING AREA

A. All the Work under this Contract shall be performed on the Project site. The Contractor shall access the Project site via City streets and rights-of-way. The Contractor shall review the legal loading limit for the access streets and rights-of-way and shall be responsible for coordinating deliveries and shipments that do not exceed the legal load limits.
B. The Contractor shall use Flagmen whenever trucks or equipment enter public roadways from the project site.

C. Should additional working or storage space be desired, the Contractor shall make all arrangements with any property owner and submit to the County written evidence that the Contractor has secured permission to use this property for construction purposes. The Contractor shall pay all expense in connection with its use, and in no way involves or obligates the County by such use.

1.29 SPECIAL SYSTEM INSPECTIONS
A. The Contractor, as part of the Work, shall coordinate all specialty manufacturer inspections and testing required to certify that the installation of the Work meets the manufacturer's conditions for warranty.

1.30 TIME OF STARTING AND COMPLETION OF WORK
A. The Contractor shall carry on the construction operations continuously without stoppage so that all items of work are totally complete including punchlist in accordance with the agreed upon completion date. This shall not relieve the Contractor from the responsibility to coordinate the Work with County, and to sequence the Work including interrupting the Work as required by the County.

1.31 TESTING & INSPECTION
A. The University's separately contracted Construction Engineering & Inspection Consultant shall arrange and pay for all testing and inspection required to verify conformance of the Work with the Contract Documents. All testing and inspection shall be coordinated with the University.

1.32 SOIL EROSION AND SEDIMENT CONTROL
A. The Contractor shall install and maintain, for the duration of the Project, soil erosion protection measures as required by Wayne County. The Contractor shall provide other temporary soil erosion control as required to eliminate sedimentation from entering sewers and open ditches due to the Contractor's operations. The Contractor shall remove completely all soil erosion control measures from the site at the end of the Project.

B. The Contractor will promptly remove soil, debris, or other materials spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares by the Contractor's equipment and operations.

C. The Contractor shall abide by the requirements of the "Authorized Public Agency" under the provisions of Section 11 of Act 347 of the Public Acts of 1972, "Soil Erosion and Sedimentation Control Act" as modified or superseded.

D. Current Soil Erosion and Sediment Control Plans included in set are approved by the Health Department.

1.33 DISCLAIMER OF SITE INFORMATION
A. By its own examinations, observations, investigations and tests the Contractor shall make its own determination of the existing site conditions. Information contained in this Bid Package is provided solely for the informational use of the Contractor. The County does not guarantee the accuracy or sufficiency of any site information.

1.34 UNIT PRICES
A. Unit prices, if established during the Project, shall include all permits, fees, labor, material, tools, supervision, equipment, taxes, insurance and bonding necessary for or incidental to the proper completion of the Work.
1.35 TRUCK TICKETS

A. Any excavated materials removed from the site shall be controlled for assurance of legal dumping by (3) part "Truck Tickets" for each load of material removed from the site. The Contractor shall note on each truck ticket the bid package number, date, location of excavation, trucking firms, quantity of material and time of departure for each outgoing truck. The Contractor shall record the disposal site and time of disposal on the "Truck Ticket" and shall obtain the signature of the recipient of the material in verification thereof and return the completed "Truck Ticket" to the County.

1.36 ENVIRONMENTAL COORDINATION

A. Owner shall make available to the Contractor any environmental reports or information in the Owner’s possession as reference information to assist in the Contractor's required production of the Health and Safety Plan, as expressed in paragraph 1.3 of Section VII of the Bid Documents. Unless otherwise noted in the plans and specifications the Contractor shall assume that all excavated material in the right of way is contaminated and shall be taken to a licensed Class II landfill. If the Contractor encounters potential hazardous materials, the Contractor shall notify the EDC for inspection of the condition before proceeding with any Work in that area. The contractor shall continue with the orderly progression of work in non impacted areas. Subject to the nature of the hazardous material encountered and the Contractors qualifications, the EDC reserves the right to require the Contractor to perform any removal/remediation work for hazardous materials on a time and material basis, or negotiated basis according to the provisions of the Contract Documents.

1.37 PROTECTION OF THE PRIVATE AND EXISTING UTILITIES

A. The Contractor shall protect and maintain for the duration of the work all existing improvements and utilities that are to remain. The Contractor will immediately undertake and pay for the repair of any damaged existing improvements or utilities.

B. All unattended excavations, voids, pits, manholes or holes shall be barricaded immediately by the Contractor. Barriers shall be removed promptly by the Contractor when no longer required.

C. Precautions against fire, accidental explosion, excessive dust and accident shall be strictly enforced by the Contractor in cooperation with the County and the EDC.

D. The Contractor shall not allow salvaged material, debris, and trash to accumulate on the project site but shall require all such material to be hauled away on a regular, daily basis.

1.38 PROTECTION OUTSIDE THE PROJECT AREA

A. All existing areas outside the limits of the Work shall be protected from damage. All damage caused by the Contractor shall be corrected at the expense of the Contractor and to abide by City or County Standards.

B. During progress of work, the Contractor shall keep adjacent roads free of trash, debris, and salvage material resulting from the work.

C. The Contractor is advised that other construction activities may be performed by others within the Project area during this the performance of the Work under this Contract Agreement. The Contractor shall plan proposed trucking and all other vehicular routes accordingly in coordination with and at the reasonable direction of the County.

D. All construction traffic control signage and barricading shall conform to the standard requirements of the governmental body having jurisdiction over the street right of way.
1.39 TEMPORARY CONTROLS

A. Surface Water Control – The Contractor shall complete the work in such a manner so as not to entrap surface water on the site. Low areas caused by removals, shall be graded in such a manner to allow drainage to existing storm water structures. The Contractor shall be responsible for drying out and repairing any grade surfaces damaged due to the Contractor’s failure to properly grade the work area.

B. The Contractor shall secure and pay for all erosion control permits and conduct earth changes in a manner, which will effectively eliminate accelerated soil erosion and resulting sedimentation. Measures to be taken shall include but not be limited to:

C. Provide temporary soil erosion control to eliminate sedimentation from entering sewers and open ditches.

D. Remove sediment caused by accelerated soil erosion from runoff water before it leaves the site.

E. Maintain temporary soil erosion silt fences, sediment traps and control measures for the term of this contract.

F. Promptly remove soil, debris, or other material spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares during transit.

G. The Contractor shall utilize applicable soil erosion details, shown on Contract drawings, in implementing his work.

H. The Contractor shall utilize water trucks and other dust inhibiting methods to control fugitive dust emanating from the work activity performed under this scope of work. Truck and equipment wheels shall be cleaned before exiting the project area. Travel routes shall be established with the prior approval of the County to reduce dust in adjacent areas. Existing roads shall be used wherever practical based on street loading capacity.

1.40 SUSPECTED HAZARDOUS MATERIALS

A. In the event the Contractor encounters excavated materials that are suspected as hazardous, the Contractor shall notify the County for review, and through County’s Environmental Consultant the possible characterization and management of the suspect material. If it is determined that the suspect material is hazardous by the County’s environmental Consultant, the Consultant will provide a material handling protocol for the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONTRACTOR USE OF PREMISES

A. Confining operations at site to areas permitted by:

1. Law
2. Permits
3. Contract
4. Owner’s Representative
5. Required use of adjacent existing buildings
6. Contract documents
B. Confer with Owner's Representative and obtain full knowledge of all site rules and regulations affecting work.

C. Conform to site rules and regulations while engaged in project construction.

D. Site rules and regulations take precedence over others that may exist outside such jurisdiction.

E. Employees On Site: The Owner's Representative may examine Contractor's list of employees, including those of his subcontractors and their agents for all employees working on site.

F. Vehicle use: Rigidly enforce the following:
   1. Keep all vehicles, mechanized or motorized equipment locked at all times when parked and unattended on Owner's premises.
   2. Do not, under any circumstance, leave any vehicle unattended with motor or engine running, or with ignition key in place.
   3. All traffic control subject to Owner's Representative approval.
   4. Contractor employee parking shall be limited to areas indicated by Owner's Representative.
   5. Contractor shall not park any vehicles within the dripline of trees.

G. Do not unreasonably encumber site with materials or equipment.

H. Assume full responsibility for protection safety and safekeeping of products stored on premises.

I. Move all stored products or equipment, which interferes with operations of Owner or other subcontractors.

J. Obtain and pay for use of additional storage or work area needed for operations.

K. Limit use of site for work and storage:
   1. To areas indicated on the drawings.
   2. To areas approved in advance by Owner's Representative.

L. The Contractor acknowledges that the Owner will use the adjacent sites and the Contractor must maintain staff and appropriate safety requirements. Contractor to work with Owner's Representative to coordinate with scheduled events. Owner's Representative to provide schedule.

3.2 DUTIES OF CONTRACTOR

A. Except as specifically noted, provide and pay for:
   1. Labor, materials and equipment.
   2. Tools, construction equipment and machinery.
   4. Other facilities and services necessary for proper execution and completion of work.

B. Secure and pay for as necessary for proper execution and completion of work, and as applicable at time of receipt of bids.
   1. Licenses.

C. Give required notices.

D. Promptly submit written notice to Professional Services Consultant of known or observed variances of Contract Documents from legal requirements.
   1. Appropriate modifications to Contract Documents will adjust necessary changes.
2. Assume responsibility for Work known to be contrary to such requirements.

E. Enforce strict discipline and good order among employees. Do not employ on Work:
   1. Unfit persons.
   2. Persons not skilled in assigned task.

F. Purchase and maintain insurance in accordance with the Contract Agreement.

G. Contractor shall protect existing site from damage. Contractor shall clean areas of construction debris, equipment, and material prior to Date of Completion for such area.

3.3 PERMITS

A. See Section 003143 PERMIT APPLICATION

3.4 TIME OF COMPLETION

A. Completion of work shall be in accordance with the schedule as indicated in the Bid Form.

3.5 JOB OPERATIONS

A. Project Security:
   1. Take necessary precautions such as barrier to protect Owner's personnel, the public, in the area of construction.
   2. Securely close off all areas of construction after working hours to prevent entry by unauthorized persons.
   3. Provide barriers to prevent visitors from construction area.

3.6 WORK LIMITATIONS:

A. Owner's personnel may occupy all spaces around where work will be done. Any work done during times of occupancy shall be limited in scope to prevent disturbing it.

B. Give Owner's representative three days notice before starting Construction Work in any area.

C. All work, including material storage, shall be limited to the project area.

3.7 PHOTOGRAPHY

A. Starting on the 01st of the month following Notice to Proceed, and on the 01st of each subsequent month up to and the 01st of the month following the Substantial Completion Date eight color photographs are to be taken of the Site. One image from each following direction facing the improvements of the site: N, S, E, W, NE, NW, SE, SW Pictures are to include the date taken on the photograph

B. By the 15th of each month delivery two sets of 8 x10 color prints of all photographs taken that month; one set to the Landscape Architect and one set to the Owner's Representative. Also deliver digital/electronic copies of the photographs to the Landscape Architect and Owner.
C. All rights, privileges, copyrights, ownership, etc to the pictures shall be transferred to the Architect and Owner so they each may use the images / photographs at their discretion now and in the future. A written release stating such is to be provided each month with each set of photographs.

D. Receipt of the photographs on the 15th of each month is prerequisite to the processing of that month's pay request.

3.8 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.

END OF SECTION
SECTION 014200 - REFERENCES

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 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "As Otherwise Direct": Used in relation to items to be determined after Contract by agreement between Owner, Architect, and Contractor, with input from other entities as appropriate.

D. "Certified": Guaranteed in writing over the signature of an authorized representative of the certifying organization.

E. "Directed": An instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

F. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

G. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

H. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

I. "Install": Operations including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations at Project site.

J. "N.I.C" or "NIC": Not in Contract.

K. "Necessary": That which is reasonably necessary to the proper completion of the Work.

L. "Per": In accordance with the requirements of.

M. "Products": Materials, equipment, or systems.

N. "Provide": Furnish and install, complete and ready for the intended use.

O. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
P. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

Q. "Replace": To put something new in place of.

R. "Required": Referring to requirements of the Contract Documents, unless its use clearly implies a different interpretation.

S. "Shown" or "Indicated": Appearing on the Drawings, unless their use clearly implies a different interpretation.

T. "Supply": Same as Furnish.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
16. AIA - American Institute of Architects (The); www.aia.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); wwwasse.org.
34. ASSE - American Society of Sanitary Engineering; wwwasse-plumbing.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwf.org.
49. CDA - Copper Development Association; www.copper.org.
50. CE - Conformité Européenne; http://ec.europa.eu/growth/single-market/ce-marking/
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.ce.org.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
59. CLFM - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - Canadian Standards Association; www.csa.ca.
65. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWC - Composite Wood Council; (See CPA).
71. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. EIA - Electronic Industries Alliance; (See TIA).
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org .
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
82. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
83. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
90. GA - Gypsum Association; www.gypsum.org.
92. GS - Green Seal; www.greenseal.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
100. IAS - International Approval Services; (See CSA).
101. ICBO - International Conference of Building Officials; (See ICC).
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICRA - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
114. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
115. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
116. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
117. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
120. ITU - International Telecommunication Union; www.itu.int/home.
121. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
122. LMA - Laminating Materials Association; (See CPA).
125. MCA - Metal Construction Association; www.metalconstruction.org.
132. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.;
133. NAAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
134. NACE - NACE International; (National Association of Corrosion Engineers International);
    www.nace.org.
139. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
140. NCMA - National Concrete Masonry Association; www.ncma.org.
142. NECA - National Electrical Contractors Association; www.necanet.org.
144. NEMA - National Electrical Manufacturers Association; www.nema.org.
146. NFHS - National Federation of State High School Associations; www.nfhs.org.
148. NFPA - NFPA International; (See NFPA).
151. NLGA - National Lumber Grades Authority; www.nlga.org.
152. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
154. NRCA - National Roofing Contractors Association; www.nrca.net.
158. NSSGA - National Stone, Sand & Gravel Association; www.sssga.org.
159. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
161. PCI - Precast/Prestressed Concrete Institute; www pci.org.
162. PDI - Plumbing & Drainage Institute; www.pdionline.org.
163. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association);
168. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
169. SDI - Steel Deck Institute; www.sdi.org.
170. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
171. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
175. MACNA - Sheet Metal and Air Conditioning Contractors’ National Association; www.macna.org.
176. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
177. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
186. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
187. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
190. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
191. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
194. TPI - Turfgrass Producers International; www.turfgrass sod.org.
197. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
198. USAV - USA Volleyball; www.usavolleyball.org.
202. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
203. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
204. WDMA - Window & Door Manufacturers Association; www.wdma.com.
207. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's Representative, Landscape Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer, Water, and Electric Power Service: Use charges are specified in Section 011200 "Multiple Contract Summary."

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with IBC ADA requirements.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of at each return-air grille in system and remove at end of construction.

D. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

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

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.

3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install land-based telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.

G. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Core i5 or i7.
4. Display: 24-inch LCD monitor with 256-Mb dedicated video RAM.
5. Full-size keyboard and mouse.
8. Productivity Software:
   a. Microsoft Office Professional, 2010 or higher, including Word, Excel, and Outlook.
   b. Adobe Reader 11.0 or higher.
c. WinZip 7.0 or higher.

9. Printer: “All-in-one” unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum Mbps upload and Mbps download speeds at each computer.
11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
13. Access to large format scanner.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.
G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
   a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touch up signs so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

L. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

   1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

   1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

   1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of DEQ Construction General Permit or authorities having jurisdiction, whichever is more stringent.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

I. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

K. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

N. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistant materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for hours are considered defective and require replacing.
b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

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

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION
SECTION 033000 – CAST-IN-PLACE CONCRETE

PART – 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section specifies requirements for concrete cast-in-place on the site.
B. The work includes cast-in-place concrete pavement, walkways bases, unit paver bases, foundations, structures, and thrust blocks.

1.3 REFERENCE STANDARDS

A. References herein are made in accordance with the following abbreviations and all work under this Section shall conform to the latest editions as applicable.

1. American Concrete Institute (ACI):

   301 Specifications for Structural Concrete
   305R Hot Weather Concreting
   306R Cold Weather Concreting
   325.9R Guide for Construction of Concrete Pavements and Concrete Bases

2. ASTM International (ASTM):

   A82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
   A1064 Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
   A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
   C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
   C33 Standard Specification for Concrete Aggregates
   C94 Standard Specification for Ready-Mixed Concrete
   C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
   C150 Standard Specification for Portland Cement
   C171 Standard Specification for Sheet Materials for Curing Concrete
   C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
   C260 Standard Specification for Air-Entraining Admixtures for Concrete
1.4 QUALITY ASSURANCE

A. Work, materials, and color of the wheelchair ramp paving shall conform to applicable sections of Americans with Disabilities Act (ADA) and State Standards, whichever is more stringent.

B. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features shown on the Drawings are approximate. Manufacturer’s approved shop Drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size, and details.

1.5 SUBMITTALS

A. Submit description of methods and sequence of placement for each type of specially-finished concrete, including description of methods and sequence of placement.

B. Submit manufacturer’s product data for the following:
   1. Form release agent.
   2. Concrete coloring additive.
   3. Preformed joint filler.
   4. Concrete reinforcement specification data from manufacturer.
   5. Stamp and imprinting tools, manufacturer’s literature.
   6. Manufacturer’s literature for protective coating for sidewalks.
   7. Detectable Warning including manufacturer’s certification that product complies with ADA

1.6 TESTING

A. The Owner shall employ a qualified independent testing laboratory to inspect and test concrete paving and other cast-in-place concrete work.

B. When requested, Contractor shall prepare test specimens in accordance with ASTM C31, standard cylinder size 4-inch x 8 inch.

C. Testing of materials and installed work may occur at any time during progress of the work. Rejected materials and installed work shall be removed and replaced.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Steel reinforcing bars shall conform to ASTM A615, Grade 60, deformed.
   1. Bars employed as dowels shall be hot-rolled plain rounds.

B. Steel Wire: ASTM A82, plain cold drawn steel.
C. Welded Wire Reinforcement: Welded wire reinforcement shall conform to the applicable requirements of ASTM A1064. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.

D. Supports for Reinforcement: Bolsters, chairs, and other devices for spacing, supporting, and fastening reinforcing bars, and welded wire fabric in place shall be wire bar-type supports complying with CRSI Manual.
   1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI Class 1).

2.2 PORTLAND CEMENT CONCRETE

A. Portland cement concrete shall conform to the following:
   1. Maximum water-cement ratio shall be 0.45 conforming to ACI 316R.
   2. Concrete shall be air-entrained type conforming to ASTM C94. Air content by volume shall be 6 percent + 1.5 percent, tested in accordance with ASTM C260.
   3. Slump of concrete shall not be less than 3 inches nor greater than 4 inches, determined in accordance with ASTM C143.
   4. Cement for concrete shall be a Portland cement conforming to ASTM C150, Type I or II. Only one color of cement, all of the same manufacturer, shall be used for the work.
   5. Fine and coarse aggregates for concrete shall conform to ASTM C33.
   6. Concrete shall contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C494, Type A.
   7. Concrete shall contain no calcium chloride or admixtures containing calcium chloride. No admixtures other than those specified shall be used in the concrete without the specific written permission of the Engineer.

2.3 CONCRETE AGGREGATES


B. Coarse Aggregates: Coarse aggregates shall conform to ASTM C33, Parts 9 through 11 and Tables 2 and 3, with the following Class designations:
   1. Class 1S: For footings and foundations not exposed to the weather.
   2. Class 4S: For pavements, driveways, curbs, walkways, sidewalks, and retaining walls that are exposed to the weather.
   3. Class 1N: For pavements, driveways, curbs, walkways, sidewalks, and retaining walls that are not exposed to the weather.

C. Exposed Aggregate: Exposed aggregate for ADA curb ramps shall be selected, hard, durable, washed rounded stones free of deleterious reactivity to cement with graded sizes between 1/2 to 3/4 inch diameter nominal sieves.

2.4 COLORED CONCRETE

A. Color hardener and curing compound shall be manufactured and supplied by the Bomanite Corporation, 81 Encina Avenue, Palo Alto, CA 94301; tel. 800-854-2094, or approved equivalent.
   1. Color for concrete shall have visual contrast with surrounding paving.
   2. Curing compound shall be liquid applied.
B. Surface sealer shall be non-yellowing type which breathes water vapor, as manufactured by ProSoCo, Sika Chemical Corporation, Dural-International Corporation, or approved equivalent.

2.5 CURING MATERIALS FOR UNCOLORED CONCRETE
A. Curing shall be accomplished by the following methods.
   1. Moist curing with burlap covering.
   2. Curing paper, nonstaining, fiber reinforced laminated Kraft bituminous product conforming to ASTM C171. Four mil polyethylene sheeting may be substituted for curing paper.
   3. Curing compound, a resin-base, white pigmented compound conforming to ASTM C309, Type 2.

2.6 EXPANSION JOINTS
A. Expansion joint filler shall be preformed, nonbituminous type conforming to ASTM D1752, Type II, similar to Sealight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equivalent.
   1. Premolded filler shall be one piece for the full depth and width of the joint.
B. Smooth dowel shall be hot rolled plain steel dowel bonded at one end and operating in smooth close fitting sleeve (of same material) at the other end.

2.7 CONTROL JOINTS
A. Joint filler to be polyethylene foam with manufacturer’s recommended sealant.

2.8 FORMS
A. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms manufactured by Sonoco Products Company, General Products Division, ABS or PVC plastic reusable forms, or approved equivalent.
B. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Plywood shall conform to U.S. Product Standard PS-1 and APA Graded B-B (Concrete Form) Class I Exterior Grade plywood or B-B or A-C Class I high density overlay concrete form plywood. Formwork materials shall produce smooth, continuous, straight and level surfaces.
C. Forms for Unexposed Finish: Plywood, lumber, or metal, with lumber dressed on at least two edges and one side.
D. Form Ties: Prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, corner-locks, and other accessories as necessary.
E. Form Release Agent: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.
F. Imprinting Tools: Mats and tools used to stamp projecting texture and patterns onto plastic concrete surfaces and which shall be specifically designed with rigid back supports to enable a clean, sharp, stamping image. Stamps for curb ramps shall be designed to meet ADA detectable warning requirements.

2.9 FIBROUS REINFORCING
A. Material shall meet ASTM C1116 and shall be as manufactured by NyCon Incorporated, or approved equal.
B. Mix fibrous reinforcement in accordance with manufacturer’s instructions including product data and technical bulletins.
   1. Add fibrous reinforcement to concrete mix at the concrete batch facility.
   2. Adding and mixing fibrous reinforcement at the job site will not be allowed.
C. Provide job mix design data to show concrete mix will attain specified strength requirements.
2.10 EXPOSED CONCRETE PROTECTIVE COATING

A. Protective Coating shall be silane-siloxane product.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

A. The subgrade of areas to be paved shall be graded and compacted as specified in Section 321100, "BASE COURSES (PAVEMENT)."

B. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade, subbase, base, or pavement, subsequent backfill and compaction shall be performed as required by the Engineer and as specified in Section 312000, "EARTH MOVING".

C. Materials shall not be stored or stockpiled on subgrade.

D. Prepared subgrade will be inspected by the Engineer. Subgrade shall be approved for installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired.

3.2 BASE COURSE

A. Base course for concrete paving shall be pavement subbase course or gravel base materials specified in Section 321100, "BASE COURSES (PAVEMENT)" as shown on the Drawings.

B. Width of base course shall extend beyond edge of the proposed pavement as shown on the Drawings.

C. Material shall be placed in lifts no more than 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.
   1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade.
   2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
   3. Surface irregularities which exceed 1/2 inch as measured by means of a 10 foot long straightedge shall be regraded and recompacted.

D. Base course shall be compacted at optimum moisture content to not less than 95 percent of maximum density as determined by ASTM D1557.

E. The base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with the base course material.

3.3 STEEL REINFORCEMENT

A. Before being placed in position, reinforcing steel shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when required.

B. Any bar showing cracks after bending shall be discarded.

C. Unless otherwise shown on the Drawings, reinforcing shall extend within 2 inches of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 inches.

D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel shall be securely wired in the required position and shall be maintained in that position until concrete is placed
and compacted. Chair bars and supports shall be installed in a number and arrangement approved by the Engineer.

3.4 FORMS
A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits.
   1. Provide Class A tolerances for concrete surfaces exposed to view.
   2. Provide Class C tolerances for other concrete surfaces.
B. Construct forms to provide for openings, offsets, sinkages, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required for the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent cement paste from leaking.
C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and other features for easy removal.
D. Chamfer exposed corners and edges, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
E. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re-tighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.5 INSTALLING EMBEDDED ITEMS
A. General: Set and build into formwork the anchorage devices and other embedded items required for work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.6 PREPARING FORM SURFACES
A. Coat contact surfaces of forms with an approved, nonresidual, low-VOC form-coating compound before placing reinforcement.

3.7 CONCRETE PLACING
A. Equipment, methods of mixing and placing, and precautions to be observed as to weather, and condition of base shall meet the requirements of ACI 316R.
B. The Engineer shall be notified of scheduled concrete placement sufficiently in advance of start of operation to allow preliminary inspection of the work, including subgrade, forms, and reinforcing steel.
C. Work shall not be performed during rainy weather or when temperature is less than 40°F. (4.4°C.).
D. Adjacent work shall be protected from stain and damage. Damaged and stained areas shall be replaced or repaired to equal their original conditions.
E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.
F. Concrete which has set or partially set, before placing shall not be used. Retempering of concrete will not be permitted.
G. Concrete shall be thoroughly vibrated, or otherwise consolidated to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

H. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 inch thick, shall be well scrubbed into the thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.8 FINISHING

A. Concrete surfaces shall be screeded and finished true to line and grade, and free of hollows and bumps. Surface shall be dense and smooth.

1. Finished concrete surface for concrete subbases shall be wood floated to a slightly rough surface. Surface shall not deviate more than 1/4 inch in 10 feet.

2. Finished concrete surfaces shall be wood floated and steel troweled, or broom finished, to a uniform surface. Surface shall not deviate more than 1/8 inch in 10 feet.

B. Horizontal surfaces of concrete surfaces which will be exposed shall be given a light broomed finish, with direction of grooves in concrete surface perpendicular to length of concrete band, slab, or pad. After concrete has set sufficiently to prevent coarse aggregate from being torn from surface, but before it has completely set, brooms shall be drawn across the surface to produce a pattern of small parallel grooves. Broomed surface shall be uniform, with no smooth, unduly rough or porous spots, or other irregularities. Coarse aggregate shall not be dislodged by brooming operation.

C. Vertical surfaces of concrete which will be exposed; refer to architectural concrete spec 033300 requirements

D. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a 1/4- inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall at same time be finished to a 1/4-inch radius.

E. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

F. Sidewalks, walkways, accessible routes, and ramps shall be constructed and finished in accordance with the Americans with Disabilities Act (ADA) and state and local requirements. Provide protective coating in accordance with manufacturer’s recommendations.

G. Exposed Aggregate Finish: Expose coarse aggregate in pavement surfaces as follows.

1. Immediately after float finishing, spray-apply chemical surface retarder to pavement according to manufacturer’s written instructions.

2. Cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.

3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon-bristle broom.

4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.

3.9 CURING

A. Concrete shall be kept continuously damp from time of placement until end of specified curing period or cured by other methods. Water shall not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations, surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed.
over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.

B. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing compound.
1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period, concrete surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.
2. Concrete cured with a curing compound shall have the compound applied at a rate of 200 square feet per gallon, in two applications perpendicular to each other.
3. Curing period shall be seven (7) days minimum.

C. Only if additional protection is absolutely required, the surface should remain uncovered after the seven (7) day period for at least four (4) days, after which time new and unwrinkled non-staining reinforced waterproof Kraft curing paper may be used.

3.10 EXPANSION JOINTS
A. Expansion joints shall be 1/2 inch wide and located to provide a maximum spacing of 50 feet between joints or where shown on the Drawings. Expansion joints shall be troweled in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full depth of the slab and full length of the expansion joint.
1. For concrete walks, pavements, and pads, depth of joint filler shall be placed to form a 1-1/4 inch deep recess for sealant and backer rod below finished concrete surface.
2. Use of multiple pieces to make up required depth and width of joint will not be permitted.

3.11 CONSTRUCTION JOINTS
A. Construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.
1. Butt joint with dowels or use a thickened edge joint if construction joints occur at control joint locations.
2. Keyed joints with tie-bars shall be used if the joint occurs at any other location.

3.12 CONTROL JOINTS
A. Control joints shall be tooled into the concrete slab, with 3-inch wide border and troweled edges, in pattern as shown on the Drawings. If no pattern is shown, then pattern shall result in square shape with a maximum area of 36 square feet. Joints shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab, but before slab has achieved its final set.

B. Scoring shall cut into slab surface at least 1 inch, but in no case not less than 25 percent of slab depth.

3.13 COLD WEATHER CONCRETING
A. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40°F. or is expected to fall to below 40°F. within 72 hours. The concrete, after placing, shall be protected by covering, heat, or both.

B. Details of handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. Procedures shall be in accordance with provisions of ACI 306R.
3.14 HOT WEATHER CONCRETING

A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. Every effort shall be made to minimize delays which will result in excessive mixing of the concrete after its arrival on-site.

B. During periods of excessively hot weather (95°F., or above), ingredients in the concrete shall be cooled with cold mixing water to maintain the temperature of the concrete at permissible levels in accordance with the provisions of ACI 305R. Any concrete with a temperature above 95°F., when ready for placement, will be rejected.

C. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. Records shall include checks on temperature of concrete when delivered to Project site and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

3.15 PROTECTION OF CONCRETE SURFACES

A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently.

END OF SECTION
SECTION 042200 - CONCRETE UNIT MASONRY

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. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
5. Embedded flashing.
6. Miscellaneous masonry accessories.
7. Masonry-cell fill.

B. Products Installed but not Furnished under This Section:

C. Related Requirements:
1. Section 071900 "Water Repellents" for water repellents applied to unit masonry assemblies.
2. Section 323223 "Segmental Retaining Walls" for dry-laid, concrete unit retaining walls.

1.3 DEFINITIONS
A. CMU(s): Concrete masonry unit(s).
B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Sustainable Design Submittals:
1. Environmental Product Declaration: For each product.

2. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer

C. Shop Drawings: For the following:
1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars.
Comply with ACI 315. Show elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

D. Samples for Initial Selection:
1. Colored mortar.
2. Weep holes/vents.

E. Samples for Verification: For each type and color of the following:
1. Exposed CMUs.
2. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS
A. Qualification Data: For testing agency.
B. Material Certificates: For each type and size of the following:
1. Masonry units.
a. Include data on material properties and material test reports substantiating compliance with requirements.
2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE
A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
1. Build sample panels for typical exterior wall in sizes approximately 48 inches (1200 mm) high by full thickness. This can be part of the total wall. To be approved by WSU prior to continuation of the wall.
2. Protect approved sample panels from the elements with weather-resistant membrane.
3. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
   a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.
C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS
A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days
C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.


PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS
A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL
A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet (6 m) vertically and horizontally of a walking surface.
C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS
A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.
B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or
leaks on the back of test specimen.

a. **Products:** Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   1) ACM Chemistries; RainBloc.
   2) BASF Construction Chemicals - Building Systems; Rheopel Plus.
   3) GCP Applied Technologies; Dry-Block.

C. Insulated CMUs: Where indicated, units shall contain rigid, specially shaped, cellular thermal insulation units complying with ASTM C 578, Type I, designed for installing in cores of masonry units.

D. CMUs: ASTM C 90.
   1. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.

E. Concrete Building Brick: ASTM C 55.
      a. Standard pattern, ground-face finish – see detail elevation
   2. Colors: Standard Gray

F. Pre-faced CMUs: Lightweight hollow concrete units complying with ASTM C 90, with manufacturer’s standard smooth resinous facing complying with ASTM C 744.
   1. **Products:** Subject to compliance with requirements

### 2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.
   1. **Products:** Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]: MATCH CMU WALL COLOR
      a. Cemex S.A.B. de C.V.; [Brikset, Type N] [Citadel, Type S] [Dixie, Type S] [Kosmortar, Type N] [Richmortar] [Victor Plastic Cement].
      b. Essroc, Italcementi Group; [Brixment] [Flamingo Color Masonry Cement] [Velvet].
      c. Holcim (US) Inc.; [Mortamix Masonry Cement] [Rainbow Mortamix Custom Buff Masonry Cement] [White Mortamix Masonry Cement].
      d. Lafarge North America Inc.; [Magnolia Masonry Cement] [Lafarge Masonry Cement] [Trinity White Masonry Cement].
      e. Lehigh Cement Company; [Lehigh Masonry Cement] [Lehigh White Masonry Cement].

E. Mortar Cement: ASTM C 1329/C 1329M.
   1. **Products:** Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. Lafarge North America Inc.; Lafarge Mortar Cement
      Retain "Mortar Pigments" Paragraph below for colored cement or for pigments added at Project site.
   2. **Products:** Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. Davis Colors; True Tone Mortar Colors.
      b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
      c. Solomon Colors, Inc.; SGS Mortar Colors.

F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
   1. **Products:** Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. ACM Chemistries; RainBloc for Mortar.
      b. BASF Construction Chemicals - Building Systems; Rheopel Mortar Admixture.
      c. GCP Applied Technologies; Dry-Block Mortar Admixture.
G. Water: Potable.

2.6 REINFORCEMENT

A. See Concrete Spec for specific requirements on rebar

B. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

D. Contractor to provide information on 9 GA horizontal ties as submittal

E. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.
   1. Stainless-Steel Wire: ASTM A 580/A 580M, [Type 304] [Type 316].
   2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
   4. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, [Type 304] [Type 316].
   5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

F. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. See plans for Tie information.
      a. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
         1) Advanced Building Products Inc.; Peel-N-Seal.
         2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
         3) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
         4) GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
         5) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
         6) Hohmann & Barnard, Inc.; Sando-Seal.
         7) Polyguard Products, Inc.; Polyguard 300 [Polyguard 400].
         8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
      b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

G. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer’s standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from [neoprene] [urethane] [or] [PVC].

B. Preformed Control-Joint Gaskets: Made from [styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805] [or] [PVC, complying with ASTM D 2287, Type PVC-65406] and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.8 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. For exterior masonry, use masonry cementmortar.
   3. For reinforced masonry, use masonry cement mortar.
   4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
   5. For masonry below grade or in contact with earth, use Type S.
For reinforced masonry, use **Type S**.

For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior
load-bearing walls; for interior nonload-bearing partitions; and for other applications where another
type is not indicated, use **Type N**.

### B. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply
with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, **for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa)**.
3. Provide grout with a slump of **8 to 11 inches (200 to 280 mm)** as measured according to ASTM C 143/C 143M.

### C. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

---

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that would impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

#### 3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and
control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS
A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in [running bond] [bond pattern indicated on Drawings]; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than [2 inches (50 mm)] [4 inches (100 mm)]. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors [48 inches (1200 mm)] <Insert spacing> o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING
A. Lay hollow CMUs as follows:
1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Wet joint surfaces thoroughly before applying mortar.
   3. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive air barriers, dampproofing or waterproofing unless otherwise indicated.

3.6 MASONRY-CELL FILL

A. Pour [loose-fill insulation] [lightweight-aggregate fill] into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet (6 m).

B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.7 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
   1. Space reinforcement not more than 16 inches (406 mm) o.c.
   2. Extending 12 inches (305 mm) beyond openings

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than [1/2 inch (13 mm)] [1 inch (25 mm)] [2 inches (50 mm)] wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry [as follows] [using one of the following methods]:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
C. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated.
      Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level [B] [C] in TMS 402/ACI 530/ASCE 5.
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for [mortar air content] [and] [compressive strength].

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at [7 days and at 28 days].

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing
surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
   3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200
SECTION 129300 - SITE FURNISHINGS

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.

PART 2 - PRODUCTS

2.1 NET SYSTEM

A. Tension batting Tunnel - Duel
   1. Tension cable Support – Aircraft cable with jaw turnbuckles
   2. Black powdered coat finish poles
   3. 8.625" x 0.322" steel pole
   4. Net provided by WSU
   5. Foundations engineered by SmithGroup in collaboration with Sportsfield Specialties

B. SportsField Specialties
   1. Terra Erickson
   2. 312-933-9680
   3. terickson@sportsfieldspecialties.com
   4. Or Approved Equal

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.
D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings 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, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION
End Cable Support: 1/4" X 7X19 Galv. Aircraft Cable

Rear Crossbar Support: 4" (3/16" Wall) Square Steel Tubing

Standard: Direct Pole Embedment, Optional: 48" Formed and Welded 11 Ga. Steel Octagonal Ground Sleeve

HSS 8.625" X 0.322" Steel Pole

13'H X 14'W Batting Tunnel Net, #36 Black Nylon 1-3/4" Square Mesh Net with Black Vinyl Enclosed Weighted 1/4" Galvanized Chain Bottom and Two (2) 4'W X 13'H Openings with Curtain Style Exterior Overlap Flaps

NET LENGTH:
BASEBALL: 75'
SOFTBALL: 55'

FOUNDATION REQUIREMENTS VARY BASED ON LOCAL CODES AND SOIL CONDITIONS

SPORTSFIELD SPECIALTIES, INC. STRONGLY RECOMMENDS THE REMOVAL OF ALL NETS PRIOR TO EXPOSURE TO WINTER WEATHER, INCLUDING SNOW AND/OR ICE STORMS. WHENEVER POSSIBLE, THE NETS SHOULD ALSO BE LOWERED PRIOR TO ANY EXTREME WIND EVENTS. REMOVAL/Lowering OF THE NETS WILL MITIGATE ANY UNFORESEEN DAMAGE TO THE POLES, NETS AND/OR ATTACHMENT HARDWARE. STORING NETS IN A DRY, PEST FREE LOCATION WILL HELP EXTEND THE LIFE OF THE NETS. SPORTSFIELD SPECIALTIES, INC. WILL NOT BE HELD LIABLE OR ASSUME RESPONSIBILITY FOR ANY DAMAGE TO THE NETS, POLES AND/OR CORRESPONDING ATTACHMENT HARDWARE IF THE NETS ARE NOT REMOVED/Lowered PRIOR TO THE ABOVE DESCRIBED WIND AND/OR WEATHER EVENTS.

TENSION BATTLING TUNNEL

Model | Sport | Type
--- | --- | ---
BTTBS | Baseball | Single
BTTBD | Baseball | Double
BTTBT | Baseball | Triple
BTTSS | Softball | Single
BTTSD | Softball | Double
BTTST | Softball | Triple

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SPORTSFIELD SPECIALTIES INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SPORTSFIELD SPECIALTIES INC. IS PROHIBITED.

Sportsfield Specialties Inc 03232020

Not To Scale
**TENSION BATTING TUNNEL**

**POLE AND GROUND SLEEVE LAYOUT**

**Note:** All measurements are center-to-center of ground sleeve/pole.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sport</th>
<th>Type</th>
<th>Net Length</th>
<th>Pole to Pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTTBS</td>
<td>BASEBALL</td>
<td>SINGLE</td>
<td>75'</td>
<td>78'-8 5/8&quot;</td>
</tr>
<tr>
<td>BTTBD</td>
<td></td>
<td>DOUBLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTBT</td>
<td></td>
<td>TRIPLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTSS</td>
<td>SOFTBALL</td>
<td>SINGLE</td>
<td>55'</td>
<td>58'-8 5/8&quot;</td>
</tr>
<tr>
<td>BTTSD</td>
<td></td>
<td>DOUBLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTST</td>
<td></td>
<td>TRIPLE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Finishing Grade**

4’-0”

GROUND SLEEVE OR DIRECT EMBEDMENT
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>YARN:</td>
<td>4400 Denier Nylon 6</td>
</tr>
<tr>
<td>PRODUCT WEIGHT:</td>
<td>35 oz / yd²</td>
</tr>
<tr>
<td>PILE HEIGHT:</td>
<td>0.34”</td>
</tr>
<tr>
<td>TUFTING GAUGE:</td>
<td>3/16”</td>
</tr>
<tr>
<td>PRIMARY BACKING:</td>
<td>3.5 oz/yd²</td>
</tr>
<tr>
<td>SECONDARY BACKING:</td>
<td>17 oz/yd²</td>
</tr>
<tr>
<td>TOTAL WEIGHT:</td>
<td>55.5 oz/yd²</td>
</tr>
</tbody>
</table>
YARN: 4400 Denier Nylon 6
PRODUCT WEIGHT: 35 oz/yd²
PILE HEIGHT: 0.34"
TUFTING GAUGE: 3/16"
PRIMARY BACKING: 3.5 oz/yd²
URETHANE PRE-COAT: 17 oz/yd²
PAD/CUSHION THICKNESS: 5 mm
PAD SCRIM / 13 PIC: 4.5 oz/yd²
TOTAL WEIGHT: 115 oz/yd² *

* Total Weight Tolerance does not account for Pad/Cushion. Pad/Cushion Tolerance (oz/yd²) is ± 15%.
SECTION 321373 – SITE JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Perform all site sealant work as indicated on drawing and as specified herein.
2. Required applications of sealants include, but are not necessarily limited to, the following general locations:
   a. Curb and paving

1.2 QUALITY ASSURANCE

A. Manufacturers: Firms with not less than five years of successful experience in production of types of sealants required for this project.

1. Obtain elastomeric sealants from a manufacturer which will, upon request, send a qualified technical representatives to the project site for purpose of advising installer on proper procedures for use of products.

B. Installer: A firm with a minimum of five years of successful experience in application of type of materials required.

1.3 SUBMITTALS

A. Product Date: Submit manufacturer’s specification, recommendations and installation and instructions for each type of sealant and associated miscellaneous material required.

B. Samples: Submit three 12-inch long samples of each color required (except black) for each type of sealant exposed to view. Install sample between two strips of material similar to or representative of typical surfaces where compound will be used, held apart to represent typical joint widths and shape.

1.4 JOB CONDITIONS

A. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer’s recommended temperature range for installation. Proceed with the work only when the weather conditions are favorable for proper cure and development of high early bond strength. Where joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in lower third of the manufacturer’s recommended installation temperature range so that sealant will not be subject to excessive elongations and bond stress at subsequent low temperatures.

1.5 SPECIAL PROJECT WARRANT

A. Sealant Warranty: Provide written warranty, signed by manufacturer and installer agreeing to, within warranty period of six years after date of substantial completion replace/repair defective materials and workmanship defined to include: instances of leakage or water or air; failures in joint adhesion, material cohesion, abrasion resistance, strain resistance, or general durability; failure to perform as required and the general appearance of deterioration in any other manner not clearly specified in manufacturer’s published project literature as an inherent characteristic of the sealant material.
PART 2 - PRODUCTS

2.1 MATERIAL

A. Expansion Joints:
   1. All expansion joints without exception shall be resin impregnated, premolded fiberboard, conforming to the physical requirements of ASTM D 1752 with a removable poly-plastic top edge that after set in position, and the paving properly cured, the poly-plastic edge can be removed to accommodate joint sealant. Size, width and length as required and shown on drawings.

B. Provide manufacturer’s standard, non-modified two or more part, polyurethane-based elastomeric sealant; comply with either ASTM C920 Grade P, Class 50; self-leveling grade/type. Color to match adjacent surface color.

C. Provide product of one of the following manufacturers:
   1. Contech/Sonneborn
   2. Mameco International
   3. W. R. Meadows, Incorporated
   4. Pecora Corporation
   5. Products Research and Chemical Corporation
   6. Sika Chemical Corporation
   7. Toch/Carboline
   8. Tremco, Incorporated
   9. Dow

D. Color: Sika limestone color, or equal.

2.2 MISCELLANEOUS MATERIALS

A. Joint Cleaner: Provide type of joint cleaning compound recommended by sealant manufacturer for joint surfaces to be cleaned.

B. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.

C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

D. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer. Provide size and shape or rod which will control joint depth for sealant placement, break bond of sealant at bottom of joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize possibility of sealant extrusion when joint is compressed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The installer must examine joint surfaces, backing, and anchorage of units forming sealant rabbet, and conditions under which sealant work is to be performed, and notify Engineer in writing of conditions detrimental to proper completion of the work and performance by sealants. Do not proceed with sealant work until unsatisfactory conditions have been corrected in a manner acceptable to installer.
3.2 JOINT SURFACE PREPARATION

A. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture, and other substances which would interfere with bond of sealant.

B. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer’s printed instructions indicated that alkalinity does not interfere with sealant bond and performance.

C. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution; rinse thoroughly with water and allow to dry before sealant installation.

D. Roughen joint surfaces in vitreous-coated and similar non-porous materials, where sealant manufacturer’s data indicate lower bond strength than for porous surfaces. Rub with fine abrasive to produce a dull sheen.

3.3 INSTALLATION

A. Comply with sealant manufacturer’s printed instructions except where more stringent requirements are shown on specified and except where manufacturer’s technical representative directs otherwise.

B. Prime or seal joint surfaces where shown or recommended by sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

C. Install sealant backer rod for liquid sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.

D. Install bond breaker tape where shown and where required by manufacturer’s recommendations to ensure that elastomeric sealants will perform properly.

E. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete “wetting” of joint bond surface equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove so that joint will not trap moisture and dirt.

F. Install sealants to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section or bead:

1. For sidewalks, pavements, and similar joints sealed with elastomeric sealant and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, and neither more than 5/8 inch deep nor less than 3/8 inch deep.

2. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but neither more than ½ inch deep, nor less than ¼ inch deep.

G. Spillage: Do not allow sealants to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces by primer/sealer.

H. Remove excess and spillage of sealants promptly as the work progresses. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes.

3.4 CURE AND PROTECTION

A. Cure sealants in compliance with manufacturer’s instructions and recommendations to obtain high early bond strength, internal cohesive strength, and surface durability. Do not cure in a manner which would significantly alter materials modules of elasticity of other characteristics.
B. Installer shall advise Engineer of procedures required for curing and protection of sealants during construction period so that they will be without deterioration or damage (other than normal wear and weathering) at time of Engineer acceptance.

END OF SECTION
SECTION 321813 - SYNTHETIC TURF

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 all materials, labor and equipment for installation of synthetic turf and base as indicated on drawings.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver manufactured materials in original packages with seals unbroken and bearing manufacturer's labels indicating brand name and directions for storing.

B. Store manufactured materials in a clean, dry location, protected from the weather and deterioration, and complying with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

C. Store units on flat surfaces.

D. Protect UV-light sensitive materials from exposure to sunlight.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply surface system materials or components over wet, frozen, or excessively damp substrates if prohibited by manufacturer's written instructions or warranty requirements.

B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system to be performed according to manufacturer's written dimensions of other construction by field measurements.

1.5 WARRANTY

A. The Contractor shall provide its Manufacturer's Warranty which guarantees the usability and playability of the synthetic turf system for its intended use. The warranty coverage shall not be prorated nor limited to the amount of the usage.

B. The warranty must have the following characteristics:

1. Must provide full coverage for eight (8) years from the date of Substantial Completion
2. Must warranty materials and workmanship.
3. Must warrant that the materials installed meet or exceed the product specifications.
4. Must have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer a serviceable as a playable surface.
5. Manufacturer’s warranty shall be supported by a third-party insurance policy for the full eight (8) year period. The insurance policy shall be pre-paid, direct with the owner, and non pro-rated. The insurance policy shall cover full labor and material replacement of the entire system including backing, fibers, infill, seams, inlays, adhesives, and nailer boards.

6. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.

1.6 SHOP DRAWINGS

A. Contractor to provide color rendered, computer designed shop drawings show turf colors, line markings and dimensions, roll lengths and seam locations.

PART 2 - PRODUCTS

2.1 SYNTHETIC TURF

A. Contractor shall provide Information and pricing from following company and product

B. Synthetic Turf Systems

a. 0.34” pile height
b. 35 oz/sq yd Product Weight
b. Total Weight 55.5 oz / sq yd
b. Shaw: Hitting Streak (or approved equal)

C. Pad

1) 35 oz / sy – Product Weight
2) 0.34” Pile Height
3) 115 oz / sq yd
4) Shaw: Strike One 5mm (or approved equal)

PART 3 - EXECUTION

3.1 GENERAL

A. The installation shall be performed in full compliance with approved shop drawings.

B. All installation operations shall be performed by personnel directly employed by the manufacturer, full familiar with the materials and their application, under the full-time direction and supervision of a qualified technical supervisor employed by the manufacturer of the synthetic turf. Installation supervisors shall have a minimum of five (5) years experience.

C. The surface to receive the synthetic turf shall be inspected and certified by the manufacturer as ready for the installation of the synthetic turf system. Contact Landscape Architect to schedule on-site meeting.

D. Adhesives for bonding knitted synthetic turf appropriately shall be as recommended by the synthetic turf manufacturer.
E. Cord for sewing seams of the turf shall be as recommended by the synthetic turf manufacturer.

3.2 BASE STONE CONSTRUCTION

A. The base stone slope gradation and direction shall match subgrade slope, unless otherwise noted.
   1. The geotextile fabric shall be installed under the stone base.
   2. The drain system shall be installed as indicated on the drawings.
   3. The base stone shall consist of open graded aggregate. The open graded aggregate material must be free draining consistent with the vertical draining requirements of the turf manufacturer.
   4. The finished grade of the base stone shall not vary more than ¼" when compared with a 50' taut string line. Any imperfections, divots, etc in the base stone will be repaired by the contractor and re-evaluated.

3.3 SYNTHETIC TURF INSTALLATION

A. The turf installer shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

B. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.

C. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the turf manufacturer. Seaming tape is to be constructed of high tenacity polyurethane coated, woven nylon. Inlaid markings shall be adhered to the seaming tape with a two-part, high strength polyurethane adhesive applied per the turf manufacturer's standard procedures for outdoor applications. All seams shall be transverse to the field direction; i.e., run perpendicularly across the field.

D. Prior to infill installation, Landscape Architect shall conduct a pre-fill inspection for the purpose of verifying striping seaming and other requirements. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment to produce a layered system of the manufacturer's standard infill products composed of a minimum 30% silica sand and maximum of 70% crumb rubber by weight. The turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a depth of 1-3/4 inches. The infill materials can only be applied when the turf fabric is bone dry.

3.4 FIELD MARKINGS

A. Field markings and decorations shall be installed in accordance with approved project shop drawings, and shall be in color as indicated on drawings.

B. All synthetic turf logos as indicated on the drawings shall be manufactured at the factory in (1) piece, with colors as noted on the drawings.

3.5 CLEAN UP

A. Contractor shall provide the labor, supplies and equipment, as necessary, for final cleaning of surfaces and installed items.

B. All usable remnants of new material shall become the property of the Wayne State University.
   1. Coordinate with WSU Project Manager, provide a minimum 10' x 10' square green attic stock.
   2. Dispose of off-site in accordance with waste management and disposal requirements.
C. The Contractor shall keep the area clean throughout the project and clear of debris.

D. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION
SECTION 329100 - SOIL PREPARATION (TOPSOIL)

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 specifies all soil materials designated as “Topsoil” on the drawings or in the specifications. Supply topsoil for landscape work seeding, sod, transplant areas, heritage rose area and planting) from both on-site and off-site sources.

1.3 REFERENCES

A. ASTM International, as referenced herein as ASTM.
B. US Department of Agriculture (USDA) Handbook No. 60 – Diagnosis and Improvement of Saline and Alkali Soils.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than 25 mm (one inch) in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 6.0 nor more than 7.0, and should be best suited to the region, climate and plant material specific to the project.

B. Obtain material from stockpiles established under Section 31 20.00, EARTH MOVING, subparagraph, Stripping Topsoil that meet the general requirements as stated above. Amend topsoil not meeting the pH range specified by the addition of pH Adjusters.

C. If sufficient topsoil is not available on the site to meet the depth as specified herein, the Contractor shall furnish additional topsoil. At least 10 days prior to topsoil delivery, notify the Owner’s Representative of the source(s) from which topsoil is to be furnished. Obtain topsoil from well drained areas. Additional topsoil shall meet the general requirements as stated above and comply with the requirements specified in Section 01 45 29, TESTING LABORATORY SERVICES and Part 1.4.E of this Section. Amend

D. See Planting Specification for planting mixtures.

E. Topsoil Sieve Chart

<table>
<thead>
<tr>
<th>Sieve Designation</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch screen</td>
<td>100</td>
</tr>
<tr>
<td>1/4 inch screen</td>
<td>97 - 100</td>
</tr>
<tr>
<td>No. 10 U.S.S. mesh sieve</td>
<td>95 - 100</td>
</tr>
<tr>
<td>No. 140 U.S.S.</td>
<td>15 – 35</td>
</tr>
</tbody>
</table>
PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Sampling: Each soil test unit shall be a composite of five to seven subsamples taken the full depth of proposed source for each acre of surface area. For on-site stockpiles, discard upper 6 inches of soil before sampling. For large stockpiles, partial excavation will be required for collection of representative samples. Include site plan verifying the locations of all topsoil sampling. Topsoil test reports shall be accompanied with each sample unit for review and approval by the Landscape Architect.

B. Testing methods and written recommendations when not references elsewhere, shall comply with USDA's Handbook No. 60. Nutrient data to be given in parts per million (ppm) dry soil.

C. Topsoil shall be as defined in ASTM D5268.

D. Soil pH shall be tested in accordance with ASTM D4972.

E. Test for organic material by using ASTM D2974.

3.2 FINE GRADING

A. Contractor shall obtain Owner Representative's written approval of previously completed rough grading work prior to commencing organic soil amendment incorporation work.

B. Immediately prior to dumping and spreading the approved organic soil amendment, the subgrade shall be cleaned of all stones greater than one inches (1") and all debris or rubbish. Such material shall be removed from the site. Prior to spreading of the organic soil amendment, subgrades which are too compact to drain water and too compact based upon compaction tests shall be ripped with a claw one foot (1’) deep, pulled by a bulldozer two feet (2’) on center, both directions. Contractor shall then regrade surface.

C. Organic soil amendment material shall be placed and uniformly spread over approved finish sub-grades to a depth sufficiently greater than the specified depth so that after natural settlement and light rolling, the specified minimum compacted depth will have been provided and the completed work will conform to the lines, grades and elevations indicated with allowance for additional topsoil spreading for turfgrass areas in determining final elevations. Incorporate organic soil amendment by disc harrowing, rototilling or other means in a uniform manner. The depth of incorporation shall be based upon the organic content of the tested and approved organic soil amendment, so as to produce a finished soil with an organic matter content of between four (4) and six percent (6%). Supply additional organic soil amendment material, after in-place testing and approval, as may be needed to give the required organic matter content and finished grades under the Contract without additional cost to the Government.

D. Disturbed areas outside the limit of work shall be spread with four inch (4") minimum depth of organic soil amendment material to the finished grade.

E. No subsoil or organic soil amendment material shall be handled in any way if it is in a wet or frozen condition.

F. Sufficient grade stakes shall be set for checking the finished grades. Stakes must be set in the bottom of swales and at the top of slopes. Connect contours and spot elevations with an even slope.

G. After organic soil amendment material has been incorporated into the subsoil, it shall be carefully prepared by scarifying or harrowing and hand raking. Remove all large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Remove all stones over one and one half inch (1-1/2") diameter from the amended soil bed. The amended soil shall also be free of smaller stones in excessive quantities as determined by the Resident Engineer.
H. The whole surface shall then be compacted with a roller or other suitable means to achieve a maximum dry density of 88 to 90 percent in accordance with compaction standards of ASTM D1557 Method D. During the compaction process, all depressions caused by settlement or rolling shall be filled with additional organic soil amendment and the surface shall be regraded and rolled until presenting a smooth and even finish corresponding to the required grades.

END OF SECTION
SECTION 3292000 - LAWNS

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. Seeding
   2. Hydroseeding
   3. Sodding
   4. Sprigging
   5. Mulching
   6. Erosion control blanket – slope stabilization
   7. Turf renovation
   8. Maintenance
   9. Warranty

B. Related Requirements:
   1. Section 311000 "Site Clearing" for stripping and using on-site topsoil.
   2. Section 312000 "Earth Moving" for mass grading of the site.
   3. Section 312500 "Soil Erosion and Sedimentation Control" for soil stabilization during construction.
   4. Section 329100 "Soil Preparation (Topsoil)" for lawns and plant mixture amendment.
   5. Section 329300 "Exterior Plantings" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.
   6. Section 334600 "Subdrainage" for below-grade drainage of landscaped areas.

1.3 REFERENCES AND REGULATORY REQUIREMENTS

A. United States Department of Agriculture (USDA), Federal Seed Act - labeling and purity standards and miscellaneous requirements.

B. State Seed Laws – where applicable.

C. Association of Official Seed Analysts (AOSA): “Rules for Testing Seed”.

D. Turfgrass Producers International (TPI): Guidelines for Turfgrass Sod.

1.4 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and mollusccides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
C. Pests: Living organisms that occur where they are not desired or that cause damage to grasses, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Pure Live Seed (PLS): \[
\frac{\text{percent germination} \times \text{percent purity}}{100} = \text{Percent PLS}
\]

E. Topsoil: Existing, on-site soil that has been modified with soil amendments and fertilizers to produce a soil mixture best for lawn growth. See Section 329110 "Soil Preparation-Topsoil" and drawing designations for topsoil.

F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before topsoil is placed.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data:

1. Erosion control blanket and anchors.
2. Fertilizers - from manufacturer.
3. Mycorrhizal inoculum.
5. Seeding and mulching equipment.
7. Lawn maintenance equipment.
9. Maintenance edge aggregate gradation analysis.

B. Source Quality Control:

1. Samples:
   a. Seed: Quart size sealable plastic bag
   b. Straw Mulch: 1 cubic foot (On-Site).

2. Test Report:
   a. Topsoil: Test reports including soil amendments and fertilization rates for each seed mix. Refer to Section 329100 Soil Preparation (Topsoil).

3. Certifications/Licenses:
   a. Certification of Grass Seed for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity (PLS), germination, weed seed, year of production, and date of packaging. Include identification of source, name and telephone number of supplier.
   b. Certification of sod from proposed sod supplier that identifies quality standard, turf species stating the botanical and common names, proportions of each species in the sod, composition of the root zone soil in which the sod has been grown, and date the sod was planted. Include identification of source, name and telephone number of supplier.
C. Field Quality Control:

1. Project Work Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a project work schedule to the Landscape Architect indicating dates for delivery, installation, and Substantial Completion for all landscape work. The Schedule shall be comprehensive and address procurement, delivery, and installations of irrigation, lawn areas of the site. For a large site, the schedule shall reflect a phased installation and shall include support graphics required to identify this phased approach. Refer to 1.10 below for a complete list of schedule requirements.

2. Maintenance Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a detailed typewritten approach and schedule for the warranty maintenance of all landscape activities outlined under 3.13 of this section. Coordinate landscape maintenance with other applicable Sections Section 329300 Exterior Plantings and combine all maintenance activities into one plan of action. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

3. Irrigation Plan: Prior to the issuance of Substantial Completion, submit a detailed typewritten approach and schedule that outlines watering requirements for maintaining the landscape as described herein. The Irrigation Plan shall be submitted in conjunction with the Maintenance Schedule. The plan shall address how the irrigation system will be operated during the warranty period, frequencies and durations that will be established to provide the correct watering rates for plants and lawns, inspection protocols and winterization procedures. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Landscape Architect and Owner's Representative. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period), and may be automated with a timer. Supply all water and equipment at the Contractor's expense from a source approved by the Owner's Representative. Reliance on natural precipitation will only be allowed with provision of recorded data from a rain gauge located within a 2-mile radius of the project site. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

4. Maintenance Report Forms: Using the approved Maintenance Schedule and Irrigation Plan as the framework for all maintenance activities (plant maintenance, and seed bed maintenance and irrigation operations). The Contractor shall provide detailed maintenance report forms for each site visit. The reports shall be completed by the on-site maintenance superintendent performing the work prior to leaving the site and shall be submitted monthly as back-up to each invoice. Office prepared reports will not be permitted and payment for this work will only be made by the Owner when proof of completed specified maintenance has been provided. Each report shall include the following:

   a. Date of activity.
   b. Length of time on site (start time and finish time).
   c. Name and signature of the maintenance superintendent.
   d. Number of personnel performing the work.
   e. Site climatic conditions (rain, wind, temperature, etc.)
   f. Detailed description of maintenance activities performed by area.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. Include list of at least three similar projects completed in the last 5 years by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

2. Provide resumes of field technician (foreman) responsible for managing the purchase and installation of all materials. Separate resumes shall be provided for the seeding, planting, irrigation and maintenance technicians.

3. License certificates for pesticide applicator.
1.8 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor shall be a company specializing in seeding, sodding, exterior landscape, installations and maintenance, having a minimum 5 years’ experience in projects of the scope and scale being specified.
2. Installer’s field technician: The installer shall provide a full-time supervisor on site when work is in progress.
3. Maintenance field technician: The maintenance activities for all turf areas shall be performed by skilled employees of the landscape installer. Subcontractors specializing in landscape and turf maintenance will not be permitted unless approved in writing by the Owner’s Representative.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding". Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Straw Mulch: Straw mulch shall be stored off the ground under a cover that provides protection from moisture and humidity.

D. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.10 SCHEDULING

A. Work Schedule:

1. Upon authorization to proceed with the work, submit a project work schedule indicating the dates of each of the following items:
   a. Submittal schedule.
   b. Delivery of materials to the site.
   c. Layout of seed bed locations on the site.
   d. Installation including; topsoil placement, fine grading, seeding and sodding.
   e. Substantial Completion of the work.
2. Update schedule monthly to reflect progress of the work.

B. Seasonal Limitations:

1. Seed mixes shall be installed during planting seasons normally recognized in the job locality.
2. Cool Season Grasses: Install during the spring and fall only when soil temperatures are between 50 and 65 degrees Fahrenheit and air temperatures is 60 to 75 degrees Fahrenheit.
   
a. Approximate spring installation: Between April 1 and May 15.
b. Approximate fall installation: Between August 15 and September 30 but no later than 60 days before the first average annual frost date.

3. Dormant seeding: Due to construction operations and schedules, if contractor cannot install seed/sod between April 1 and May 15, Contractor to seed/sod and provide irrigation to the area with Owner Representative’s Approval.

4. If special circumstances warrant installation outside the normal installation season, submit a written request to the Owner’s Representative describing conditions and stating the proposed variance. Seeding/Sodding outside the specified seasons may extend warranty obligations and will be dependent upon the extent of the variance.

5. Weather limitations: Proceed with seeding and sodding only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer’s written instructions and warranty requirements.

6. Coordination with Plantings: Plant trees, shrubs, and other plants after finish grades but prior to lawn installation unless otherwise indicated. When planting trees, shrubs, and other plants after lawn installation, protect completed areas, and promptly repair damage caused by planting operations.

1.11 WARRANTY, MAINTENANCE AND ACCEPTANCE

A. Substantial Completion:

1. The Substantial Completion inspection shall occur in Spring 2020. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion or correction.
2. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
3. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
4. Substantial Completion will be provided for all lawn areas complying with the following:
   
a. Landscape Architect approval of all specified submittals.
b. The work shall be 100% complete (including all site preparation, earthwork, topsoil, seeding, sodding, mulching, erosion control blanket, planting, irrigation and clean-up), and ready for inspection.
5. After receiving a Notice of Substantial Completion, warrant and maintain all lawn areas in a vigorous, well-kept condition until Final Acceptance.

B. Final Acceptance:

1. Approximately two weeks prior to the expiration of the warranty and maintenance period (or sooner if plantings are included in the inspection), the Owner’s Representative will conduct an inspection of all lawn areas, plantings, irrigation system and review all previously submitted maintenance report forms to verify all completed maintenance activities. There shall be thorough documentation previously submitted by the contractor and field observations made by the Owner or Landscape Architect that the specified maintenance has occurred. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
2. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
3. Final Acceptance will be based upon Owner approval and the work having:
   
a. Uniform finished grades conforming to the drawings and free of erosion.
b. All maintenance items completed and documented by Contractor through maintenance report forms.

c. Satisfactory Seeded Lawn: At end of warranty and maintenance period, a healthy, uniform well-rooted, even-colored, close stand of grass has been established, free of weeds, disease and insect problems, and surface irregularities, with 100% coverage of the specified species.

d. Satisfactory Sodded Lawn: At end of warranty and maintenance period, a healthy, well-rooted, even-colored, viable lawn, free of weeds, disease and insect problems, open joints, bare or dead areas, and surface irregularities.

4. Areas which do not meet the contract requirements shall be regraded as needed and seeded, mulched, sodded. Use specified materials and procedures to reestablish lawn that does not comply with requirements and continue maintenance at no cost to the Owner until lawn is satisfactory.

5. Final Acceptance and the end of the warranty period for the lawns will occur only after all punch list items have been satisfactorily completed and the site is left in the condition specified under Cleanup and Protection.

C. Warranty and Maintenance Period:

1. The end of the warranty and maintenance period shall be:

a. 1 year following University acceptance of the project

1) When the initial warranty and maintenance period has not elapsed before end of growing season (October 31), or if lawns are not fully established, continue maintenance during next growing season until all maintenance and warranty obligations have been met.

2. The Contractor will not be held responsible for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents beyond landscape installer's control which result from floods, hail storms, winds over 100 miles per hour, fires or vandalism, unless Contractor has not completed specified installation in a manner that could have protected the landscaping from these phenomena.

3. If, in the opinion of the Owner’s Representative it is advisable to extend the warranty and maintenance period for an additional growing season, the contractor will be notified of such requirement by the Owner. Improper execution of the installation and/or failure to perform and document the specified maintenance in accordance with contract requirement shall be the basis for extending the period of establishment for a second growing season. All specified maintenance and warranty requirements will be required during this extended period and all costs shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Other varieties that those specified may be submitted for approval to Landscape Architect, but they must be newer, more improved cultivars than what is listed.

C. Dormant seeding shall only be permitted if approved by Landscape Architect in writing. Apply seed at a rate that is 25 percent higher than the rates specified below.

D. Seed Species:
1. The University prefers to use a Sun and Partial Shade Blend. If contractor would like to suggest a different blend for the restoration around the perimeter of the synthetic turf field, please contact the Landscape Architect.

2. Quality: Seed of grass species as listed below for solar exposure, with not less than 90 percent germination, not less than 98 percent pure seed, and not more than 0.3 percent weed seed:

3. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   a. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

4. Sun and Partial Shade Blend: Proportioned by weight as follows:
   a. 60 percent Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   b. 30 percent fine fescue (Festuca), a minimum two varieties; chewing and creeping red.
   c. 10 percent perennial ryegrass (Lolium perenne).
   d. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

5. Shade Blend: Proportioned by weight as follows:
   a. 65 percent fine fescues (Festuca), a minimum of three varieties consisting of chewing, creeping red and hard.
   b. 25 percent Kentucky bluegrass (Poa pratensis), a minimum two turf type varieties.
   c. 10 percent perennial ryegrass (Lolium perenne), use shade tolerant variety.
   d. Install at a rate of 6 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

6. Shade and Sun Fescue Blend: Proportioned by weight as follows:
   a. 100% turf type tall fescue (Festuca) consisting of a minimum 3 improved varieties.
   b. All varieties shall be labeled endophyte free or contain beneficial endophytes.
   c. Install at a rate of 8 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

2.2 TURFGRASS SOD

A. Provide an approved nursery grown, Number 1 Quality/Premium sod, complying with “Specifications for Turfgrass Sod Materials” in TPI’s “Guideline Specifications to Turfgrass Sodding”. Furnish sod comprised of the specified species and of uniform density, color, and texture, strongly rooted, weed free and capable of vigorous growth and development once installed. Sod shall be 2 years old and shall have been grown at a sod nursery in a mineral-based root zone. Sod grown on peat (organic soil) will not be approved. Sod shall be free of objectionable grassy and broad leaf weeds.

B. Thickness and width of sod shall be kept to strict dimensions, with width being 24” and containing 90-degree angle cut edges. Netting associated with harvest must be removed before installation.

C. Turfgrass Sod Species: Sod of grass species as follows, with not more than 0.5 percent weed seed:

1. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
2. Sun and Partial Shade: Proportioned by weight as follows:
   a. 60 percent Kentucky bluegrass (Poa pratensis), a minimum of two improved turf type varieties.
   b. 40 percent chewing red fescue (Festuca rubra variety) a minimum of two varieties.
3. Shade: Proportioned by weight as follows:
   a. 60 percent fine fescues (Festuca), a minimum of two varieties; chewing, creeping red and
b. 40 percent Kentucky bluegrass (Poa pratensis), a minimum of two turf type varieties.

D. Turfgrass-Sod Species: Proprietary blend as follows: <insert sod product name and supplier>.

E. Sod Stakes: Sod Stakes shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer spacing and installation instructions.

2.3 STRAW MULCH

A. Straw Mulch: Provide stalks from oats, wheat, rye, barley or rice that are free of weeds, air-dry, clean, mildew- and seed-free, threshed straw of wheat, rye, oats, or barley.

1. Straw shall be in an air dry condition and suitable for placing with commercial mulch blowing equipment.

B. Tackifier

1. Hydraulically applied tackifier shall be an organic based or polymeric emulsion blend designed for use over long-fibered mulch (straw). Tackifier shall:
   a. Be powder or liquid based
   b. Achieve a drying time between 12 and 18 hours
   c. Minimum 4 month longevity after application

2. Asphalt Emulsion tackifier is not permitted.

2.4 HYDRAULIC MULCH

A. Hydraulic mulch is not permitted.

B. Hydraulic Mulch: Provide biodegradable, cellulose fiber mulch made from 100% post-consumer recycled paper, or a combination of 70% recycled wood fiber and 30% post-consumer recycled paper cellulose fiber. Mulch should be processed to contain no growth or germination-inhibiting factors, nontoxic and dyed an appropriate color to facilitate visual metering of the application of materials. On an air-dry weight basis, provide hydroseeding mulch containing not more than 12 percent moisture, plus or minus three percent at the time of manufacture, with a pH range from 3.5 to 5.0 for wood/cellulose fiber blends and from 5.0 to 9.0 for 100% cellulose fiber mulch. Provide hydraulic mulch manufactured so that:

1. After addition and agitation in slurry tanks with the fibers, tackifier and water, the material will become uniformly suspended to form an homogeneous slurry. Mixing the lawn seed, fertilizers and soil amendments is prohibited.
2. When hydraulically sprayed on the ground, the material will form a blotter-like cover.
3. The cover will allow the absorption of moisture and allow rainfall or applied water to percolate to the underlying soil.

C. Hydraulic Mulch Tackifier

1. Binding agent shall clear and non-staining and result in a stabilized fiber matrix consisting of wood and/or paper fibers and a stabilizing emulsion that includes a hydro-colloidal tackifier and polycarbonate flocculant specific to hydraulic mulch applications.
2. Use products as recommended by fiber-mulch manufacturer for slurry application.
3. Asphalt Emulsion tackifier is not permitted.
2.5 EROSION CONTROL BLANKET

A. Erosion Control Blanket - [Type 1]: Intended for use on flat surfaces or slopes 4:1 (H:V) or greater where only sheet flow will be encountered.

1. Straw/jute blanket shall be constructed with a 100% agricultural straw matrix (0.5 lbs per square yard), with jute or cotton netting on top and bottom, sewn together with biodegradable cloth thread. The blanket shall be 100% biodegradable, and have a typical functional longevity of 12 months after installation. Plastic netting will not be permitted.

B. Erosion Control Blanket - [Type 2]: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 8 feet per second (fps).

1. Straw/coconut fiber blanket shall be constructed with 70% agricultural straw (0.35 lbs per square yard), and 30% coconut (coir) fiber matrix (0.15 lbs per square yard), with 100% woven jute netting on the top and bottom, sewn together with biodegradable cloth thread. The Blanket shall be 100% biodegradable, and have a typical functional longevity of 18 months after installation. Plastic netting will not be permitted.

C. Erosion Control Blanket - Type 3: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 10 feet per second (fps).

1. Coconut fiber blanket shall be constructed with 100% coconut (coir) fiber matrix (0.50 lbs per square yard), with 100% woven coir fiber netting on top and 100% woven jute netting on the bottom, sewn together with biodegradable cloth thread. The Blanket shall be 100% biodegradable, and have a typical functional longevity of 24 months after installation. Plastic netting will not be permitted.

D. Fasteners: Fasteners shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer’s spacing and installation instructions.

2.6 EQUIPMENT

A. Tiller:

1. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 2:1 (H:V): A minimum D-7 size tractor with a mounted ripper consisting of 3 to 5 tines spaced a maximum 24 inches apart. Tines shall be equipped with 12 inch wide winged ripper points and shall be capable of penetrating subsoils up to 24 inches deep in one pass.

2. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 4:1 (H:V): A tractor mounted disk harrow consisting of 6 – 12 offset disks weighing a minimum 1,800 pounds each. The harrow shall be capable of penetrating subsoils up to 18 inches deep in one pass.

B. Fine Grading: Hand rake, tractor mounted york rake or other similar equipment.

C. Hydroseeder: Hydroteeding will not be permitted.

D. Hydroseeder: A truck-mounted, hydraulically driven variable speed agitation seeder that effectively shoots an aqueous mixture of seed, fertilizer, and mulch over broad areas through a discharge boom and hydraulic hose. Minimum tank capacity shall be 1,000 gallons.

E. Drop Spreader with Cultipacker, as manufactured by Brillion or John Deere or equivalent.

F. Broadcast Seeding: A spinning-disc type broadcaster with a calibration gauge (hand held and tractor mounted) shall be used to broadcast the seed over the designated areas.
G. Seed Imprinting Equipment: Used with spinning-disc type broadcaster to lightly cover or press seed into the soil. A tractor or all-terrain vehicle mounted dragging devise consisting of anchor chains, disk chains, cables, chain harrow or other similar equipment.

H. Straw Mulcher: A power mulcher that thrashes and separates, then evenly distributes the straw at a capacity between 2 and 20 tons per hour, with a discharge distance between 35 and 100 feet in still air.

I. Crimping Device: A mulch disc or other mechanical anchoring/crimping device for use in anchoring straw mulch into place, such as a Reinco Model MD-96 or equivalent, having flat discs with notched edges spaced 8” apart to impress mulch 1-3” down into soil.

2.7 WATER

A. Water for lawns shall be available from on-site sources.

B. Water shall be free of wastewater effluent or other hazardous chemicals

2.8 TOPSOIL

A. Refer to Section 329100

2.9 SOIL AMENDMENTS

A. Peat shall be a product having at least 95% organic content consisting of sphagnum peat moss with a pH range of 3.0 – 4.0 and Von Post decomposition value of H1 – H3, or low-lime reed-sedge peat with a pH range of 4.0 to 5.0 and Von Post decomposition value of H4 – H6. Product shall be free of sticks, wood or other debris.

B. Compost shall be a heavily decomposed mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings or other compostable materials. Manure is not suitable for use. The compost shall have a dark brown or black color, be capable of supporting plant growth without ongoing addition of fertilizers or other soil amendments and shall not have an objectionable odor. The compost shall be free of plastic, glass, metal and other physical contaminants, as well as viable weed seeds and other plant parts capable of reproducing (except airborne weed species). Composting facility shall be tested in accordance with the United States Composting Council, Seal of Testing Assurance (STA) following procedures as outlined in the Test Methods for the Examination of Composting and Compost protocols (TMECC).

1. pH: 5.5 to 8.
2. Moisture content: 35 to 55 percent by weight. No visible free water or dust is produced when handling it.
3. Sieve analysis: 100 percent passing ¾ inch screen.
4. Soluble salt content: Less than 5 percent.
5. Organic matter content: Minimum 60 percent.

C. Sand shall be clean, coarse, ungraded, meeting the requirements of ASTM C33 for fine aggregates.

D. pH Adjusters:

1. Lime shall be finely ground agricultural grade dolomitic limestone containing not less than 85% calcium and magnesium carbonates conforming to ASTM C602, Class T or O.
2. Elemental sulfur shall be granular, biodegradable, horticultural grade material containing at least 90% sulfur, with a minimum of 99% passing through No. 6 sieve and a maximum of 10% passing
through No. 40 sieve.

E. Mycorrhizal Inoculum:

1. Mycorrhizal fungi in the inoculant shall be available as propagules, i.e., spores, root fragments and hyphae. The inoculant shall contain highly selected strains of low host specificity endo- and ectomycorrhizal fungi combined with other beneficial fungi (Trichoderma), humic acids, biostimulants, beneficial bacteria, soluble sea kelp, and yucca plant extracts, as manufactured by Horticultural Alliance or approved equal. The selection of inoculants shall be based upon fungal partners that are compatible with the specified turf grasses.

2.10 FERTILIZER

A. Fertilizer shall be a complete fertilizer of neutral character, consisting of fast and slow-release nitrogen and shall be applied at the rates and formulations that release nutrients when new plants can effectively draw them from the soil.

1. The percentages of slow release and fast release nitrogen shall be adjusted based on the time of year fertilizers are being applied.
2. For fall seeding, the percentage of slow-release nitrogen shall be higher than spring seeding since a high percentage of fast-release nitrogen will be mostly lost by runoff or infiltration before plant uptake.

B. Composition: The percentages by weight shall be determined per recommendations of the soil testing reports for lawns.

2.11 PESTICIDES

A. General: Pesticide and herbicides shall be registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides and herbicides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within seeded areas at the soil level.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General:

1. The Contractor shall establish a quantifiable system to be employed in the field for measuring areas, weighing products and calibrating equipment on a daily basis to ensure all products are installed at the specified rates of application.
2. Prior to beginning work, examine and verify the acceptability of the project site and notify the Owner's Representative of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
3. Identify areas of subsoil compaction prior to placement of topsoil.
4. Verify that no foreign or deleterious material has been deposited in soil within a planting area.
5. Where lawn installation occurs in close proximity to other site improvements, provide adequate protection to all features prior to commencing work. Promptly repair any items damaged during installation operations to their original condition.

6. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

7. Suspend spoil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

8. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

9. If lawn areas die or are rejected due to non-conformity to contract requirements, they must be removed from the site immediately and replaced before Substantial Completion.

B. Utilities: Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand-excavate to minimize possibility of damage.

C. Coordination with Other Work:

1. The Contractor shall coordinate work with other contractors or trades to determine the appropriate sequence of landscape installation with respect to other work on the site.

2. Completed work installed out of construction sequence which is subsequently disturbed by the completion of work by other trades shall be repaired by the landscape installer at no cost to the Owner.

3. Maintain grade stakes and layout controls set by others until removal is mutually agreed upon by all parties concerned.

3.2 SUBGRADE PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by lawn installation operations.

B. Install erosion control measures, if necessary, to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties, natural resources and walkways.

C. Vegetation Removal: Strip and dispose of organic debris and root mat.

D. Topsoil stripping, stockpiling: Refer to Section 311000 - Site Clearing.

E. Maintain subgrade in areas to be topsoiled in a uniform condition so as to prevent future depressions. Prior to placing topsoil:

1. Till all subsoils to a minimum depth of 18-inches with approved equipment to remove all compacted subsoils. Tilling shall be complete breaking thoroughly fracturing. Perform tilling in two directions, one perpendicular to the other.

2. Upon completion of tilling, the subsoils will require light compaction and leveling to prevent ponding of water and settlement after topsoil placement. As a final operation, a light-weight tracked dozer shall be employed that will remove surface irregularities and prevent excessive settlement. During this procedure, the surface of the subsoil on slopes greater that 4:1 (H:\V) shall be imprinted with tracks from the dozer. Imprinting shall be perpendicular to the slope and shall be approximately one-inch deep.

3. Do not proceed with topsoil placement until subgrade tilling and imprinting is completed to the satisfaction of the Landscape Architect.

4. Repair disturbances to previously graded areas and remove surplus subgrade material associated with any landscape construction.

F. If the prepared subgrade is eroded or compacted by rainfall prior to topsoil placement, rework the surface as specified.

G. In locations where existing topsoil has not been removed, till entire area in accordance with paragraph E above. Do not till within dripline of existing trees.
3.3 PLACING TOPSOIL, SOIL AMENDMENTS AND FERTILIZER

A. Provide, fertilize and amend topsoil in accordance with testing laboratory recommendations specified under Section 329113 "Soil Preparation (Topsoil)".

B. Uniformly distribute topsoil on lawn areas so that after light compaction and finish grading, a uniform depth of 4-inches is achieved. Reduce elevation of planting soil to allow for thickness of sod. Placement shall include spreading, cultivating, lightly compacting, dragging and grading to the conditions specified below.

C. Topsoil, when placed, shall be dry enough so as not to puddle or bond. Do not place topsoil when the subgrade is frozen, excessively wet, extremely dry or in a condition otherwise detrimental to proper grading or lawn operation.

D. Following topsoil placement but prior to finish grading, broadcast all soil amendments and fertilizer and rototill into the topsoil. The coverage areas for soil amendments and fertilizer shall be carefully calculated by the installer and fully blended into the entire topsoil profile. Do not incorporate soil amendments and fertilizer more than 5 days in advance of seeding.

E. Mycorrhizal Inoculum:
   1. Rototill two granular pounds per 1,000 square feet of seed bed into the top four to six inches of topsoil or as recommended by supplier.

3.4 PRE-INSTALLATION PREPARATION

A. Finish Grading:
   1. Immediately before lawn installation scarify, loosen, float, and drag topsoil as necessary to bring it to the proper condition. Remove all foreign matter larger than 1” in diameter. There shall be no visible plants, roots, debris or any foreign material present prior to installation.
   2. Finished grades shall slope to drain, be free of depressions or other irregularities, lightly compacted to prevent settlement, and shall be uniform in slope between grading controls and the elevations indicated.
   3. Finished grade for seeded lawn areas shall meet existing grades at contract limits and be ½” below top of curbs, walk paving, and metal edging if used.
   4. Finished grade for sodded areas shall meet existing grades at contract limits and be 1” below top of curbs, walk paving, and metal edging if used.

B. Before lawn installation obtain Landscape Architect's acceptance of finish grading. Restore seedbed areas if eroded or otherwise disturbed after finish grading.

3.5 SEEDING AND MULCHING

A. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.

B. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean seeding, dragging, mulching, crimping and tackifier.

C. Seeding Procedures:
   1. Do not sow seed when weather conditions are unfavorable, such as during drought or high winds.
   2. Perform seeding with only approved equipment. Do not broadcast or drop seed when wind velocity exceeds 10 mph.
3. Sow the seed uniformly at a rates specified under 2.1 of this section. For dormant seeding, increase seeding rates by 25% 9 (if accepted by Owner's Representative).

4. Do not use wet seed or seed that is moldy or otherwise damaged.

5. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucers, plant beds and other seed beds.

6. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

7. Immediately following seeding, rake, drag or float all seed beds to provide a light covering of topsoil approximately 1/8 inch deep. When using equipment that lightly injects the seed into the soil, include equipment that lightly rolls the seed bed to provide good moisture contact between the seed and soil.

8. Maintain soil moisture in accordance with 3.11 below.

D. Mulching Procedures:

1. Do not use any straw that contains weeds and other plants that will contaminate the seed beds with unspecified plants. Carefully inspect each bale of straw prior to spreading and any bales observed to be contaminated with weeds shall be removed from the site on a daily basis.

2. Do not mechanically blow straw when wind speeds exceed 10 mph.

3. Remove all straw that has been deposited outside the limits of seeding and on adjacent pavement, plant beds and tree saucers.

4. Spread straw mulch evenly at the rate of approximately 2 tons dry straw per acre. Place all mulch over all seeded areas within 24 hours after seeding. A mechanical blower or hand spreading shall be used to apply mulch material, provided the machine has been specifically designed and approved for this purpose. Mulch shall be uniform in thickness and cover resulting in a blanket of straw approximately 1 ½ inches loose thickness with little to no visible soil.

5. Slopes 4:1 or steeper and drainage swales shall be stabilized with erosion control blanket in accordance with 3.12 below.

6. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with 3.12 below at no additional cost to the Owner.

E. Anchoring Mulch Procedures:

1. Anchor the mulch by using both an approved crimping device and applying tackifier on the mulched surface immediately following mulching operation.

2. Mulch shall be crimped in all seed beds where slopes are less than 4:1 (H:V) and of sufficient width to allow equipment to perform crimping without damaging the finish seed bed. Crimp all locations in two directions. When finished, straw shall be anchored one to two inches into the seed bed in rows no more than eight inches apart.

3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.

4. Any seed and mulch displaced due to improper crimping and bonding with tackifier shall be immediately replaced to the specified condition at no additional cost to the Owner.

3.6 HYDROSEEDING AND HYDROMULCHING

A. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.

B. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.

C. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean, seeding, mulching, crimping and tackifier.

D. Hydroteedding and mulching shall be installed as a two-step process.
1. Step One: Apply the seed and water slurry at the specified seed-sowing rate, with a light application of an approved hydraulic fiber mulch tracer.

2. Step Two: Apply the specified straw mulch and tackifier at specified rate, see 3.5 D and E above. Combining both steps into one will not be permitted.

E. Hydroseeding – Step One Procedures:

1. Fertilizer and soil amendments shall be applied as specified under 3.3 above and shall not be included within the step one slurry.

2. Apply seed on the previously prepared bed at the rates specified under 2.1 of this section. For dormant seeding, increase seeding rates by 25%.

3. Water used shall be obtained from fresh water source, and shall be free from injurious chemicals and other toxic substances at all times. Identify to the Owner all sources of water at least two weeks prior to use. The Owner, at his/her discretion, may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content.

4. Mixtures shall be constantly agitated from the time they are combined until they are finally applied to the seed bed. Once combined, mixtures shall be used within 8 hours.

5. Apply slurry uniformity and at the prescribed rate, avoiding misses and overlapping areas, gauging quantities of mixtures to measured application areas. Checks on the rate and uniformity of application may be made by the Landscape Architect observing the degree of wetting, or by distributing test sheets and observing the quantity of seed deposited thereon.

6. Direct application nozzle sufficiently upward so that the mixture falls to the ground in a uniform shower. Never direct spray toward the ground in a manner that produces erosion or runoff. Discontinue application during periods of high wind that affect the ability to properly apply the seed at a uniform cover.

7. Maintain soil moisture in accordance with 3.11 below.

F. Mulching – Step Two Procedures:

1. Hydromulching is not permitted. Apply straw mulch and erosion control blanket and anchor to soil as specified under 3.5 above.

2. Mulch all seeded areas with specified hydraulic mulch following the same requirements outlined under 3.6 E above.

3. Hydraulic mulch shall be applied at the following rates:

   a. 100% cellulose fibers: 2,000 lb/acre on slopes flatter than 4:1 (H:V).
   b. 70% wood fiber / 30% cellulose fiber: 2,500 lb/acre of slopes flatter than 4:1. (H:V).

4. Slopes 4:1 or steeper shall be stabilized with erosion control blanket in accordance with 3.12 below.

5. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with 3.12 below at no additional cost to the Owner.

G. Anchoring Mulch Procedures:

1. Spray hydraulic mulch tackifier concurrent with or immediately after mulching following the same requirements outlined under 3.6 E above.

2. Use only an approved tackifier applied at the rate recommended by the manufacturer.

3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.

4. Any seed and mulch displaced due to improper installation of tackifier shall be immediately replaced to the specified condition at no additional cost to the Owner.
3.7 TURF RENOVATION

A. All preparation work shall be conducted in accordance with 3.1 through 3.4 above. Following surface preparation, lawn installation shall be completed in accordance with the applicable lawn installation methods specified above. Blend newly seeded areas into adjacent existing lawns.

B. Renovate existing lawns where indicated. In areas where diseased or contaminated lawns are identified, remove existing topsoil and dispose off site.

C. Renovate lawns damaged by Contractor’s operations, such as storage of materials, haul roads or other areas outside the limits of work.

D. Renovate lawns where topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor’s operations has occurred. Remove existing topsoil and dispose off-site.

E. Mow, dethatch, core aerate, and rake existing turf where identified.

F. Maintain soil moisture in accordance with 3.11 below.

3.8 WATERING

A. Watering Procedures:

1. Immediately following lawn installation water all bed areas thoroughly and immediately with a fine mist until soil is soaked to a depth of at least 2-inches or as indicated above. Puddling of water or allowing the seedbed to dry is unacceptable.

2. For seeded areas, maintain soil in a moist condition (in hot dry weather irrigation may be required 2-4 times per day) until seeds have sprouted and reached a height of 1-inch. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering. Provide irrigation to moisten soil to a depth of 4" to encourage deeper rooting.

3. For sodded areas, begin watering the entire area within 24 hours of installation and water daily for the first two weeks; twice a day in hot dry weather. Keep soil in all areas moist but not soaked to 2-inches below the bottoms of the plants. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering until Final Acceptance. During this period, moisten soil to a minimum depth of 4" to encourage deeper rooting.

4. Watering at accelerated rates that dislodge seed and mulch materials or cause erosion shall be immediately repaired at no cost to the Owner.

3.9 EROSION CONTROL BLANKET

A. Erosion Control Blanket Procedures:

1. Install erosion control blanket as indicated in on the Plans and all seed beds with slopes 4:1 (H:V) or steeper.

2. Immediately following seeding, erosion control blanket shall be rolled out in place in the direction of the slope fall line. The material shall be applied without stretching and shall lie smoothly but loosely on the soil surface. Installers shall minimize walking directly on the seed or topsoil bed either before or after the blanket is applied.

3. All ends shall be buried a minimum of 4 inches deep and the trench shall be firmly tamped after closing.

4. In cases where roll ends join, the up-slope piece shall overlap the down-slope piece by at least 18 inches.

5. Anchor edges prior to backfilling trench, all overlaps at 12-inch intervals, and the center of each panel on 3-foot intervals.

6. The upslope ends of the blanket shall be buried a minimum of 6 inches deep and anchored at 12-inch intervals prior to backfilling trench.
7. Reseed all disturbed edges immediately following straw blanket installation and work seed into blanket.

3.10 MAINTENANCE

A. General: Maintain and establish lawn areas by watering, fertilizing, pest and weed control, litter removal, mowing, trimming, repairs, and performing other operations as required to establish healthy, viable lawn. Maintenance shall also include grade repair, seeding, sodding all associated soil amendments and fertilizers.

B. Provide all maintenance under the supervision of a skilled employee of the lawn installer. The skilled maintenance supervisor shall be: capable of operating the automatic irrigation system controller, conducting turf diagnostics to identify the presence of disease, insect and fertility problems, and directing a maintenance crew in the performance of horticultural maintenance practices identified below. Maintenance requirements identified below shall be the basis for information to be included in the Maintenance Schedule and Irrigation Plan identified under 1.5.C of this section and thoroughly documented under the required Maintenance Report Forms to verify the work has been properly performed.

1. Failure to perform and submit factual Maintenance Report Forms could result in non-payment for said services and require the extension of the warranty and maintenance period an additional year at the Contractor’s expense.

C. Provide all equipment, materials, labor and services to maintain the landscape beginning immediately after each area is installed and continuing until Final Acceptance and the end of the warranty period. During this period, perform the following:

1. Inspect the entire landscape at least once per week during the growing season and perform needed maintenance promptly.
2. Prior to each mowing, collect all debris, litter and miscellaneous materials accumulating on the site and remove from the site.
3. Irrigation: Irrigate all turf areas to maintain optimum moisture within the root zone as specified under 3.11 above. When using an automatic sprinkler system, the lawn installer responsible for maintenance shall bear full responsibility to set each zone to the correct frequency and duration.
4. Mow all lawns weekly during the growing season and as described below. Mowing frequencies shall be adjusted based on cutting requirements and may require more frequent visits during high growth periods. Use mulching mower only with sharpened blades and alternate direction of each mowing session to prevent rutting.
5. Fertilize as described below.
6. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Apply herbicides and pesticides as described below.
7. Remove leaves bi-weekly during the fall as they accumulate on the lawns. Bag and dispose off-site. Do not mow in advance of leaf removal.
8. Repair bare, eroded or settled areas and restore to provide a uniformly smooth lawn with the specified grasses. Provide same materials and installation procedures as those used in the original installation.
9. Reclaim/replace soil materials and turf damaged or lost in areas of subsidence. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth lawn.
10. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

D. Mowings: Mow turf as soon as top growth is tall enough to cut. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. At the time of each mowing, adjust mowing equipment to meet this requirement. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass, fescue to a height of 2-1/2 to 3-inches.
2. For sodded lawns wait at least 2 weeks after installation for first mowing.
3. Mowing heights may increase during the hot summer months based on regional conditions.
4. Collect all grass clippings if mowings are not sufficiently timed to allow for composting into the existing lawn and accumulations of clippings can be observed on the surface of the grass. Collection and off-site disposal shall be performed at no additional cost to the Owner.

3.11 POST-INSTALLATION FERTILIZATION
A. Apply fertilizers at the time of season, rate of application and grade of N-P-K that maximizes the health of the lawn and minimizes the potential run-off of fertilizers to adjacent waterways and groundwater. Avoid the use of phosphorus unless site soils are deficient of this nutrient.
B. During the warranty and maintenance period, fertilize warm season grasses three times and cool season grasses two times during the growing season.
C. Test site topsoil in early-spring and base actual rates on testing recommendations.
D. Apply fertilizer during the following dates;
   1. Spring (April / May): Cool season grasses: After the second spring mowing apply fertilizer at a rate of 1 lb. actual nitrogen per 1,000 square feet of lawn. Nitrogen shall be 70% slow-release. Avoid the use of phosphorous and apply at 4-0-1 ratio of N-P-K.
   2. Fall (September/October): Warm and cool season grasses: 8 weeks following application of spring apply fertilizer at a rate of 1.5 lbs. actual nitrogen per 1,000 square feet of lawn. Nitrogen shall be water soluble, quick release. Avoid the use of phosphorous and apply at 3-0-1 ratio of N-P-K.

3.12 PESTICIDE APPLICATION
A. Apply pesticides, and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 CLEANUP AND PROTECTION
A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
D. Protect newly seeded areas from stormwater flows discharging from paved surfaces until grass establishment. Additional water diversion and erosion control measures such as wattles and check dams may be utilized at Contractor's discretion and expense.
E. Remove nondegradable erosion-control measures after grass establishment period.
END OF SECTION
1.2 SUBMITTAL OF SHOP DRAWINGS

A. The Contractor shall submit the requisite shop drawings and catalog documents for any material or equipment proposed to be utilized in the performance of the Work to the Owner's Construction Engineering Inspection Consultant, which shall distribute the Submittals to the Landscape Architect/Civil Engineer with a copy to the Owner. The Contractor shall transmit said submittals to the Landscape Architect/Civil Engineer in a form and manner that would allow the Landscape Architect/Civil Engineer to review the submittals in an efficient and timely manner. The Design Engineer will review each submittal for compliance with the Contract Documents. If a submittal is found to be non-compliant, then the submittal will be returned to the Contractor to be corrected. Finally, after the Landscape Architect/Civil Engineer have reviewed and approved the submittals, the Contractor shall distribute the final submittal copies to the Owner as part of the close out documents.

1.3 AS-BUILT RECORDS

A. A set of Construction Documents shall be marked as As-Built Drawings and be maintained at the Project site by the Contractor for the purposes of making all changes, revisions, relocations, reroutes, or variances in the Work that differ from the Construction Documents. The As-Built Drawings shall be made accessible to all of the Contractor's subcontractors for recording any changes, field sketches, revisions, relocations, reroutes, or variances in the Work. The completed set of As-Built Drawings shall be transmitted to the Owner upon completion of the Work provided in a timely manner and in AutoCADD 2010 version or later, to the County. Field sketches and installation records, other than shop, fabrication, or field installation drawings, shall not be submitted separately but shall be recorded on the As-Built Drawing set only.

1.4 PROJECT MEETINGS

A. The Contractor shall arrange and conduct scheduled progress meetings determined by the Owner's Representative and prepare and distribute meeting minutes. Special meetings for the purposes of coordinating and monitoring the work progress, identifying problems, informing subcontractor and Project participants of project status, stressing safety, coordinating construction details and inspecting quality conformance shall be conducted as required to assure the smooth and uninterrupted progression of the Work.

1.5 FIELD OFFICE BUILDINGS, SHEDS, AND TEMPORARY STORAGE AREAS

A. The Contractor shall provide all temporary field offices and storage area enclosures to conduct the Work and properly administrate the Work. The Contractor may locate field offices and storage areas on site at Contractor's discretion, and subject to Owner Representative's location approval, but Contractor will have full responsibility to maintain access to the Work and the work of the Owner. Any relocation of the Contractor's temporary facilities required to provide access for installation of utilities or the Owner shall be done to maintain the schedule at no cost to the County. The appearance of field offices is subject to the reasonable approval of the County.

1.6 TEMPORARY PROJECT SIGN

A. The Contractor, may at its own expense design, fabricate and construct one (1) Project Identification Sign for the purpose of advertising the Project. Contractor to coordinate with Landscape Architect/Civil Engineer for rendered graphics of proposed site. The sign shall be constructed of exterior grade wood, with weather resistant graphics and hardware and shall be a maximum of 16 square feet. The design and content of the sign shall be subject to the approval of the County.
1.7 CONSTRUCTION SEQUENCING AND NOTIFICATION PLAN

A. The Contractor must submit to the Owner’s Representative, Landscape Architect and Owner a detailed plan, which shall delineate the sequence of the various construction activities that will occur on the Project Site, all road closure requirements (including closure time duration on a per block basis) and proposed measures to maintain reasonable and safe access for the stakeholders and business owners which may be affected by construction activities. The Construction Sequence and Lane closure plan shall be provided to the Owner’s representative at the time of the Contractor's first proposed Schedule submittal to the County, due within 7 days of the County providing the Contractor with a Notice to Proceed. The County at its sole discretion will determine the reasonableness of the Contractor’s plan to provide and maintain pedestrian and vehicular access. The Plan has to be approved by the Owner’s Representative, Landscape Architect and Owner before the Contractor will be allowed to commence work on the Project Site. Owner’s Representative to provide dates and limitations to site for Fairground events during the time of construction.

B. The Contractor shall designate only one (1) individual who will be assigned to the work throughout its entirety to be responsible for all communications with the stakeholders in the project area. The Contractor shall notify the stakeholders in writing at least thirty (30) days prior to the anticipated start of construction activities and again not less than seven (7) days prior to the actual start of construction activities. The Contractor may be required to fabricate and post signage in various locations on the project site advising the stakeholders in the project area of the forthcoming construction activity.

1.8 CONSTRUCTION PARKING

A. The Contractor shall be responsible for its employees’ and subcontractors’ vehicles while parked on or off the construction site. Any vehicle found to be owned by the Contractor’s employee or an employee of the Contractor's subcontractor parked illegally may be towed away by the County and charged to the Contractor by Change Order. The County reserves the right to deny parking privileges on the Project site to any individual who parks a vehicle improperly or operates any vehicle in an unsafe manner.

1.9 WATER SERVICE

A. If required for construction purposes, the Contractor will arrange for, or otherwise furnish, and pay for water required for the Work. The Contractor shall be responsible to provide and maintain connections, backwater valves, valves, and pipe that may be required to supply water at a point convenient to the work area. The locations of the connections shall be acceptable to Water Department.

1.10 TEMPORARY POWER, LIGHTING AND PHONE SERVICE

The Contractor will furnish and pay for electrical power and telephone service necessary for the Work including labor, equipment and materials required to make connections to power sources and to provide and pay for any required temporary electrical power and light at location of work. Temporary equipment and wiring for power, lighting and distribution requirements shall be in accordance with applicable provisions of governing laws, codes and ordinances. The Contractor shall maintain temporary wiring and related equipment so as not to constitute a hazard to persons or property. County may possibly provide electric to site. Temporary electrical power may be needed for portion of work.

1.11 TOILET FACILITIES

A. The Contractor shall arrange for, provide (per OSHA guidelines) and maintain temporary on-site sanitary toilet facilities for use by the Contractor and County for the duration of the Work.
1.12 WEATHER PROTECTION

A. The Contractor shall provide weather protection, including pumping water and temporary heat and ventilation as required during construction to protect the Work from damage due from freezing, frost, rain, dampness, excessive heat or other adverse elements and as required to maintain the continuous progression of the Work without stoppage due to the weather. This shall include hot and cold weather concrete placement protections recommended by the American Concrete Institute.

1.13 EXISTING SITE CONDITIONS

A. The information in this Bid Package is intended to orient the Contractor to the site. The Contractor will be responsible to thoroughly evaluate the site conditions for construction requirements. It is the responsibility of the Contractor in conjunction with the utility companies to verify the exact types and locations of existing utilities. All damage to existing utilities, caused by the Contractor, shall be repaired at Contractor’s expense, in accordance with the standards of the applicable City department or private utility company.

1.14 UTILITY SHUT-OFF REQUIREMENTS

A. The Contractor shall coordinate all utility shut-offs with the Utility Companies and departments to permit the proper and safe performance of the Work as scheduled. The Contractor shall have the full responsibility for contacting MISSDIG at least 72-hours prior to any subsurface excavation.

1.15 FIRE HYDRANT RELOCATION

A. Contractor to coordinate with University Project Management, Fire Marshal and any other required University or City Department to relocate any fire hydrant. The Fire hydrant to be relocated shall move directly east, using the same water line. Relocation of the hydrant requires all University standard equipment that meets all necessary life safety codes. Adjacent structures and Athletic Facilities along pedestrian corridor do not have sprinklers. Fire hydrant relocation shall be coordinated to have the water service shut off for a minimum period of time. Max 1 day. Contractor to coordinate.

1.16 PROTECTION

A. The Contractor shall provide site protection, traffic controls and barricades as required to secure the site from trespassers and the general public. The Contractor shall install, in conformance to the requirements of the governing road/street authority, traffic controls for all work performed in the rights-of-way including curb cuts and utility taps.

1.17 REPLACEMENT OF DAMAGED WORK

A. The Contractor shall be responsible to pay all costs for the timely (within schedule parameters) replacement or restoration of any portion of the Facility damaged by fire or other cause during construction to the extent that such damage is a result of the negligence or a faulty installation made by the Contractor or its subcontractors.
1.18  EMERGENCIES

A. In any emergency affecting the safety of persons or property, the Contractor shall act at its discretion to prevent threatened damage, injury or loss, provided that the Contractor shall have determined that there is not sufficient time to advise and consult with the County prior to taking such action.

1.19  FIRE HAZARDS

A. The Contractor shall take all necessary precautions to eliminate possible fire hazards and to prevent damage to construction work, equipment, temporary field offices, storage sheds, and other property. During construction, the Contractor shall provide fire extinguishers and fire hose in accordance with the appropriate OSHA and construction industry rules and regulations.

1.20  FLAMMABLE HAZARDS

A. Gasoline, benzene, other combustible materials, oils, solvents, or chemicals shall not be poured into sewers, manholes, or traps. All casual spills shall be immediately cleaned up and all contaminated soil removed from the site and legally disposed. Tarpaulins and other materials used for temporary enclosures, coverings and protection shall be flameproofed. The Contractor shall comply with County, State and Federal regulations with respect to barrels and tanks containing flammable or hazardous materials, and shall remove any such materials immediately at the request of the County.

1.21  EXPLOSIVE CHARGES

A. Any fastening device, powder activated stud gun or any other device or system of any kind using an explosive charge for activation may not be used in performing work at the Project site unless it is specifically approved by OSHA or the County Health Department. It shall be the responsibility of the Contractor to secure all permits and permissions without extra cost to the County and to assure the safe use of any such devices by trained individuals.

1.22  FIRST AID

A. A completely equipped first-aid kit shall be provided and maintained by the Contractor at the site in a clean orderly condition and shall be readily accessible at all times to all the Contractor's employees. The Contractor shall designate certain employees who are properly instructed to be in charge of first aid. At least one such employee shall be available at the site whenever work is being carried on.

1.23  HOURS OF WORK

A. The Contractor shall conduct the work during normal working hours in cooperation with the existing property owners and occupants. At the beginning of work on this Contract, the Contractor shall notify the County, in writing, the schedule of the days and work hours proposed for a normal workweek. The Contractor shall be responsible for contacting in advance all involved parties whenever the Contractor intends to depart from the normal workweek schedule and resolve to the satisfaction of the County any reasonable objections made. All costs incurred, due to the failure of the Contractor to properly notify involved parties, shall be paid by the Contractor or deducted from the Contractor's contract amount.

B. The Contractor shall plan and conduct the Work so as not to create a public nuisance or disturb the peace specifically for any residents near or adjacent to the Project site. Should the Contractor be stopped by order of a public authority from working at such times that are contrary to or in violation of any law, ordinance, permit, or license, the Contractor shall not be entitled to an extension of time or additional compensation due to such stoppage.

C. In an emergency, requiring work to be performed outside the normal work week schedule to save or protect life or property, the requirements for the twenty-four (24) hour notification will be waived. The Contractor shall notify the County as soon as the Contractor determines that an emergency condition exists necessitating the change in or extension of the normal hours of work. However, the Contractor's determination of the existence of the emergency is subject to the review and revision by the County.
D. The normal workweek schedule and/or daily hours of work may be altered as directed by the County, when, in its reasonable judgment, such alteration is necessary to maintain the required progress of the Work.

1.24 SANITARY REQUIREMENT

A. Committing unnecessary acts of nuisance on the Project site is prohibited. Any employee who violates such provisions shall be promptly removed from the Project by the Contractor and not be permitted to work on the project site without the written consent of the County.

1.25 CLEANLINESS OF PROJECT SITE AND STREET

A. The Work and all public or private property used in connection with the Work shall be kept in a neat, clean and orderly condition at all times. Stored materials shall be safely stacked and ordered. Waste materials, rubbish and debris shall removed daily and shall not be allowed to accumulate. No burning of rubbish is permitted.

B. The Contractor shall remove unused construction equipment, temporary buildings and excess materials from the site upon the reasonable request of the EDC. The site shall not be permitted to become a storage yard for the Contractor's equipment and materials not directly involve in the Work. Any stored equipment or unnecessary materials stockpiled shall be removed from the Project site upon the request of the County.

C. During the performance of the Work, the Contractor shall daily inspect and maintain the Project site in a clean condition including control of dust, picking up scattered construction debris, and removal of splattered materials from the surfaces of the new construction. Should the Contractor fail to maintain proper cleanliness or order of the site the County, upon 48 hour notice to the Contractor, shall arrange for the cleaning and removal of extraneous materials accumulated at the site and shall have the right to deduct the costs incurred from the Contract value.

D. Trucks hauling loose material from or to the project site shall be tight and their loads trimmed and tarped to prevent spillage on the public streets. This requirement likewise applies to suppliers making deliveries to the Project site. The Contractor will be held responsible to require compliance by the Contractor's suppliers. The County shall have the right to deny site access to any subcontractor or supplier who refuses to comply with this requirement. The Contractor shall promptly (daily as a minimum) clean streets, sidewalks and alleys dirtied by any cause arising from the Contractor's operations. Should the Contractor fail to maintain proper street cleanliness, the County, upon notice to the Contractor will clean any such public right of ways and shall have the right to deduct the costs incurred from the Contract value.

1.26 DEWATERING

A. The Contractor shall dewater and keep dry all trenches and other excavated areas at the site by evenly grading the surface drainage to eliminate standing water. The Contractor shall be responsible to protect structural bearing subgrades and materials from ponding, standing water or erosion. Dewatering operations shall not be permitted to discharge water to any other private properties. The Contractor shall be responsible for securing Water Department permission prior to discharging any water from the site into public sewers.

1.27 SECURITY

A. The Contractor shall secure and protect from theft, loss or damage all materials and equipment used for or relating to the Work until final completion and acceptance by the County.

1.28 WORKING AREA

A. All the Work under this Contract shall be performed on the Project site. The Contractor shall access the Project site via City streets and rights-of-way. The Contractor shall review the legal loading limit for the access streets and rights-of-way and shall be responsible for coordinating deliveries and shipments that do not exceed the legal load limits.
B. The Contractor shall use Flagmen whenever trucks or equipment enter public roadways from the project site.

C. Should additional working or storage space be desired, the Contractor shall make all arrangements with any property owner and submit to the County written evidence that the Contractor has secured permission to use this property for construction purposes. The Contractor shall pay all expense in connection with its use, and in no way involves or obligates the County by such use.

1.29 SPECIAL SYSTEM INSPECTIONS

A. The Contractor, as part of the Work, shall coordinate all specialty manufacturer inspections and testing required to certify that the installation of the Work meets the manufacturer’s conditions for warranty.

1.30 TIME OF STARTING AND COMPLETION OF WORK

A. The Contractor shall carry on the construction operations continuously without stoppage so that all items of work are totally complete including punchlist in accordance with the agreed upon completion date. This shall not relieve the Contractor from the responsibility to coordinate the Work with County, and to sequence the Work including interrupting the Work as required by the County.

1.31 TESTING & INSPECTION

A. The University’s separately contracted Construction Engineering & Inspection Consultant shall arrange and pay for all testing and inspection required to verify conformance of the Work with the Contract Documents. All testing and inspection shall be coordinated with the University.

1.32 SOIL EROSION AND SEDIMENT CONTROL

A. The Contractor shall install and maintain, for the duration of the Project, soil erosion protection measures as required by Wayne County. The Contractor shall provide other temporary soil erosion control as required to eliminate sedimentation from entering sewers and open ditches due to the Contractor’s operations. The Contractor shall remove completely all soil erosion control measures from the site at the end of the Project.

B. The Contractor will promptly remove soil, debris, or other materials spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares by the Contractor’s equipment and operations.

C. The Contractor shall abide by the requirements of the “Authorized Public Agency” under the provisions of Section 11 of Act 347 of the Public Acts of 1972, “Soil Erosion and Sedimentation Control Act” as modified or superseded.

D. Current Soil Erosion and Sediment Control Plans included in set are approved by the Health Department.

1.33 DISCLAIMER OF SITE INFORMATION

A. By its own examinations, observations, investigations and tests the Contractor shall make its own determination of the existing site conditions. Information contained in this Bid Package is provided solely for the informational use of the Contractor. The County does not guarantee the accuracy or sufficiency of any site information.

1.34 UNIT PRICES

A. Unit prices, if established during the Project, shall include all permits, fees, labor, material, tools, supervision, equipment, taxes, insurance and bonding necessary for or incidental to the proper completion of the Work.
1.35 TRUCK TICKETS

A. Any excavated materials removed from the site shall be controlled for assurance of legal dumping by (3) part "Truck Tickets" for each load of material removed from the site. The Contractor shall note on each truck ticket the bid package number, date, location of excavation, trucking firms, quantity of material and time of departure for each outgoing truck. The Contractor shall record the disposal site and time of disposal on the "Truck Ticket" and shall obtain the signature of the recipient of the material in verification thereof and return the completed "Truck Ticket" to the County.

1.36 ENVIRONMENTAL COORDINATION

A. Owner shall make available to the Contractor any environmental reports or information in the Owner’s possession as reference information to assist in the Contractor’s required production of the Health and Safety Plan, as expressed in paragraph 1.3 of Section VII of the Bid Documents. Unless otherwise noted in the plans and specifications the Contractor shall assume that all excavated material in the right of way is contaminated and shall be taken to a licensed Class II landfill. If the Contractor encounters potential hazardous materials, the Contractor shall notify the EDC for inspection of the condition before proceeding with any Work in that area. The contractor shall continue with the orderly progression of work in non impacted areas. Subject to the nature of the hazardous material encountered and the Contractors qualifications, the EDC reserves the right to require the Contractor to perform any removal/remediation work for hazardous materials on a time and material basis, or negotiated basis according to the provisions of the Contract Documents.

1.37 PROTECTION OF THE PRIVATE AND EXISTING UTILITIES

A. The Contractor shall protect and maintain for the duration of the work all existing improvements and utilities that are to remain. The Contractor will immediately undertake and pay for the repair of any damaged existing improvements or utilities.

B. All unattended excavations, voids, pits, manholes or holes shall be barricaded immediately by the Contractor. Barriers shall be removed promptly by the Contractor when no longer required,

C. Precautions against fire, accidental explosion, excessive dust and accident shall be strictly enforced by the Contractor in cooperation with the County and the EDC.

D. The Contractor shall not allow salvaged material, debris, and trash to accumulate on the project site but shall require all such material to be hauled away on a regular, daily basis.

1.38 PROTECTION OUTSIDE THE PROJECT AREA

A. All existing areas outside the limits of the Work shall be protected from damage. All damage caused by the Contractor shall be corrected at the expense of the Contractor and to abide by City or County Standards.

B. During progress of work, the Contractor shall keep adjacent roads free of trash, debris, and salvage material resulting from the work.

C. The Contractor is advised that other construction activities may be performed by others within the Project area during this the performance of the Work under this Contract Agreement. The Contractor shall plan proposed trucking and all other vehicular routes accordingly in coordination with and at the reasonable direction of the County.

D. All construction traffic control signage and barricading shall conform to the standard requirements of the governmental body having jurisdiction over the street right of way.
1.39 TEMPORARY CONTROLS

A. Surface Water Control – The Contractor shall complete the work in such a manner so as not to entrap surface water on the site. Low areas caused by removals, shall be graded in such a manner to allow drainage to existing storm water structures. The Contractor shall be responsible for drying out and repairing any grade surfaces damaged due to the Contractor's failure to properly grade the work area.

B. The Contractor shall secure and pay for all erosion control permits and conduct earth changes in a manner, which will effectively eliminate accelerated soil erosion and resulting sedimentation. Measures to be taken shall include but not be limited to:

C. Provide temporary soil erosion control to eliminate sedimentation from entering sewers and open ditches.

D. Remove sediment caused by accelerated soil erosion from runoff water before it leaves the site.

E. Maintain temporary soil erosion silt fences, sediment traps and control measures for the term of this contract.

F. Promptly remove soil, debris, or other material spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares during transit.

G. The Contractor shall utilize applicable soil erosion details, shown on Contract drawings, in implementing his work.

H. The Contractor shall utilize water trucks and other dust inhibiting methods to control fugitive dust emanating from the work activity performed under this scope of work. Truck and equipment wheels shall be cleaned before exiting the project area. Travel routes shall be established with the prior approval of the County to reduce dust in adjacent areas. Existing roads shall be used wherever practical based on street loading capacity.

1.40 SUSPECTED HAZARDOUS MATERIALS

A. In the event the Contractor encounters excavated materials that are suspected as hazardous, the Contractor shall notify the County for review, and through County’s Environmental Consultant the possible characterization and management of the suspect material. If it is determined that the suspect material is hazardous by the County’s environmental Consultant, the Consultant will provide a material handling protocol for the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONTRACTOR USE OF PREMISES

A. Confine operations at site to areas permitted by:

1. Law
2. Permits
3. Contract
4. Owner's Representative
5. Required use of adjacent existing buildings
6. Contract documents
B. Confer with Owner's Representative and obtain full knowledge of all site rules and regulations affecting work.

C. Conform to site rules and regulations while engaged in project construction.

D. Site rules and regulations take precedence over others that may exist outside such jurisdiction.

E. Employees On Site: The Owner's Representative may examine Contractor's list of employees, including those of his subcontractors and their agents for all employees working on site.

F. Vehicle use: Rigidly enforce the following:
   1. Keep all vehicles, mechanized or motorized equipment locked at all times when parked and unattended on Owner's premises.
   2. Do not, under any circumstance, leave any vehicle unattended with motor or engine running, or with ignition key in place.
   3. All traffic control subject to Owner's Representative approval.
   4. Contractor employee parking shall be limited to areas indicated by Owner's Representative.
   5. Contractor shall not park any vehicles within the dripline of trees.

G. Do not unreasonably encumber site with materials or equipment.

H. Assume full responsibility for protection safety and safekeeping of products stored on premises.

I. Move all stored products or equipment, which interferes with operations of Owner or other subcontractors.

J. Obtain and pay for use of additional storage or work area needed for operations.

K. Limit use of site for work and storage:
   1. To areas indicated on the drawings.
   2. To areas approved in advance by Owner's Representative.

L. The Contractor acknowledges that the Owner will use the adjacent sites and the Contractor must maintain staff and appropriate safety requirements. Contractor to work with Owner's Representative to coordinate with scheduled events. Owner's Representative to provide schedule.

3.2 DUTIES OF CONTRACTOR

A. Except as specifically noted, provide and pay for:
   1. Labor, materials and equipment.
   2. Tools, construction equipment and machinery.
   4. Other facilities and services necessary for proper execution and completion of work.

B. Secure and pay for as necessary for proper execution and completion of work, and as applicable at time of receipt of bids.
   1. Licenses.

C. Give required notices.

D. Promptly submit written notice to Professional Services Consultant of known or observed variances of Contract Documents from legal requirements.
   1. Appropriate modifications to Contract Documents will adjust necessary changes.
2. Assume responsibility for Work known to be contrary to such requirements.

E. Enforce strict discipline and good order among employees. Do not employ on Work:
   1. Unfit persons.
   2. Persons not skilled in assigned task.

F. Purchase and maintain insurance in accordance with the Contract Agreement.

G. Contractor shall protect existing site from damage. Contractor shall clean areas of construction debris, equipment, and material prior to Date of Completion for such area.

3.3 PERMITS
A. See Section 003143 PERMIT APPLICATION

3.4 TIME OF COMPLETION
A. Completion of work shall be in accordance with the schedule as indicated in the Bid Form.

3.5 JOB OPERATIONS
A. Project Security:
   1. Take necessary precautions such as barrier to protect Owner's personnel, the public, in the area of construction.
   2. Securely close off all areas of construction after working hours to prevent entry by unauthorized persons.
   3. Provide barriers to prevent visitors from construction area.

3.6 WORK LIMITATIONS:
A. Owner's personnel may occupy all spaces around where work will be done. Any work done during times of occupancy shall be limited in scope to prevent disturbing it.

B. Give Owner's representative three days notice before starting Construction Work in any area.

C. All work, including material storage, shall be limited to the project area.

3.7 PHOTOGRAPHY
A. Starting on the 01st of the month following Notice to Proceed, and on the 01st of each subsequent month up to and the 01st of the month following the Substantial Completion Date eight color photographs are to be taken of the Site. One image from each following direction facing the improvements of the site: N, S, E, W, NE, NW, SE, SW. Pictures are to include the date taken on the photograph.

B. By the 15th of each month delivery two sets of 8 x10 color prints of all photographs taken that month; one set to the Landscape Architect and one set to the Owner's Representative. Also deliver digital/electronic copies of the photographs to the Landscape Architect and Owner.
C. All rights, privileges, copyrights, ownership, etc to the pictures shall be transferred to the Architect and Owner so they each may use the images / photographs at their discretion now and in the future. A written release stating such is to be provided each month with each set of photographs.

D. Receipt of the photographs on the 15th of each month is prerequisite to the processing of that month's pay request.

3.8 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.

END OF SECTION
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 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "As Otherwise Direct": Used in relation to items to be determined after Contract by agreement between Owner, Architect, and Contractor, with input from other entities as appropriate.

D. "Certified": Guaranteed in writing over the signature of an authorized representative of the certifying organization.

E. "Directed": An instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

F. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

G. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

H. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

I. "Install": Operations including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations at Project site.

J. "N.I.C" or "NIC": Not in Contract.

K. "Necessary": That which is reasonably necessary to the proper completion of the Work.

L. "Per": In accordance with the requirements of.

M. "Products": Materials, equipment, or systems.

N. "Provide": Furnish and install, complete and ready for the intended use.

O. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
P. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

Q. "Replace": To put something new in place of.

R. "Required": Referring to requirements of the Contract Documents, unless its use clearly implies a different interpretation.

S. "Shown" or "Indicated": Appearing on the Drawings, unless their use clearly implies a different interpretation.

T. "Supply": Same as Furnish.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
REFERENCES

16. AIA - American Institute of Architects (The); www.aia.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
38. BIA - Brick Industry Association (The); www.gobrick.com.
40. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
41. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
42. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwf.org.
43. CDA - Copper Development Association; www.copper.org.
44. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/
45. CEA - Canadian Electricity Association; www.electricity.ca.
46. CEA - Consumer Electronics Association; www.ce.org.
47. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
48. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
50. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
53. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
56. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
58. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
59. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
60. CWC - Composite Wood Council; (See CPA).
62. DHI - Door and Hardware Institute; www.dhi.org.
REFERENCES

72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. EIA - Electronic Industries Alliance; (See TIA).
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
82. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
83. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
90. GA - Gypsum Association; www.gypsum.org.
92. GS - Green Seal; www.greenseal.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
100. IAS - International Approval Services; (See CSA).
101. ICBO - International Conference of Building Officials; (See ICC).
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICPC - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
114. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
115. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
116. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
117. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
120. ITU - International Telecommunication Union; www.itu.int/home.
121. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
122. LMA - Laminating Materials Association; (See CPA).
125. MCA - Metal Construction Association; www.metalconstruction.org.
134. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
139. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
140. NCMA - National Concrete Masonry Association; www.ncma.org.
142. NECA - National Electrical Contractors Association; www.necanet.org.
144. NEMA - National Electrical Manufacturers Association; www.nema.org.
146. NFHS - National Federation of State High School Associations; www.nfhs.org.
148. NFPA - NFPA International; (See NFPA).
151. NLGA - National Lumber Grades Authority; www.nlga.org.
152. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
154. NRCA - National Roofing Contractors Association; www.nrca.net.
159. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
161. PCI - Precast/Prestressed Concrete Institute; www pci.org.
162. PDI - Plumbing & Drainage Institute; www.pdionline.org.
163. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); http://www.plasa.org.
168. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
169. SDI - Steel Door Institute; www.steeldoor.org.
170. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
171. SEII/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
175. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
176. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
177. SPF - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
186. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
187. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
190. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
191. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
194. TPI - Turfgrass Producers International; www.turfgrassassoc.org.
197. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
198. USAV - USA Volleyball; www.usavolleyball.org.
202. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
203. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
204. WDMA - Window & Door Manufacturers Association; www.wdma.com.
207. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's Representative, Landscape Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer, Water, and Electric Power Service: Use charges are specified in Section 011200 "Multiple Contract Summary."

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with IBC ADA requirements.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of at each return-air grille in system and remove at end of construction.

D. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.

3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install land-based telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor’s home office.
   d. Contractor’s emergency after-hours telephone number.
   e. Architect’s office.
   f. Engineers’ offices.
   g. Owner’s office.
   h. Principal subcontractors’ field and home offices.

G. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Core i5 or i7.
4. Display: 24-inch LCD monitor with 256-Mb dedicated video RAM.
5. Full-size keyboard and mouse.
8. Productivity Software:
   a. Microsoft Office Professional, 2010 or higher, including Word, Excel, and Outlook.
   b. Adobe Reader 11.0 or higher.
c. WinZip 7.0 or higher.

9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.

10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum Mbps upload and Mbps download speeds at each computer.

11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.


13. Access to large format scanner.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.

2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.

2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."

3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.

2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

2. Remove snow and ice as required to minimize accumulations.
G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs as indicated on Drawings.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      a. Provide temporary, directional signs for construction personnel and visitors.
   3. Maintain and touch up signs so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

L. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
   1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
   1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and] requirements specified in Section 311000 "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of DEQ Construction General Permit or authorities having jurisdiction, whichever is more stringent.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Section 015639 “Temporary Tree and Plant Protection.”

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

I. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

K. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

N. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor’s Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistant materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer’s written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for hours are considered defective and require replacing.
b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

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

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

   1. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

   2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION
SECTION 033000 – CAST-IN-PLACE CONCRETE

PART – 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section specifies requirements for concrete cast-in-place on the site.

B. The work includes cast-in-place concrete pavement, walkways bases, unit paver bases, foundations, structures, and thrust blocks.

1.3 REFERENCE STANDARDS

A. References herein are made in accordance with the following abbreviations and all work under this Section shall conform to the latest editions as applicable.

1. American Concrete Institute (ACI):

   301 Specifications for Structural Concrete

   305R Hot Weather Concreting

   306R Cold Weather Concreting

   325.9R Guide for Construction of Concrete Pavements and Concrete Bases

2. ASTM International (ASTM):

   A82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

   A1064 Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

   A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

   C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

   C33 Standard Specification for Concrete Aggregates

   C94 Standard Specification for Ready-Mixed Concrete

   C143 Standard Test Method for Slump of Hydraulic-Cement Concrete

   C150 Standard Specification for Portland Cement

   C171 Standard Specification for Sheet Materials for Curing Concrete

   C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

   C260 Standard Specification for Air-Entraining Admixtures for Concrete
C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

C494 Standard Specification for Chemical Admixtures for Concrete

C1116 Standard Specification for Fiber-Reinforced Concrete

3. Concrete Reinforcing Steel Institute (CRSI):


4. United States Department of Justice - Americans with Disabilities Act (ADA):


1.4 QUALITY ASSURANCE

A. Work, materials, and color of the wheelchair ramp paving shall conform to applicable sections of Americans with Disabilities Act (ADA) and State Standards, whichever is more stringent.

B. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features shown on the Drawings are approximate. Manufacturer's approved shop Drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size, and details.

1.5 SUBMITTALS

A. Submit description of methods and sequence of placement for each type of specially-finished concrete, including description of methods and sequence of placement.

B. Submit manufacturer’s product data for the following:

   1. Form release agent.
   2. Concrete coloring additive.
   3. Preformed joint filler.
   4. Concrete reinforcement specification data from manufacturer.
   5. Stamp and imprinting tools, manufacturer’s literature.
   6. Manufacturer’s literature for protective coating for sidewalks.
   7. Detectable Warning including manufacturer’s certification that product complies with ADA

1.6 TESTING

A. The Owner shall employ a qualified independent testing laboratory to inspect and test concrete paving and other cast-in-place concrete work.

B. When requested, Contractor shall prepare test specimens in accordance with ASTM C31, standard cylinder size 4-inch x 8 inch.

C. Testing of materials and installed work may occur at any time during progress of the work. Rejected materials and installed work shall be removed and replaced.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Steel reinforcing bars shall conform to ASTM A615, Grade 60, deformed.

   1. Bars employed as dowels shall be hot-rolled plain rounds.

B. Steel Wire: ASTM A62, plain cold drawn steel.
C. Welded Wire Reinforcement: Welded wire reinforcement shall conform to the applicable requirements of ASTM A1064. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.

D. Supports for Reinforcement: Bolsters, chairs, and other devices for spacing, supporting, and fastening reinforcing bars, and welded wire fabric in place shall be wire bar-type supports complying with CRSI Manual.
   1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI Class 1).

2.2 PORTLAND CEMENT CONCRETE

A. Portland cement concrete shall conform to the following:
   1. Maximum water-cement ratio shall be 0.45 conforming to ACI 316R.
   2. Concrete shall be air-entrained type conforming to ASTM C94. Air content by volume shall be 6 percent + 1.5 percent, tested in accordance with ASTM C260.
   3. Slump of concrete shall not be less than 3 inches nor greater than 4 inches, determined in accordance with ASTM C143.
   4. Cement for concrete shall be a Portland cement conforming to ASTM C150, Type I or II. Only one color of cement, all of the same manufacturer, shall be used for the work.
   5. Fine and coarse aggregates for concrete shall conform to ASTM C33.
   6. Concrete shall contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C494, Type A.
   7. Concrete shall contain no calcium chloride or admixtures containing calcium chloride. No admixtures other than those specified shall be used in the concrete without the specific written permission of the Engineer.

2.3 CONCRETE AGGREGATES


B. Coarse Aggregates: Coarse aggregates shall conform to ASTM C33, Parts 9 through 11 and Tables 2 and 3, with the following Class designations:
   1. Class 1S: For footings and foundations not exposed to the weather.
   2. Class 4S: For pavements, driveways, curbs, walkways, sidewalks, and retaining walls that are exposed to the weather.
   3. Class 1N: For pavements, driveways, curbs, walkways, sidewalks, and retaining walls that are not exposed to the weather.

C. Exposed Aggregate: Exposed aggregate for ADA curb ramps shall be selected, hard, durable, washed rounded stones free of deleterious reactivity to cement with graded sizes between 1/2 to 3/4 inch diameter nominal sieves.

2.4 COLORED CONCRETE

A. Color hardener and curing compound shall be manufactured and supplied by the Bomanite Corporation, 81 Encina Avenue, Palo Alto, CA 94301; tel. 800-854-2094, or approved equivalent.
   1. Color for concrete shall have visual contrast with surrounding paving.
   2. Curing compound shall be liquid applied.
B. Surface sealer shall be non-yellowing type which breathes water vapor, as manufactured by ProSoCo, Sika Chemical Corporation, Dural-International Corporation, or approved equivalent.

2.5 CURING MATERIALS FOR UNCOLORED CONCRETE

A. Curing shall be accomplished by the following methods.
   1. Moist curing with burlap covering.
   2. Curing paper, nonstaining, fiber reinforced laminated Kraft bituminous product conforming to ASTM C171. Four mil polyethylene sheeting may be substituted for curing paper.
   3. Curing compound, a resin-base, white pigmented compound conforming to ASTM C309, Type 2.

2.6 EXPANSION JOINTS

A. Expansion joint filler shall be preformed, nonbituminous type conforming to ASTM D1752, Type II, similar to Sealight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equivalent.
   1. Premolded filler shall be one piece for the full depth and width of the joint.

B. Smooth dowel shall be hot rolled plain steel dowel bonded at one end and operating in smooth close fitting sleeve (of same material) at the other end.

2.7 CONTROL JOINTS

A. Joint filler to be polyethylene foam with manufacturer's recommended sealant.

2.8 FORMS

A. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms manufactured by Sonoco Products Company, General Products Division, ABS or PVC plastic reusable forms, or approved equivalent.

B. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Plywood shall conform to U.S. Product Standard PS-1 and APA Graded B-B (Concrete Form) Class I Exterior Grade plywood or B-B or A-C Class I high density overlay concrete form plywood. Formwork materials shall produce smooth, continuous, straight and level surfaces.

C. Forms for Unexposed Finish: Plywood, lumber, or metal, with lumber dressed on at least two edges and one side.

D. Form Ties: Prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, cornerlocks, and other accessories as necessary.

E. Form Release Agent: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.

F. Imprinting Tools: Mats and tools used to stamp projecting texture and patterns onto plastic concrete surfaces and which shall be specifically designed with rigid back supports to enable a clean, sharp, stamping image. Stamps for curb ramps shall be designed to meet ADA detectable warning requirements.

2.9 FIBROUS REINFORCING

A. Material shall meet ASTM C1116 and shall be as manufactured by NyCon Incorporated, or approved equal.

B. Mix fibrous reinforcement in accordance with manufacturer's instructions including product data and technical bulletins.
   1. Add fibrous reinforcement to concrete mix at the concrete batch facility.
   2. Adding and mixing fibrous reinforcement at the job site will not be allowed.

C. Provide job mix design data to show concrete mix will attain specified strength requirements.
2.10 EXPOSED CONCRETE PROTECTIVE COATING

A. Protective Coating shall be silane-siloxane product.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

A. The subgrade of areas to be paved shall be graded and compacted as specified in Section 321100, “BASE COURSES (PAVEMENT)”.

B. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade, subbase, base, or pavement, subsequent backfill and compaction shall be performed as required by the Engineer and as specified in Section 312000, “EARTH MOVING”.

C. Materials shall not be stored or stockpiled on subgrade.

D. Prepared subgrade will be inspected by the Engineer. Subgrade shall be approved for installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired.

3.2 BASE COURSE

A. Base course for concrete paving shall be pavement subbase course or gravel base materials specified in Section 321100, “BASE COURSES (PAVEMENT)” as shown on the Drawings.

B. Width of base course shall extend beyond edge of the proposed pavement as shown on the Drawings.

C. Material shall be placed in lifts no more than 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.

1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade.

2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.

3. Surface irregularities which exceed 1/2 inch as measured by means of a 10 foot long straightedge shall be regraded and recompacted.

D. Base course shall be compacted at optimum moisture content to not less than 95 percent of maximum density as determined by ASTM D1557.

E. The base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with the base course material.

3.3 STEEL REINFORCEMENT

A. Before being placed in position, reinforcing steel shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when required.

B. Any bar showing cracks after bending shall be discarded.

C. Unless otherwise shown on the Drawings, reinforcing shall extend within 2 inches of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 inches.

D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel shall be securely wired in the required position and shall be maintained in that position until concrete is placed.
and compacted. Chair bars and supports shall be installed in a number and arrangement approved by the Engineer.

3.4 FORMS

A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits.

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

B. Construct forms to provide for openings, offsets, sinkages, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required for the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent cement paste from leaking.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and other features for easy removal.

D. Chamfer exposed corners and edges, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

E. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.5 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork the anchorage devices and other embedded items required for work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.6 PREPARING FORM SURFACES

A. Coat contact surfaces of forms with an approved, nonresidual, low-VOC form-coating compound before placing reinforcement.

3.7 CONCRETE PLACING

A. Equipment, methods of mixing and placing, and precautions to be observed as to weather, and condition of base shall meet the requirements of ACI 316R.

B. The Engineer shall be notified of scheduled concrete placement sufficiently in advance of start of operation to allow preliminary inspection of the work, including subgrade, forms, and reinforcing steel.

C. Work shall not be performed during rainy weather or when temperature is less than 40°F. (4.4°C.).

D. Adjacent work shall be protected from stain and damage. Damaged and stained areas shall be replaced or repaired to equal their original conditions.

E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.

F. Concrete which has set or partially set, before placing shall not be used. Retempering of concrete will not be permitted.
G. Concrete shall be thoroughly vibrated, or otherwise consolidated to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

H. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 inch thick, shall be well scrubbed into the thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.8 FINISHING

A. Concrete surfaces shall be screeded and finished true to line and grade, and free of hollows and bumps. Surface shall be dense and smooth.

1. Finished concrete surface for concrete subbases shall be wood floated to a slightly rough surface. Surface shall not deviate more than 1/4 inch in 10 feet.

2. Finished concrete surfaces shall be wood floated and steel troweled, or broom finished, to a uniform surface. Surface shall not deviate more than 1/8 inch in 10 feet.

B. Horizontal surfaces of concrete surfaces which will be exposed shall be given a light broomed finish, with direction of grooves in concrete surface perpendicular to length of concrete band, slab, or pad. After concrete has set sufficiently to prevent coarse aggregate from being torn from surface, but before it has completely set, brooms shall be drawn across the surface to produce a pattern of small parallel grooves. Broomed surface shall be uniform, with no smooth, unduly rough or porous spots, or other irregularities. Coarse aggregate shall not be dislodged by brooming operation.

C. Vertical surfaces of concrete which will be exposed; refer to architectural concrete spec 033300 requirements

D. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a 1/4- inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall at same time be finished to a 1/4-inch radius.

E. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

F. Sidewalks, walkways, accessible routes, and ramps shall be constructed and finished in accordance with the Americans with Disabilities Act (ADA) and state and local requirements. Provide protective coating in accordance with manufacturer’s recommendations.

G. Exposed Aggregate Finish: Expose coarse aggregate in pavement surfaces as follows.

1. Immediately after float finishing, spray-apply chemical surface retarder to pavement according to manufacturer’s written instructions.

2. Cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.

3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon-bristle broom.

4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.

3.9 CURING

A. Concrete shall be kept continuously damp from time of placement until end of specified curing period or cured by other methods. Water shall not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations, surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed
over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent
drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled
or floated into surface.

B. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing com-

pound.

1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and
sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36
hours after placing concrete. During curing period, concrete surface shall be checked frequently, and
sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing
concrete.

2. Concrete cured with a curing compound shall have the compound applied at a rate of 200 square feet
per gallon, in two applications perpendicular to each other.

3. Curing period shall be seven (7) days minimum.

C. Only if additional protection is absolutely required, the surface should remain uncovered after the seven (7)
day period for at least four (4) days, after which time new and unwrinkled non-staining reinforced waterproof
Kraft curing paper may be used.

3.10 EXPANSION JOINTS

A. Expansion joints shall be 1/2 inch wide and located to provide a maximum spacing of 50 feet between joints
or where shown on the Drawings. Expansion joints shall be troweled in the concrete to required width with
preformed joint filler in place. Joint filler shall extend the full depth of the slab and full length of the expan-
sion joint.

1. For concrete walks, pavements, and pads, depth of joint filler shall be placed to form a 1-1/4 inch deep
recess for sealant and backer rod below finished concrete surface.

2. Use of multiple pieces to make up required depth and width of joint will not be permitted.

3.11 CONSTRUCTION JOINTS

A. Construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.

1. Butt joint with dowels or use a thickened edge joint if construction joints occur at control joint locations.

2. Keyed joints with tie-bars shall be used if the joint occurs at any other location.

3.12 CONTROL JOINTS

A. Control joints shall be tooled into the concrete slab, with 3-inch wide border and troweled edges, in pattern
as shown on the Drawings. If no pattern is shown, then pattern shall result in square shape with a maximum
area of 36 square feet. Joints shall be made after concrete is finished and when the surface is stiff enough
to support the weight of workmen without damage to the slab, but before slab has achieved its final set.

B. Scoring shall cut into slab surface at least 1 inch, but in no case not less than 25 percent of slab depth.

3.13 COLD WEATHER CONCRETING

A. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily tem-
perature is below 40°F. or is expected to fall to below 40°F. within 72 hours. The concrete, after placing,
shall be protected by covering, heat, or both.

B. Details of handling and protecting of concrete during freezing weather shall be subject to the approval and
direction of the Engineer. Procedures shall be in accordance with provisions of ACI 306R.
3.14 HOT WEATHER CONCRETING

A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. Every effort shall be made to minimize delays which will result in excessive mixing of the concrete after its arrival on-site.

B. During periods of excessively hot weather (95°F. or above), ingredients in the concrete shall be cooled with cold mixing water to maintain the temperature of the concrete at permissible levels in accordance with the provisions of ACI 305R. Any concrete with a temperature above 95°F., when ready for placement, will be rejected.

C. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. Records shall include checks on temperature of concrete when delivered to Project site and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

3.15 PROTECTION OF CONCRETE SURFACES

A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently.

END OF SECTION
SECTION 042200 - CONCRETE UNIT MASONRY

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. Concrete masonry units.
   2. Mortar and grout.
   3. Steel reinforcing bars.
   5. Embedded flashing.
   6. Miscellaneous masonry accessories.
   7. Masonry-cell fill.
B. Products Installed but not Furnished under This Section:
C. Related Requirements:
   1. Section 071900 "Water Repellents" for water repellents applied to unit masonry assemblies.
   2. Section 323223 "Segmental Retaining Walls" for dry-laid, concrete unit retaining walls.

1.3 DEFINITIONS
A. CMU(s): Concrete masonry unit(s).
B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Sustainable Design Submittals:
   1. Environmental Product Declaration: For each product.
2. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
C. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars.
      Comply with ACI 315. Show elevations of reinforced walls.
   3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
D. Samples for Initial Selection:
   1. Colored mortar.
   2. Weep holes/vents.
E. Samples for Verification: For each type and color of the following:
   1. Exposed CMUs.
   2. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS
A. Qualification Data: For testing agency.
B. Material Certificates: For each type and size of the following:
   1. Masonry units.
      a. Include data on material properties and material test reports substantiating compliance with
         requirements.
   2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE
A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
1. Build sample panels for typical exterior wall in sizes approximately 48 inches (1200 mm) high by full thickness. This can be part of the total wall. To be approved by WSU prior to continuation of the wall.
2. Protect approved sample panels from the elements with weather-resistant membrane.
3. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
   a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.
C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS
A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days.
after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.


PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet (6 m) vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or...
leaks on the back of test specimen.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   1) ACM Chemistries; RainBloc.
   2) BASF Construction Chemicals - Building Systems; Rheopel Plus.
   3) GCP Applied Technologies; Dry-Block.

C. Insulated CMUs: Where indicated, units shall contain rigid, specially shaped, cellular thermal insulation units complying with ASTM C 578, Type I, designed for installing in cores of masonry units.

D. CMUs: ASTM C 90.
   1. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.

E. Concrete Building Brick: ASTM C 55.
      a. Standard pattern, ground-face finish – see detail elevation
   2. Colors: Standard Gray

F. Pre-faced CMUs: Lightweight hollow concrete units complying with ASTM C 90, with manufacturer's standard smooth resinous facing complying with ASTM C 744.
   1. Products: Subject to compliance with requirements

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.
   1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following: MATCH CMU WALL COLOR
      a. Cemex S.A.B. de C.V.; [Brikset, Type N] [Citadel, Type S] [Dixie, Type S] [Kosmortar, Type N] [Richmortar] [Victor Plastic Cement].
      b. Essroc, Italcementi Group; [Brixment] [Flamingo Color Masonry Cement] [Velvet].
      c. Holcim (US) Inc.; [Mortamix Masonry Cement] [Rainbow Mortamix Custom Buff Masonry Cement] [White Mortamix Masonry Cement].
      d. Lafarge North America Inc.; [Magnolia Masonry Cement] [Lafarge Masonry Cement] [Trinity White Masonry Cement].
      e. Lehigh Cement Company.; [Lehigh Masonry Cement] [Lehigh White Masonry Cement].

E. Mortar Cement: ASTM C 1329/C 1329M.
   1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. Lafarge North America Inc.; Lafarge Mortar CementRetain "Mortar Pigments" Paragraph below for colored cement or for pigments added at Project site.
   2. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. Davis Colors; True Tone Mortar Colors.
      b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
      c. Solomon Colors, Inc.; SGS Mortar Colors.

F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
   1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. ACM Chemistries; RainBloc for Mortar.
      b. BASF Construction Chemicals - Building Systems; Rheopel Mortar Admixture.
      c. GCP Applied Technologies; Dry-Block Mortar Admixture.
2.6 REINFORCEMENT

A. See Concrete Spec for specific requirements on rebar.

B. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

D. Contractor to provide information on 9 GA horizontal ties as submittal.

E. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.
   1. Stainless-Steel Wire: ASTM A 580/A 580M, [Type 304] [Type 316].
   2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
   4. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, [Type 304] [Type 316].
   5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

F. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. See plans for Tie information.
      a. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
         1) Advanced Building Products Inc.; Peel-N-Seal.
         2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
         3) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
         4) GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
         5) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
         6) Hohmann & Barnard, Inc.; Sando-Seal.
         7) Polyguard Products, Inc.; Polyguard 300 [Polyguard 400].
         8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
   b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

G. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from [neoprene] [urethane] [or] [PVC].

B. Preformed Control-Joint Gaskets: Made from [styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805] [or] [PVC, complying with ASTM D 2287, Type PVC-65406] and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.8 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. For exterior masonry, use masonry cement mortar.
   3. For reinforced masonry, use masonry cement mortar.
   4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
   5. For masonry below grade or in contact with earth, use Type S.
6. For reinforced masonry, use Type S

7. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.

B. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
   3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

C. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.
   1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that would impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and
control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.

5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.

7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in [running bond] [bond pattern indicated on Drawings]; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm) [4 inches (100 mm)]. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors [48 inches (1200 mm)] <Insert spacing> o.c. unless otherwise indicated.
   3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
   4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:
   1. Bed face shells in mortar and make head joints of depth equal to bed joints.
   2. Bed webs in mortar in all courses of piers, columns, and pilasters.
   3. Bed webs in mortar in grouted masonry, including starting course on footings.
   4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.
3. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive air barriers, dampproofing or waterproofing unless otherwise indicated.

3.6 MASONRY-CELL FILL
A. Pour [loose-fill insulation] [lightweight-aggregate fill] into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet (6 m).

B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.7 MASONRY-JOINT REINFORCEMENT
A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Extending 12 inches (305 mm) beyond openings

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE
A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
1. Provide an open space not less than [1/2 inch (13 mm)] [1 inch (25 mm)] [2 inches (50 mm)] wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.9 CONTROL AND EXPANSION JOINTS
A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry [as follows] [using one of the following methods]:
1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
C. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level [B] [C] in TMS 402/ACI 530/ASCE 5.
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.
D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for [mortar air content] [and] [compressive strength].
H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
I. Prism Test: For each type of construction provided, according to ASTM C 1314 at [7 days and at ] 28 days.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleansed for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing
surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
   3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200
SECTION 129300 - SITE FURNISHINGS

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.

PART 2 - PRODUCTS

2.1 NET SYSTEM

A. Tension batting Tunnel - Duel
   1. Tension cable Support – Aircraft cable with jaw tunbuckles
   2. Black powdered coat finish poles
   3. 8.625” x 0.322” steel pole
   4. Net provided by WSU
   5. Foundations engineered by SmithGroup in collaboration with Sportsfield Specialties

B. SportsField Specialties
   1. Terra Erickson
   2. 312-933-9680
   3. terickson@sportsfieldspecialties.com
   4. Or Approved Equal

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.
D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings 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, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION
**Tension Batting Tunnel**

**Model**
- BTTBS: Baseball
- BTTBD: Double Tunnel
- BTTBT: Triple Tunnel
- BTSS: Softball
- BTSD: Double Softball
- BTST: Triple Softball

**Sport**
- Single
- Double
- Triple

**Type**
- Baseball
- Softball

**Finish Grade**

**Tension Cable Support:**
1/4" X 7x19 Galv. Aircraft Cable

**Rear Crossbar Support:**
4" (3/16" Wall) Square Steel Tubing

**End Cable Support:**
1/4" X 7x19 Galv. Aircraft Cable

**HSS 8.625" X 0.322" Steel Pole**

**Fixed Net Stabilizer Extension Arm,**
3/8 Plate Steel

**13' H X 14' W Batting Tunnel Net,**
#36 Black Nylon 1-3/4" Square Mesh Net with Black Vinyl Enclosed Weighted 1/4" Galvanized Chain Bottom and Two (2) 4' W X 13' H Openings with Curtain Style Exterior Overlap Flaps

**Foundation Requirements Vary Based On Local Codes And Soil Conditions**

**NET LENGTH:**
- **Baseball:** 75'
- **Softball:** 55'

**13'-0''**

**4'-0''**

**NOT TO SCALE**

**SPORTSFIELD SPECIALTIES INC 03232020**
## Tension Batting Tunnel

### Pole and Ground Sleeve Layout

**Note:** All measurements are center-to-center of ground sleeve/pole.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sport</th>
<th>Type</th>
<th>Net Length</th>
<th>Pole to Pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTTBS</td>
<td>Baseball</td>
<td>Single</td>
<td>75'</td>
<td>78’-8 5/8&quot;</td>
</tr>
<tr>
<td>BTTBD</td>
<td></td>
<td>Double</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTBT</td>
<td></td>
<td>Triple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTSS</td>
<td>Softball</td>
<td>Single</td>
<td>55'</td>
<td>58’-8 5/8&quot;</td>
</tr>
<tr>
<td>BTTSD</td>
<td></td>
<td>Double</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTST</td>
<td></td>
<td>Triple</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Finish Grade**

4'-0"

Ground Sleeve or Direct Embedment

**Cable Tab, Faces Inside of Tunnel**

**Crossbar Tab, Faces Outside of Tunnel**

**Pole Orientation**

---

**PROPRIETARY AND CONFIDENTIAL**

The information contained in this drawing is the sole property of Sportsfield Specialties Inc. Any reproduction in part or as a whole without the written permission of Sportsfield Specialties Inc. is prohibited.

---

**SPORTSFIELD SPECIALTIES**

Excellence from Design to Installation

4355 State Highway 10, PO Box 231, Delhi, NY 13753  CALL: 888-975-3343  FAX: 607-746-8481

---

**Not To Scale**

Sportsfield Specialties Inc 01242020
HITTING STREAK

YARN: 4400 Denier Nylon 6
PRODUCT WEIGHT: 35 oz / yd²
PILE HEIGHT: 0.34" 
TUFTING GAUGE: 3/16" 
PRIMARY BACKING: 3.5 oz/yd² 
SECONDARY BACKING: 17 oz/yd² 
TOTAL WEIGHT: 55.5 oz/yd²
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>YARN</td>
<td>4400 Denier Nylon 6</td>
</tr>
<tr>
<td>PRODUCT WEIGHT</td>
<td>35 oz / yd²</td>
</tr>
<tr>
<td>PILE HEIGHT</td>
<td>0.34&quot;</td>
</tr>
<tr>
<td>TUFTING GUAGE</td>
<td>3/16&quot;</td>
</tr>
<tr>
<td>PRIMARY BACKING</td>
<td>3.5 oz/yd²</td>
</tr>
<tr>
<td>URETHANE PRE-COAT</td>
<td>17 oz/yd²</td>
</tr>
<tr>
<td>PAD/CUSHION THICKNESS</td>
<td>5 mm</td>
</tr>
<tr>
<td>PAD SCRIM / 13 PIC</td>
<td>4.5 oz/yd²</td>
</tr>
<tr>
<td>TOTAL WEIGHT</td>
<td>115 oz/yd² *</td>
</tr>
</tbody>
</table>

* Total Weight Tolerance does not account for Pad/Cushion. Pad/Cushion Tolerance (oz/yd²) is ± 15%.
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Perform all site sealant work as indicated on drawing and as specified herein.
2. Required applications of sealants include, but are not necessarily limited to, the following general locations:
   a. Curb and paving

1.2 QUALITY ASSURANCE

A. Manufacturers: Firms with not less than five years of successful experience in production of types of sealants required for this project.

1. Obtain elastomeric sealants from a manufacturer which will, upon request, send a qualified technical representatives to the project site for purpose of advising installer on proper procedures for use of products.

B. Installer: A firm with a minimum of five years of successful experience in application of type of materials required.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s specification, recommendations and installation and instructions for each type of sealant and associated miscellaneous material required.

B. Samples: Submit three 12-inch long samples of each color required (except black) for each type of sealant exposed to view. Install sample between two strips of material similar to or representative of typical surfaces where compound will be used, held apart to represent typical joint widths and shape.

1.4 JOB CONDITIONS

A. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer’s recommended temperature range for installation. Proceed with the work only when the weather conditions are favorable for proper cure and development of high early bond strength. Where joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in lower third of the manufacturer’s recommended installation temperature range so that sealant will not be subject to excessive elongations and bond stress at subsequent low temperatures.

1.5 SPECIAL PROJECT WARRANT

A. Sealant Warranty: Provide written warranty, signed by manufacturer and installer agreeing to, within warranty period of six years after date of substantial completion replace/repair defective materials and workmanship defined to include: instances of leakage or water or air; failures in joint adhesion, material cohesion, abrasion resistance, strain resistance, or general durability; failure to perform as required and the general appearance of deterioration in any other manner not clearly specified in manufacturer’s published project literature as an inherent characteristic of the sealant material.
PART 2 - PRODUCTS

2.1 MATERIAL

A. Expansion Joints:
   1. All expansion joints without exception shall be resin impregnated, premolded fiberboard,
      conforming to the physical requirements of ASTM D 1752 with a removable poly-plastic top edge
      that after set in position, and the paving properly cured, the poly-plastic edge can be removed to
      accommodate joint sealant. Size, width and length as required and shown on drawings.

B. Provide manufacturer's standard, non-modified two or more part, polyurethane-based elastomeric sealant;
   comply with either ASTM C920 Grade P, Class 50; self-leveling grade/type. Color to match adjacent
   surface color.

C. Provide product of one of the following manufacturers:
   1. Contech/Sonneborn
   2. Mameco International
   3. W. R. Meadows, Incorporated
   4. Pecora Corporation
   5. Products Research and Chemical Corporation
   6. Sika Chemical Corporation
   7. Toch/Carboline
   8. Tremco, Incorporated
   9. Dow

D. Color: Sika limestone color, or equal.

2.2 MISCELLANEOUS MATERIALS

A. Joint Cleaner: Provide type of joint cleaning compound recommended by sealant manufacturer for joint
   surfaces to be cleaned.

B. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer for joint
   surfaces to be primed or sealed.

C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer to
   be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper
   performance of sealant. Provide self-adhesive tape where applicable.

D. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane
   foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable non-absorptive material as
   recommended for compatibility with sealant by the sealant manufacturer. Provide size and shape or rod
   which will control joint depth for sealant placement, break bond of sealant at bottom of joint depth for
   sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back
   side, and provide a highly compressible backer to minimize possibility of sealant extrusion when joint is
   compressed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The installer must examine joint surfaces, backing, and anchorage of units forming sealant rabbet, and
   conditions under which sealant work is to be performed, and notify Engineer in writing of conditions
   detrimental to proper completion of the work and performance by sealants. Do not proceed with sealant
   work until unsatisfactory conditions have been corrected in a manner acceptable to installer.
3.2 JOINT SURFACE PREPARATION

A. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture, and other substances which would interfere with bond of sealant.

B. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer’s printed instructions indicated that alkalinity does not interfere with sealant bond and performance.

C. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution; rinse thoroughly with water and allow to dry before sealant installation.

D. Roughen joint surfaces in vitreous-coated and similar non-porous materials, where sealant manufacturer’s data indicate lower bond strength than for porous surfaces. Rub with fine abrasive to produce a dull sheen.

3.3 INSTALLATION

A. Comply with sealant manufacturer’s printed instructions except where more stringent requirements are shown on specified and except where manufacturer’s technical representative directs otherwise.

B. Prime or seal joint surfaces where shown or recommended by sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

C. Install sealant backer rod for liquid sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.

D. Install bond breaker tape where shown and where required by manufacturer’s recommendations to ensure that elastomeric sealants will perform properly.

E. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete “wetting” of joint bond surface equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface an a vertical surface, fill joint to form a slight cove so that joint will not trap moisture and dirt.

F. Install sealants to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section or bead:

1. For sidewalks, pavements, and similar joints sealed with elastomeric sealant and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, and neither more than 5/8 inch deep nor less than 3/8 inch deep.

2. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but neither more than ½ inch deep, nor less than ¼ inch deep.

G. Spillage: Do not allow sealants to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces by primer/sealer.

H. Remove excess and spillage of sealants promptly as the work progresses. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes.

3.4 CURE AND PROTECTION

A. Cure sealants in compliance with manufacturer’s instructions and recommendations to obtain high early bond strength, internal cohesive strength, and surface durability. Do not cure in a manner which would significantly alter materials modules of elasticity of other characteristics.
B. Installer shall advise Engineer of procedures required for curing and protection of sealants during construction period so that they will be without deterioration or damage (other than normal wear and weathering) at time of Engineer acceptance.

END OF SECTION
SECTION 321813 - SYNTHETIC TURF

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 all materials, labor and equipment for installation of synthetic turf and base as indicated on drawings.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver manufactured materials in original packages with seals unbroken and bearing manufacturer's labels indicating brand name and directions for storing.

B. Store manufactured materials in a clean, dry location, protected from the weather and deterioration, and complying with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

C. Store units on flat surfaces.

D. Protect UV-light sensitive materials from exposure to sunlight.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply surface system materials or components over wet, frozen, or excessively damp substrates if prohibited by manufacturer's written instructions or warranty requirements.

B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system to be performed according to manufacturer's written dimensions of other construction by field measurements.

1.5 WARRANTY

A. The Contractor shall provide its Manufacturer's Warranty which guarantees the usability and playability of the synthetic turf system for its intended use. The warranty coverage shall not be prorated nor limited to the amount of the usage.

B. The warranty must have the following characteristics:

1. Must provide full coverage for eight (8) years from the date of Substantial Completion
2. Must warranty materials and workmanship.
3. Must warrant that the materials installed meet or exceed the product specifications.
4. Must have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer a serviceable as a playable surface.
5. Manufacturer’s warranty shall be supported by a third-party insurance policy for the full eight (8) year period. The insurance policy shall be pre-paid, direct with the owner, and non pro-rated. The insurance policy shall cover full labor and material replacement of the entire system including backing, fibers, infill, seams, inlays, adhesives, and nailer boards.

6. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.

1.6 SHOP DRAWINGS

A. Contractor to provide color rendered, computer designed shop drawings show turf colors, line markings and dimensions, roll lengths and seam locations.

PART 2 - PRODUCTS

2.1 SYNTHETIC TURF

A. Contractor shall provide Information and pricing from following company and product

B. Synthetic Turf Systems

a. 0.34” pile height
   a. 35 oz/sq yd Product Weight
   b. Total Weight 55.5 oz / sq yd
   b. Shaw: Hitting Streak (or approved equal)

C. Pad

1) 35 oz / sq yd – Product Weight
2) 0.34” Pile Height
3) 115 oz / sq yd
4) Shaw: Strike One 5mm (or approved equal)

PART 3 - EXECUTION

3.1 GENERAL

A. The installation shall be performed in full compliance with approved shop drawings.

B. All installation operations shall be performed by personnel directly employed by the manufacturer, full familiar with the materials and their application, under the full-time direction and supervision of a qualified technical supervisor employed by the manufacturer of the synthetic turf. Installation supervisors shall have a minimum of five (5) years experience.

C. The surface to receive the synthetic turf shall be inspected and certified by the manufacturer as ready for the installation of the synthetic turf system. Contact Landscape Architect to schedule on-site meeting.

D. Adhesives for bonding knitted synthetic turf appropriately shall be as recommended by the synthetic turf manufacturer.
E. Cord for sewing seams of the turf shall be as recommended by the synthetic turf manufacturer.

3.2 BASE STONE CONSTRUCTION

A. The base stone slope gradation and direction shall match subgrade slope, unless otherwise noted.
   1. The geotextile fabric shall be installed under the stone base.
   2. The drain system shall be installed as indicated on the drawings.
   3. The base stone shall consist of open graded aggregate. The open graded aggregate material must be free draining consistent with the vertical draining requirements of the turf manufacturer.
   4. The finished grade of the base stone shall not vary more than ¼” when compared with a 50’ taut string line. Any imperfections, divots, etc in the base stone will be repaired by the contractor and re-evaluated.

3.3 SYNTHETIC TURF INSTALLATION

A. The turf installer shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

B. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.

C. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the turf manufacturer. Seaming tape is to be constructed of high tenacity polyurethane coated, woven nylon. Inlaid markings shall be adhered to the seaming tape with a two-part, high strength polyurethane adhesive applied per the turf manufacturer's standard procedures for outdoor applications. All seams shall be transverse to the field direction; i.e., run perpendicularly across the field.

D. Prior to infill installation, Landscape Architect shall conduct a pre-fill inspection for the purpose of verifying striping seaming and other requirements. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment to produce a layered system of the manufacturer's standard infill products composed of a minimum 30% silica sand and maximum of 70% crumb rubber by weight. The turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a depth of 1-3/4 inches. The infill materials can only be applied when the turf fabric is bone dry.

3.4 FIELD MARKINGS

A. Field markings and decorations shall be installed in accordance with approved project shop drawings, and shall be in color as indicated on drawings.

B. All synthetic turf logos as indicated on the drawings shall be manufactured at the factory in (1) piece, with colors as noted on the drawings.

3.5 CLEAN UP

A. Contractor shall provide the labor, supplies and equipment, as necessary, for final cleaning of surfaces and installed items.

B. All usable remnants of new material shall become the property of the Wayne State University.
   1. Coordinate with WSU Project Manager, provide a minimum 10’ x 10’ square green attic stock.
   2. Dispose of off-site in accordance with waste management and disposal requirements.
C. The Contractor shall keep the area clean throughout the project and clear of debris.

D. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION
SECTION 329100 - SOIL PREPARATION (TOPSOIL)

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 specifies all soil materials designated as "Topsoil" on the drawings or in the specifications. Supply topsoil for landscape work seeding, sod, transplant areas, heritage rose area and planting) from both on-site and off-site sources.

1.3 REFERENCES
   A. ASTM International, as referenced herein as ASTM.
   B. US Department of Agriculture (USDA) Handbook No. 60 – Diagnosis and Improvement of Saline and Alkali Soils.

PART 2 - PRODUCTS

2.1 TOPSOIL
   A. Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than 25 mm (one inch) in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 6.0 nor more than 7.0, and should be best suited to the region, climate and plant material specific to the project.
   B. Obtain material from stockpiles established under Section 31 20 00, EARTH MOVING, subparagraph, Stripping Topsoil that meet the general requirements as stated above. Amend topsoil not meeting the pH range specified by the addition of pH Adjusters.
   C. If sufficient topsoil is not available on the site to meet the depth as specified herein, the Contractor shall furnish additional topsoil. At least 10 days prior to topsoil delivery, notify the Owner’s Representative of the source(s) from which topsoil is to be furnished. Obtain topsoil from well drained areas. Additional topsoil shall meet the general requirements as stated above and comply with the requirements specified in Section 01 45 29, TESTING LABORATORY SERVICES and Part 1.4.E of this Section. Amend
   D. See Planting Specification for planting mixtures.
   E. Topsoil Sieve Chart

<table>
<thead>
<tr>
<th>Sieve Designation</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch screen</td>
<td>100</td>
</tr>
<tr>
<td>1/4 inch screen</td>
<td>97 - 100</td>
</tr>
<tr>
<td>No. 10 U.S.S. mesh sieve</td>
<td>95 - 100</td>
</tr>
<tr>
<td>No. 140 U.S.S.</td>
<td>15 – 35</td>
</tr>
</tbody>
</table>
PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Sampling: Each soil test unit shall be a composite of five to seven subsamples taken the full depth of proposed source for each acre of surface area. For on-site stockpiles, discard upper 6 inches of soil before sampling. For large stockpiles, partial excavation will be required for collection of representative samples. Include site plan verifying the locations of all topsoil sampling. Topsoil test reports shall be accompanied with each sample unit for review and approval by the Landscape Architect.

B. Testing methods and written recommendations when not references elsewhere, shall comply with USDA's Handbook No. 60. Nutrient data to be given in parts per million (ppm) dry soil.

C. Topsoil shall be as defined in ASTM D5268.

D. Soil pH shall be tested in accordance with ASTM D4972.

E. Test for organic material by using ASTM D2974.

3.2 FINE GRADING

A. Contractor shall obtain Owner Representative’s written approval of previously completed rough grading work prior to commencing organic soil amendment incorporation work.

B. Immediately prior to dumping and spreading the approved organic soil amendment, the subgrade shall be cleaned of all stones greater than one inches (1”) and all debris or rubbish. Such material shall be removed from the site. Prior to spreading of the organic soil amendment, subgrades which are too compact to drain water and too compact based upon compaction tests shall be ripped with a claw one foot (1’) deep, pulled by a bulldozer two feet (2’) on center, both directions. Contractor shall then regrade surface.

C. Organic soil amendment material shall be placed and uniformly spread over approved finish sub-grades to a depth sufficiently greater than the specified depth so that after natural settlement and light rolling, the specified minimum compacted depth will have been provided and the completed work will conform to the lines, grades and elevations indicated with allowance for additional topsoil spreading for turfgrass areas in determining final elevations. Incorporate organic soil amendment by disc harrowing, rototilling or other means in a uniform manner. The depth of incorporation shall be based upon the organic content of the tested and approved organic soil amendment, so as to produce a finished soil with an organic matter content of between four (4) and six percent (6%). Supply additional organic soil amendment material, after in-place testing and approval, as may be needed to give the required organic matter content and finished grades under the Contract without additional cost to the Government.

D. Disturbed areas outside the limit of work shall be spread with four inch (4”) minimum depth of organic soil amendment material to the finished grade.

E. No subsoil or organic soil amendment material shall be handled in any way if it is in a wet or frozen condition.

F. Sufficient grade stakes shall be set for checking the finished grades. Stakes must be set in the bottom of swales and at the top of slopes. Connect contours and spot elevations with an even slope.

G. After organic soil amendment material has been incorporated into the subsoil, it shall be carefully prepared by scarifying or harrowing and hand raking. Remove all large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Remove all stones over one and one half inch (1-1/2”) diameter from the amended soil bed. The amended soil shall also be free of smaller stones in excessive quantities as determined by the Resident Engineer.
H. The whole surface shall then be compacted with a roller or other suitable means to achieve a maximum dry density of 88 to 90 percent in accordance with compaction standards of ASTM D1557 Method D. During the compaction process, all depressions caused by settlement or rolling shall be filled with additional organic soil amendment and the surface shall be regraded and rolled until presenting a smooth and even finish corresponding to the required grades.

END OF SECTION
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. Seeding
2. Hydroseeding
3. Sodding
4. Sprigging
5. Mulching
6. Erosion control blanket – slope stabilization
7. Turf renovation
8. Maintenance
9. Warranty

B. Related Requirements:

1. Section 311000 "Site Clearing" for stripping and using on-site topsoil.
2. Section 312000 "Earth Moving" for mass grading of the site.
3. Section 312500 "Soil Erosion and Sedimentation Control" for soil stabilization during construction.
4. Section 329100 "Soil Preparation (Topsoil)" for lawns and plant mixture amendment.
5. Section 329300 "Exterior Plantings" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.
6. Section 334600 "Subdrainage" for below-grade drainage of landscaped areas.

1.3 REFERENCES AND REGULATORY REQUIREMENTS

A. United States Department of Agriculture (USDA), Federal Seed Act - labeling and purity standards and miscellaneous requirements.

B. State Seed Laws – where applicable.

C. Association of Official Seed Analysts (AOSA): “Rules for Testing Seed”.

D. Turfgrass Producers International (TPI): Guidelines for Turfgrass Sod.

1.4 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
C. Pests: Living organisms that occur where they are not desired or that cause damage to grasses, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Pure Live Seed (PLS): \( \frac{\text{percent germination} \times \text{percent purity}}{100} = \text{Percent PLS} \)

E. Topsoil: Existing, on-site soil that has been modified with soil amendments and fertilizers to produce a soil mixture best for lawn growth. See Section 329110 "Soil Preparation-Topsoil" and drawing designsations for topsoil.

F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before topsoil is placed.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data:

1. Erosion control blanket and anchors.
2. Fertilizers - from manufacturer.
3. Mycorrhizal inoculum.
5. Seeding and mulching equipment.
7. Lawn maintenance equipment.
9. Maintenance edge aggregate gradation analysis.

B. Source Quality Control:

1. Samples:
   a. Seed: Quart size sealable plastic bag
   b. Straw Mulch: 1 cubic foot (On-Site).

2. Test Report:
   a. Topsoil: Test reports including soil amendments and fertilization rates for each seed mix. Refer to Section 329100 Soil Preparation (Topsoil).

3. Certifications/Licenses:
   a. Certification of Grass Seed for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity (PLS), germination, weed seed, year of production, and date of packaging. Include identification of source, name and telephone number of supplier.
   b. Certification of sod from proposed sod supplier that identifies quality standard, turf species stating the botanical and common names, proportions of each species in the sod, composition of the root zone soil in which the sod has been grown, and date the sod was planted. Include identification of source, name and telephone number of supplier.
C. Field Quality Control:

1. **Project Work Schedule:** Within 4 weeks following the issuance of the Notice to Proceed, submit a project work schedule to the Landscape Architect indicating dates for delivery, installation, and Substantial Completion for all landscape work. The Schedule shall be comprehensive and address procurement, delivery, and installations of irrigation, lawn areas of the site. For a large site, the schedule shall reflect a phased installation and shall include support graphics required to identify this phased approach. Refer to 1.10 below for a complete list of schedule requirements.

2. **Maintenance Schedule:** Within 4 weeks following the issuance of the Notice to Proceed, submit a detailed typewritten approach and schedule for the warranty maintenance of all landscape activities outlined under 3.13 of this section. Coordinate landscape maintenance with other applicable Sections Section 329300 Exterior Plantings and combine all maintenance activities into one plan of action. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

3. **Irrigation Plan:** Prior to the issuance of Substantial Completion, submit a detailed typewritten approach and schedule that outlines watering requirements for maintaining the landscape as described herein. The Irrigation Plan shall be submitted in conjunction with the Maintenance Schedule. The plan shall address how the irrigation system will be operated during the warranty period, frequencies and durations that will be established to provide the correct watering rates for plants and lawns, inspection protocols and winterization procedures. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Landscape Architect and Owner's Representative. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period), and may be automated with a timer. Supply all water and equipment at the Contractor's expense from a source approved by the Owner's Representative. Reliance on natural precipitation will only be allowed with provision of recorded data from a rain gauge located within a 2-mile radius of the project site. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

4. **Maintenance Report Forms:** Using the approved Maintenance Schedule and Irrigation Plan as the framework for all maintenance activities (plant maintenance, and seed bed maintenance and irrigation operations). The Contractor shall provide detailed maintenance report forms for each site visit. The reports shall be completed by the on-site maintenance superintendent performing the work prior to leaving the site and shall be submitted monthly as back-up to each invoice. Office prepared reports will not be permitted and payment for this work will only be made by the Owner when proof of completed specified maintenance has been provided. Each report shall include the following:

   a. Date of activity.
   b. Length of time on site (start time and finish time).
   c. Name and signature of the maintenance superintendent.
   d. Number of personnel performing the work.
   e. Site climatic conditions (rain, wind, temperature, etc.)
   f. Detailed description of maintenance activities performed by area.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. Include list of at least three similar projects completed in the last 5 years by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

2. Provide resumes of field technician (foreman) responsible for managing the purchase and installation of all materials. Separate resumes shall be provided for the seeding, planting, irrigation and maintenance technicians.

3. License certificates for pesticide applicator.
1.8 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor shall be a company specializing in seeding, sodding, exterior landscape, installations and maintenance, having a minimum 5 years' experience in projects of the scope and scale being specified.
2. Installer's field technician: The installer shall provide a full-time supervisor on site when work is in progress.
3. Maintenance field technician: The maintenance activities for all turf areas shall be performed by skilled employees of the landscape installer. Subcontractors specializing in landscape and turf maintenance will not be permitted unless approved in writing by the Owner's Representative.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding". Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Straw Mulch: Straw mulch shall be stored off the ground under a cover that provides protection from moisture and humidity.

D. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.10 SCHEDULING

A. Work Schedule:

1. Upon authorization to proceed with the work, submit a project work schedule indicating the dates of each of the following items:
   a. Submittal schedule.
   b. Delivery of materials to the site.
   c. Layout of seed bed locations on the site.
   d. Installation including; topsoil placement, fine grading, seeding and sodding.
   e. Substantial Completion of the work.

2. Update schedule monthly to reflect progress of the work.

B. Seasonal Limitations:

1. Seed mixes shall be installed during planting seasons normally recognized in the job locality.
2. Cool Season Grasses: Install during the spring and fall only when soil temperatures are between 50 and 65 degrees Fahrenheit and air temperatures is 60 to 75 degrees Fahrenheit.
   a. Approximate spring installation: Between April 1 and May 15.
   b. Approximate fall installation: Between August 15 and September 30 but no later than 60 days before the first average annual frost date.

3. Dormant seeding: Due to construction operations and schedules, if contractor cannot install seed/sod between April 1 and May 15, Contractor to seed/sod and provide irrigation to the area with Owner Representative’s Approval.

4. If special circumstances warrant installation outside the normal installation season, submit a written request to the Owner’s Representative describing conditions and stating the proposed variance. Seeding/Sodding outside the specified seasons may extend warranty obligations and will be dependent upon the extent of the variance.

5. Weather limitations: Proceed with seeding and sodding only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

6. Coordination with Plantings: Plant trees, shrubs, and other plants after finish grades but prior to lawn installation unless otherwise indicated. When planting trees, shrubs, and other plants after lawn installation, protect completed areas, and promptly repair damage caused by planting operations.

1.11 WARRANTY, MAINTENANCE AND ACCEPTANCE

A. Substantial Completion:
   1. The Substantial Completion inspection shall occur in Spring 2020. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion or correction.
   2. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
   3. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
   4. Substantial Completion will be provided for all lawn areas complying with the following:
      a. Landscape Architect approval of all specified submittals.
      b. The work shall be 100% complete (including all site preparation, earthwork, topsoil, seeding, sodding, mulching, erosion control blanket, planting, irrigation and clean-up), and ready for inspection.
   5. After receiving a Notice of Substantial Completion, warrant and maintain all lawn areas in a vigorous, well-kept condition until Final Acceptance.

B. Final Acceptance:
   1. Approximately two weeks prior to the expiration of the warranty and maintenance period (or sooner if plantings are included in the inspection), the Owner’s Representative will conduct an inspection of all lawn areas, plantings, irrigation system and review all previously submitted maintenance report forms to verify all completed maintenance activities. There shall be thorough documentation previously submitted by the contractor and field observations made by the Owner or Landscape Architect that the specified maintenance has occurred. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
   2. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
   3. Final Acceptance will be based upon Owner approval and the work having:
      a. Uniform finished grades conforming to the drawings and free of erosion.
b. All maintenance items completed and documented by Contractor through maintenance report forms.

c. Satisfactory Seeded Lawn: At end of warranty and maintenance period, a healthy, uniform well-rooted, even-colored, close stand of grass has been established, free of weeds, disease and insect problems, and surface irregularities, with 100% coverage of the specified species.

d. Satisfactory Sodded Lawn: At end of warranty and maintenance period, a healthy, well-rooted, even-colored, viable lawn, free of weeds, disease and insect problems, open joints, bare or dead areas, and surface irregularities.

4. Areas which do not meet the contract requirements shall be regraded as needed and seeded, mulched, sodded. Use specified materials and procedures to reestablish lawn that does not comply with requirements and continue maintenance at no cost to the Owner until lawn is satisfactory.

5. Final Acceptance and the end of the warranty period for the lawns will occur only after all punch list items have been satisfactorily completed and the site is left in the condition specified under Cleanup and Protection.

C. Warranty and Maintenance Period:

1. The end of the warranty and maintenance period shall be:

   a. 1 year following University acceptance of the project

      1) When the initial warranty and maintenance period has not elapsed before end of growing season (October 31), or if lawns are not fully established, continue maintenance during next growing season until all maintenance and warranty obligations have been met.

2. The Contractor will not be held responsible for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents beyond landscape installer's control which result from floods, hail storms, winds over 100 miles per hour, fires or vandalism, unless Contractor has not completed specified installation in a manner that could have protected the landscaping from these phenomena.

3. If, in the opinion of the Owner's Representative it is advisable to extend the warranty and maintenance period for an additional growing season, the contractor will be notified of such requirement by the Owner. Improper execution of the installation and/or failure to perform and document the specified maintenance in accordance with contract requirement shall be the basis for extending the period of establishment for a second growing season. All specified maintenance and warranty requirements will be required during this extended period and all costs shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Other varieties that those specified may be submitted for approval to Landscape Architect, but they must be newer, more improved cultivars than what is listed.

C. Dormant seeding shall only be permitted if approved by Landscape Architect in writing. Apply seed at a rate that is 25 percent higher than the rates specified below.

D. Seed Species:
1. The University prefers to use a Sun and Partial Shade Blend. If contractor would like to suggest a different blend for the restoration around the perimeter of the synthetic turf field, please contact the Landscape Architect.

2. Quality: Seed of grass species as listed below for solar exposure, with not less than 90 percent germination, not less than 98 percent pure seed, and not more than 0.3 percent weed seed:

3. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   a. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

4. Sun and Partial Shade Blend: Proportioned by weight as follows:
   a. 60 percent Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   b. 30 percent fine fescue (Festuca), a minimum two varieties; chewing and creeping red.
   c. 10 percent perennial ryegrass (Lolium perenne).
   d. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

5. Shade Blend: Proportioned by weight as follows:
   a. 65 percent fine fescues (Festuca), a minimum of three varieties consisting of chewing, creeping red and hard.
   b. 25 percent Kentucky bluegrass (Poa pratensis), a minimum two turf type varieties.
   c. 10 percent perennial ryegrass (Lolium perenne), use shade tolerant variety.
   d. Install at a rate of 6 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

6. Shade and Sun Fescue Blend: Proportioned by weight as follows:
   a. 100% turf type tall fescue (Festuca) consisting of a minimum 3 improved varieties.
   b. All varieties shall be labeled endophyte free or contain beneficial endophytes.
   c. Install at a rate of 8 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

2.2 TURFGRASS SOD

A. Provide an approved nursery grown, Number 1 Quality/Premium sod, complying with “Specifications for Turfgrass Sod Materials” in TPI’s “Guideline Specifications to Turfgrass Sodding”. Furnish sod comprised of the specified species and of uniform density, color, and texture, strongly rooted, weed free and capable of vigorous growth and development once installed. Sod shall be 2 years old and shall have been grown at a sod nursery in a mineral-based root zone. Sod grown on peat (organic soil) will not be approved. Sod shall be free of objectionable grassy and broad leaf weeds.

B. Thickness and width of sod shall be kept to strict dimensions, with width being 24” and containing 90-degree angle cut edges. Netting associated with harvest must be removed before installation.

C. Turfgrass Sod Species: Sod of grass species as follows, with not more than 0.5 percent weed seed:

   1. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   2. Sun and Partial Shade: Proportioned by weight as follows:
      a. 60 percent Kentucky bluegrass (Poa pratensis), a minimum of two improved turf type varieties.
      b. 40 percent chewing red fescue (Festuca rubra variety) a minimum of two varieties.
   3. Shade: Proportioned by weight as follows:
      a. 60 percent fine fescues (Festuca), a minimum of two varieties; chewing, creeping red and
2.2 TURFGRASS-SOD
b. 40 percent Kentucky bluegrass (Poa pratensis), a minimum of two turf type varieties.

D. Turfgrass-Sod Species: Proprietary blend as follows: <insert sod product name and supplier>.

E. Sod Stakes: Sod Stakes shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer spacing and installation instructions.

2.3 STRAW MULCH
A. Straw Mulch: Provide stalks from oats, wheat, rye, barley or rice that are free of weeds, air-dry, clean, mildew- and seed-free, threshed straw of wheat, rye, oats, or barley.

1. Straw shall be in an air dry condition and suitable for placing with commercial mulch blowing equipment.

B. Tackifier

1. Hydraulically applied tackifier shall be an organic based or polymeric emulsion blend designed for use over long-fibered mulch (straw). Tackifier shall:
   a. Be powder or liquid based
   b. Achieve a drying time between 12 and 18 hours
   c. Minimum 4 month longevity after application

2. Asphalt Emulsion tackifier is not permitted.

2.4 HYDRAULIC MULCH
A. Hydraulic mulch is not permitted.

B. Hydraulic Mulch: Provide biodegradable, cellulose fiber mulch made from 100% post-consumer recycled paper, or a combination of 70% recycled wood fiber and 30% post-consumer recycled paper cellulose fiber. Mulch should be processed to contain no growth or germination-inhibiting factors, nontoxic and dyed an appropriate color to facilitate visual metering of the application of materials. On an air-dry weight basis, provide hydroseeding mulch containing not more than 12 percent moisture, plus or minus three percent at the time of manufacture, with a pH range from 3.5 to 5.0 for wood/cellulose fiber blends and from 5.0 to 9.0 for 100% cellulose fiber mulch. Provide hydraulic mulch manufactured so that:

1. After addition and agitation in slurry tanks with the fibers, tackifier and water, the material will become uniformly suspended to form an homogeneous slurry. Mixing the lawn seed, fertilizers and soil amendments is prohibited.
2. When hydraulically sprayed on the ground, the material will form a blotter-like cover.
3. The cover will allow the absorption of moisture and allow rainfall or applied water to percolate to the underlying soil.

C. Hydraulic Mulch Tackifier

1. Binding agent shall clear and non-staining and result in a stabilized fiber matrix consisting of wood and/or paper fibers and a stabilizing emulsion that includes a hydro-colloidal tackifier and polycarbonate flocculant specific to hydraulic mulch applications.
2. Use products as recommended by fiber-mulch manufacturer for slurry application.
3. Asphalt Emulsion tackifier is not permitted.
2.5 EROSION CONTROL BLANKET

A. Erosion Control Blanket - [Type 1]: Intended for use on flat surfaces or slopes 4:1 (H:V) or greater where only sheet flow will be encountered.

1. Straw/jute blanket shall be constructed with a 100% agricultural straw matrix (0.5 lbs per square yard), with jute or cotton netting on top and bottom, sewn together with biodegradable cloth thread. The blanket shall be 100% biodegradable, and have a typical functional longevity of 12 months after installation. Plastic netting will not be permitted.

B. Erosion Control Blanket - [Type 2]: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 8 feet per second (fps).

1. Straw/coconut fiber blanket shall be constructed with 70% agricultural straw (0.35 lbs per square yard), and 30% coconut (coir) fiber matrix (0.15 lbs per square yard), with 100% woven jute netting on the top and bottom, sewn together with biodegradable cloth thread. The Blanket shall be 100% biodegradable, and have a typical functional longevity of 18 months after installation. Plastic netting will not be permitted.

C. Erosion Control Blanket - Type 3: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 10 feet per second (fps).

1. Coconut fiber blanket shall be constructed with 100% coconut (coir) fiber matrix (0.50 lbs per square yard), with 100 % woven coir fiber netting on top and 100% woven jute netting on the bottom, sewn together with biodegradable cloth thread. The Blanket shall be 100% biodegradable, and have a typical functional longevity of 24 months after installation. Plastic netting will not be permitted.

D. Fasteners: Fasteners shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer’s spacing and installation instructions.

2.6 EQUIPMENT

A. Tiller:

1. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 2:1 (H:V): A minimum D-7 size tractor with a mounted ripper consisting of 3 to 5 tines spaced a maximum 24 inches apart. Tines shall be equipped with 12 inch wide winged ripper points and shall be capable of penetrating subsoils up to 24 inches deep in one pass.

2. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 4:1 (H:V): A tractor mounted disk harrow consisting of 6 – 12 offset disks weighing a minimum 1,800 pounds each. The harrow shall be capable of penetrating subsoils up to 18 inches deep in one pass.

B. Fine Grading: Hand rake, tractor mounted york rake or other similar equipment.

C. Hydroseeder: Hydroseeding will not be permitted.

D. Hydroseeder: A truck-mounted, hydraulically driven variable speed agitation seeder that effectively shoots an aqueous mixture of seed, fertilizer, and mulch over broad areas through a discharge boom and hydraulic hose. Minimum tank capacity shall be 1,000 gallons.

E. Drop Spreader with Cultipacker, as manufactured by Brillion or John Deere or equivalent.

F. Broadcast Seeding: A spinning-disc type broadcaster with a calibration gauge (hand held and tractor mounted) shall be used to broadcast the seed over the designated areas.
G. Seed Imprinting Equipment: Used with spinning-disc type broadcaster to lightly cover or press seed into the soil. A tractor or all-terrain vehicle mounted dragging devise consisting of anchor chains, disk chains, cables, chain harrow or other similar equipment.

H. Straw Mulcher: A power mulcher that thrashes and separates, then evenly distributes the straw at a capacity between 2 and 20 tons per hour, with a discharge distance between 35 and 100 feet in still air.

I. Crimping Device: A mulch disc or other mechanical anchoring/crimping device for use in anchoring straw mulch into place, such as a Reinco Model MD-96 or equivalent, having flat discs with notched edges spaced 8” apart to impress mulch 1-3” down into soil.

2.7 WATER

A. Water for lawns shall be available from on-site sources.

B. Water shall be free of wastewater effluent or other hazardous chemicals

2.8 TOPSOIL

A. Refer to Section 329100

2.9 SOIL AMENDMENTS

A. Peat shall be a product having at least 95% organic content consisting of sphagnum peat moss with a pH range of 3.0 – 4.0 and Von Post decomposition value of H1 – H3, or low-lime reed-sedge peat with a pH range of 4.0 to 5.0 and Von Post decomposition value of H4 – H6. Product shall be free of sticks, wood or other debris.

B. Compost shall be a heavily decomposed mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings or other compostable materials. Manure is not suitable for use. The compost shall have a dark brown or black color, be capable of supporting plant growth without ongoing addition of fertilizers or other soil amendments and shall not have an objectionable odor. The compost shall be free of plastic, glass, metal and other physical contaminants, as well as viable weed seeds and other plant parts capable of reproducing (except airborne weed species). Composting facility shall be tested in accordance with the United States Composting Council, Seal of Testing Assurance (STA) following procedures as outlined in the Test Methods for the Examination of Composting and Compost protocols (TMECC).

1. pH: 5.5 to 8.
2. Moisture content: 35 to 55 percent by weight. No visible free water or dust is produced when handling it.
3. Sieve analysis: 100 percent passing ¾ inch screen.
4. Soluble salt content: Less than 5 percent.
5. Organic matter content: Minimum 60 percent.

C. Sand shall be clean, coarse, ungraded, meeting the requirements of ASTM C33 for fine aggregates.

D. pH Adjusters:

1. Lime shall be finely ground agricultural grade dolomitic limestone containing not less than 85% calcium and magnesium carbonates conforming to ASTM C602, Class T or O.
2. Elemental sulfur shall be granular, biodegradable, horticultural grade material containing at least 90% sulfur, with a minimum of 99% passing through No. 6 sieve and a maximum of 10% passing
through No. 40 sieve.

E. Mycorrhizal Inoculum:

1. Mycorrhizal fungi in the inoculant shall be available as propagules, i.e., spores, root fragments and hyphae. The inoculant shall contain highly selected strains of low host specificity endo- and ectomycorrhizal fungi combined with other beneficial fungi (Trichoderma), humic acids, bio-stimulants, beneficial bacteria, soluble sea kelp, and yucca plant extracts, as manufactured by Horticultural Alliance or approved equal. The selection of inoculants shall be based upon fungal partners that are compatible with the specified turf grasses.

2.10 FERTILIZER

A. Fertilizer shall be a complete fertilizer of neutral character, consisting of fast and slow-release nitrogen and shall be applied at the rates and formulations that release nutrients when new plants can effectively draw them from the soil.

1. The percentages of slow release and fast release nitrogen shall be adjusted based on the time of year fertilizers are being applied.
2. For fall seeding, the percentage of slow-release nitrogen shall be higher than spring seeding since a high percentage of fast-release nitrogen will be mostly lost by runoff or infiltration before plant uptake.

B. Composition: The percentages by weight shall be determined per recommendations of the soil testing reports for lawns.

2.11 PESTICIDES

A. General: Pesticide and herbicides shall be registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides and herbicides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within seeded areas at the soil level.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General:

1. The Contractor shall establish a quantifiable system to be employed in the field for measuring areas, weighing products and calibrating equipment on a daily basis to ensure all products are installed at the specified rates of application.
2. Prior to beginning work, examine and verify the acceptability of the project site and notify the Owner’s Representative of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
3. Identify areas of subsoil compaction prior to placement of topsoil.
4. Verify that no foreign or deleterious material has been deposited in soil within a planting area.
5. Where lawn installation occurs in close proximity to other site improvements, provide adequate protection to all features prior to commencing work. Promptly repair any items damaged during installation operations to their original condition.

6. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

7. Suspend spoil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

8. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

9. If lawn areas die or are rejected due to non-conformity to contract requirements, they must be removed from the site immediately and replaced before Substantial Completion.

B. Utilities: Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand-excavate to minimize possibility of damage.

C. Coordination with Other Work:

1. The Contractor shall coordinate work with other contractors or trades to determine the appropriate sequence of landscape installation with respect to other work on the site.

2. Completed work installed out of construction sequence which is subsequently disturbed by the completion of work by other trades shall be repaired by the landscape installer at no cost to the Owner.

3. Maintain grade stakes and layout controls set by others until removal is mutually agreed upon by all parties concerned.

3.2 SUBGRADE PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by lawn installation operations.

B. Install erosion control measures, if necessary, to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties, natural resources and walkways.

C. Vegetation Removal: Strip and dispose of organic debris and root mat.

D. Topsoil stripping, stockpiling: Refer to Section 311000 - Site Clearing.

E. Maintain subgrade in areas to be topsoiled in a uniform condition so as to prevent future depressions. Prior to placing topsoil;

1. Till all subsoils to a minimum depth of 18-inches with approved equipment to remove all compacted subsoils. Tilling shall be complete breaking thoroughly fracturing. Perform tilling in two directions, one perpendicular to the other.

2. Upon completion of tilling, the subsoils will require light compaction and leveling to prevent ponding of water and settlement after topsoil placement. As a final operation, a light-weight tracked dozer shall be employed that will remove surface irregularities and prevent excessive settlement. During this procedure, the surface of the subsoil on slopes greater that 4:1 (H:\V) shall be imprinted with tracks from the dozer. Imprinting shall be perpendicular to the slope and shall be approximately one-inch deep.

3. Do not proceed with topsoil placement until subgrade tilling and imprinting is completed to the satisfaction of the Landscape Architect.

4. Repair disturbances to previously graded areas and remove surplus subgrade material associated with any landscape construction.

F. If the prepared subgrade is eroded or compacted by rainfall prior to topsoil placement, rework the surface as specified.

G. In locations where existing topsoil has not been removed, till entire area in accordance with paragraph E above. Do not till within dripline of existing trees.
3.3 PLACING TOPSOIL, SOIL AMENDMENTS AND FERTILIZER

A. Provide, fertilize and amend topsoil in accordance with testing laboratory recommendations specified under Section 329113 "Soil Preparation (Topsoil)".

B. Uniformly distribute topsoil on lawn areas so that after light compaction and finish grading, a uniform depth of 4-inches is achieved. Reduce elevation of planting soil to allow for thickness of sod. Placement shall include spreading, cultivating, lightly compacting, dragging and grading to the conditions specified below.

C. Topsoil, when placed, shall be dry enough so as not to puddle or bond. Do not place topsoil when the subgrade is frozen, excessively wet, extremely dry or in a condition otherwise detrimental to proper grading or lawn operation.

D. Following topsoil placement but prior to finish grading, broadcast all soil amendments and fertilizer and rototill into the topsoil. The coverage areas for soil amendments and fertilizer shall be carefully calculated by the installer and fully blended into the entire topsoil profile. Do not incorporate soil amendments and fertilizer more than 5 days in advance of seeding.

E. Mycorrhizal Inoculum:
   1. Rototill two granular pounds per 1,000 square feet of seed bed into the top four to six inches of topsoil or as recommended by supplier.

3.4 PRE-INSTALLATION PREPARATION

A. Finish Grading:
   1. Immediately before lawn installation scarify, loosen, float, and drag topsoil as necessary to bring it to the proper condition. Remove all foreign matter larger than 1” in diameter. There shall be no visible plants, roots, debris or any foreign material present prior to installation.
   2. Finished grades shall slope to drain, be free of depressions or other irregularities, lightly compacted to prevent settlement, and shall be uniform in slope between grading controls and the elevations indicated.
   3. Finished grade for seeded lawn areas shall meet existing grades at contract limits and be ½” below top of curbs, walk paving, and metal edging if used.
   4. Finished grade for sodded areas shall meet existing grades at contract limits and be 1” below top of curbs, walk paving, and metal edging if used.

B. Before lawn installation obtain Landscape Architect's acceptance of finish grading. Restore seedbed areas if eroded or otherwise disturbed after finish grading.

3.5 SEEDING AND MULCHING

A. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.

B. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean seeding, dragging, mulching, crimping and tackifier.

C. Seeding Procedures:
   1. Do not sow seed when weather conditions are unfavorable, such as during drought or high winds.
   2. Perform seeding with only approved equipment. Do not broadcast or drop seed when wind velocity exceeds 10 mph.
3. Sow the seed uniformly at a rates specified under 2.1 of this section. For dormant seeding, increase seeding rates by 25% (if accepted by Owner’s Representative).

4. Do not use wet seed or seed that is moldy or otherwise damaged.

5. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucers, plant beds and other seed beds.

6. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

7. Immediately following seeding, rake, drag or float all seed beds to provide a light covering of topsoil approximately 1/8 inch deep. When using equipment that lightly injects the seed into the soil, include equipment that lightly rolls the seed bed to provide good moisture contact between the seed and soil.

8. Maintain soil moisture in accordance with 3.11 below.

D. Mulching Procedures:

1. Do not use any straw that contains weeds and other plants that will contaminate the seed beds with unspecified plants. Carefully inspect each bale of straw prior to spreading and any bales observed to be contaminated with weeds shall be removed from the site on a daily basis.

2. Do not mechanically blow straw when wind speeds exceed 10 mph.

3. Remove all straw that has been deposited outside the limits of seeding and on adjacent pavement, plant beds and tree saucers.

4. Spread straw mulch evenly at the rate of approximately 2 tons dry straw per acre. Place all mulch over all seeded areas within 24 hours after seeding. A mechanical blower or hand spreading shall be used to apply mulch material, provided the machine has been specifically designed and approved for this purpose. Mulch shall be uniform in thickness and cover resulting in a blanket of straw approximately 1 ½ inches loose thickness with little to no visible soil.

5. Slopes 4:1 or steeper and drainage swales shall be stabilized with erosion control blanket in accordance with 3.12 below.

6. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with 3.12 below at no additional cost to the Owner.

E. Anchoring Mulch Procedures:

1. Anchor the mulch by using both an approved crimping device and applying tackifier on the mulched surface immediately following mulching operation.

2. Mulch shall be crimped in all seed beds where slopes are less than 4:1 (H:V) and of sufficient width to allow equipment to perform crimping without damaging the finish seed bed. Crimp all locations in two directions. When finished, straw shall be anchored one to two inches into the seed bed in rows no more than eight inches apart.

3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.

4. Any seed and mulch displaced due to improper crimping and bonding with tackifier shall be immediately replaced to the specified condition at no addition cost to the Owner.

3.6 HYDROSEEDING AND HYDROMULCHING

A. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.

B. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.

C. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean, seeding, mulching, crimping and tackifier.

D. Hydroseeding and mulching shall be installed as a two-step process.
1. Step One: Apply the seed and water slurry at the specified seed-sowing rate, with a light application of an approved hydraulic fiber mulch tracer.

2. Step Two: Apply the specified straw mulch and tackifier at specified rate, see 3.5 D and E above. Combining both steps into one will not be permitted.

E. Hydroseeding – Step One Procedures:

1. Fertilizer and soil amendments shall be applied as specified under 3.3 above and shall not be included within the step one slurry.

2. Apply seed on the previously prepared bed at the rates specified under 2.1 of this section. For dormant seeding, increase seeding rates by 25%.

3. Water used shall be obtained from fresh water source, and shall be free from injurious chemicals and other toxic substances at all times. Identify to the Owner all sources of water at least two weeks prior to use. The Owner, at his/her discretion, may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content.

4. Mixtures shall be constantly agitated from the time they are combined until they are finally applied to the seed bed. Once combined, mixtures shall be used within 8 hours.

5. Apply slurry uniformity and at the prescribed rate, avoiding misses and overlapping areas, gauging quantities of mixtures to measured application areas. Checks on the rate and uniformity of application may be made by the Landscape Architect observing the degree of wetting, or by distributing test sheets and observing the quantity of seed deposited thereon.

6. Direct application nozzle sufficiently upward so that the mixture falls to the ground in a uniform shower. Never direct spray toward the ground in a manner that produces erosion or runoff. Discontinue application during periods of high wind that affect the ability to properly apply the seed at a uniform cover.

7. Maintain soil moisture in accordance with 3.11 below.

F. Mulching – Step Two Procedures:

1. Hydromulching is not permitted. Apply straw mulch and erosion control blanket and anchor to soil as specified under 3.5 above.

2. Mulch all seeded areas with specified hydraulic mulch following the same requirements outlined under 3.6 E above.

3. Hydraulic mulch shall be applied at the following rates:
   a. 100% cellulose fibers: 2,000 lb/acre on slopes flatter than 4:1 (H:V).
   b. 70% wood fiber / 30% cellulose fiber: 2,500 lb/acre of slopes flatter than 4:1. (H:V).

4. Slopes 4:1 or steeper shall be stabilized with erosion control blanket in accordance with 3.12 below.

5. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with 3.12 below at no additional cost to the Owner.

G. Anchoring Mulch Procedures:

1. Spray hydraulic mulch tackifier concurrent with or immediately after mulching following the same requirements outlined under 3.6 E above.

2. Use only an approved tackifier applied at the rate recommended by the manufacturer.

3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.

4. Any seed and mulch displaced due to improper installation of tackifier shall be immediately replaced to the specified condition at no addition cost to the Owner.
3.7 TURF RENOVATION

A. All preparation work shall be conducted in accordance with 3.1 through 3.4 above. Following surface preparation, lawn installation shall be completed in accordance with the applicable lawn installation methods specified above. Blend newly seeded areas into adjacent existing lawns.

B. Renovate existing lawns where indicated. In areas where diseased or contaminated lawns are identified, remove existing topsoil and dispose off site.

C. Renovate lawns damaged by Contractor's operations, such as storage of materials, haul roads or other areas outside the limits of work.

D. Renovate lawns where topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations has occurred. Remove existing topsoil and dispose off-site.

E. Mow, dethatch, core aerate, and rake existing turf where identified.

F. Maintain soil moisture in accordance with 3.11 below.

3.8 WATERING

A. Watering Procedures:

1. Immediately following lawn installation water all bed areas thoroughly and immediately with a fine mist until soil is soaked to a depth of at least 2-inches or as indicated above. Puddling of water or allowing the seedbed to dry is unacceptable.

2. For seeded areas, maintain soil in a moist condition (in hot dry weather irrigation may be required 2-4 times per day) until seeds have sprouted and reached a height of 1-inch. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering. Provide irrigation to moisten soil to a depth of 4" to encourage deeper rooting.

3. For sodded areas, begin watering the entire area within 24 hours of installation and water daily for the first two weeks; twice a day in hot dry weather. Keep soil in all areas moist but not soaked to 2-inches below the bottoms of the plants. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering until Final Acceptance. During this period, moisten soil to a minimum depth of 4" to encourage deeper rooting.

4. Watering at accelerated rates that dislodge seed and mulch materials or cause erosion shall be immediately repaired at no cost to the Owner.

3.9 EROSION CONTROL BLANKET

A. Erosion Control Blanket Procedures:

1. Install erosion control blanket as indicated in on the Plans and all seed beds with slopes 4:1 (H:V) or steeper.

2. Immediately following seeding, erosion control blanket shall be rolled out in place in the direction of the slope fall line. The material shall be applied without stretching and shall lie smoothly but loosely on the soil surface. Installers shall minimize walking directly on the seed or topsoil bed either before or after the blanket is applied.

3. All ends shall be buried a minimum of 4 inches deep and the trench shall be firmly tamped after closing.

4. In cases where roll ends join, the up-slope piece shall overlap the down-slope piece by at least 18 inches.

5. Anchor edges prior to backfilling trench, all overlaps at 12-inch intervals, and the center of each panel on 3-foot intervals.

6. The upslope ends of the blanket shall be buried a minimum of 6 inches deep and anchored at 12-inch intervals prior to backfilling trench.
3.10 MAINTENANCE

A. General: Maintain and establish lawn areas by watering, fertilizing, pest and weed control, litter removal, mowing, trimming, repairs, and performing other operations as required to establish healthy, viable lawn. Maintenance shall also include grade repair, seeding, sodding all associated soil amendments and fertilizers.

B. Provide all maintenance under the supervision of a skilled employee of the lawn installer. The skilled maintenance supervisor shall be: capable of operating the automatic irrigation system controller, conducting turf diagnostics to identify the presence of disease, insect and fertility problems, and directing a maintenance crew in the performance of horticultural maintenance practices identified below. Maintenance requirements identified below shall be the basis for information to be included in the Maintenance Schedule and Irrigation Plan identified under 1.5.C of this section and thoroughly documented under the required Maintenance Report Forms to verify the work has been properly performed.

1. Failure to perform and submit factual Maintenance Report Forms could result in non-payment for said services and require the extension of the warranty and maintenance period an additional year at the Contractor's expense.

C. Provide all equipment, materials, labor and services to maintain the landscape beginning immediately after each area is installed and continuing until Final Acceptance and the end of the warranty period. During this period, perform the following:

1. Inspect the entire landscape at least once per week during the growing season and perform needed maintenance promptly.
2. Prior to each mowing, collect all debris, litter and miscellaneous materials accumulating on the site and remove from the site.
3. Irrigation: Irrigate all turf areas to maintain optimum moisture within the root zone as specified under 3.11 above. When using an automatic sprinkler system, the lawn installer responsible for maintenance shall bear full responsibility to set each zone to the correct frequency and duration.
4. Mow all lawns weekly during the growing season and as described below. Mowing frequencies shall be adjusted based on cutting requirements and may require more frequent visits during high growth periods. Use mulching mower only with sharpened blades and alternate direction of each mowing session to prevent rutting.
5. Fertilize as described below.
6. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Apply herbicides and pesticides as described below.
7. Remove leaves bi-weekly during the fall as they accumulate on the lawns. Bag and dispose off-site. Do not mow in advance of leaf removal.
8. Repair bare, eroded or settled areas and restore to provide a uniformly smooth lawn with the specified grasses. Provide same materials and installation procedures as those used in the original installation.
9. Reclaim/replace soil materials and turf damaged or lost in areas of subsidence. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth lawn.
10. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

D. Mowings: Mow turf as soon as top growth is tall enough to cut. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. At the time of each mowing, adjust mowing equipment to meet this requirement. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass, fescue to a height of 2-1/2 to 3-inches.
2. For sodded lawns wait at least 2 weeks after installation for first mowing.
3. Mowing heights may increase during the hot summer months based on regional conditions.
4. Collect all grass clippings if mowings are not sufficiently timed to allow for composting into the existing lawn and accumulations of clippings can be observed on the surface of the grass. Collection and off-site disposal shall be performed at no additional cost to the Owner.

3.11 POST-INSTALLATION FERTILIZATION

A. Apply fertilizers at the time of season, rate of application and grade of N-P-K that maximizes the health of the lawn and minimizes the potential run-off of fertilizers to adjacent waterways and groundwater. Avoid the use of phosphorus unless site soils are deficient of this nutrient.

B. During the warranty and maintenance period, fertilize warm season grasses three times and cool season grasses two times during the growing season.

C. Test site topsoil in early-spring and base actual rates on testing recommendations.

D. Apply fertilizer during the following dates;
   1. Spring (April / May): Cool season grasses: After the second spring mowing apply fertilizer at a rate of 1 lb. actual nitrogen per 1,000 square feet of lawn. Nitrogen shall be 70% slow-release. Avoid the use of phosphorous and apply at 4-0-1 ratio of N-P-K.
   2. Fall (September/October): Warm and cool season grasses: 8 weeks following application of spring apply fertilizer at a rate of 1.5 lbs. actual nitrogen per 1,000 square feet of lawn. Nitrogen shall be water soluble, quick release. Avoid the use of phosphorous and apply at 3-0-1 ratio of N-P-K.

3.12 PESTICIDE APPLICATION

A. Apply pesticides, and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Protect newly seeded areas from stormwater flows discharging from paved surfaces until grass establishment. Additional water diversion and erosion control measures such as wattles and check dams may be utilized at Contractor's discretion and expense.

E. Remove nondegradable erosion-control measures after grass establishment period.
1.1 SUMMARY

A. In the event of conflict between this specification section ONLY and the WSU Division 0 specifications, the WSU Division 0 specifications shall prevail.

B. The following General Requirements are in addition and supplementary to the terms and conditions stated in the "The Contract Agreement." It is the intent of these General Requirements to work together with the specified requirements of the Contract Agreement to define the terms and conditions agreed to between Wayne State University and the Contractor for the performance of the Work. In the event there are any conflicts or specific contradictions between the Sections, the terms set forth in the Contract Agreement shall take precedence. Unless specifically mentioned otherwise, all costs to meet the conditions and requirements of these General Requirements shall not be paid for separately but shall be incorporated into the Contractor's pay item pricing.

C. Work covered by Contract Documents is as stipulated within this project manual and as accompanied by drawings.

D. Interpretation of drawings and order of precedence

E. Specifications shall have precedence over all drawings

F. Larger scale drawings shall have precedence over smaller scale drawings

G. Schedules and Tables shall have precedence over detail drawings and sections

H. Detail drawings and sections, shall have precedence over smaller scale drawings

I. Definitions. The following terms are used throughout the Contract Documents. The work will be governed in accord with the definitions.

1. Owner: Shall mean Wayne State University
2. Owner's Representative: Wayne State University, Design and Construction Services Project Manager.
3. Professional Service Consultant: Shall mean SmithGroup. Note that any reference to Inspection or Inspector in Division 01 through Division 35 shall not be defined as SmithGroup, but shall mean the testing agent, inspector, permit reviewer, compliance officer or other as defined within each section. Coordinate with Owner's Representative.
4. Fabricated: Fabricated pertains to items specifically assembled or made of selected materials or components to meet individual design requirements.
5. Manufactured: Manufactured means standard units, usually mass-produced by an established manufacturer of the respective item.
7. Shop fabricated or shop made: Shop fabricated or shop made refers to items made by a Contractor or Subcontractor in their own Shop.
1.2 SUBMITTAL OF SHOP DRAWINGS
A. The Contractor shall submit the requisite shop drawings and catalog documents for any material or equipment proposed to be utilized in the performance of the Work to the Owner's Construction Engineering Inspection Consultant, which shall distribute the Submittals to the Landscape Architect/Civil Engineer with a copy to the Owner. The Contractor shall transmit said submittals to the Landscape Architect/Civil Engineer in a form and manner that would allow the Landscape Architect/Civil Engineer to review the submittals in an efficient and timely manner. The Design Engineer will review each submittal for compliance with the Contract Documents. If a submittal is found to be non-compliant, then the submittal will be returned to the Contractor to be corrected. Finally, after the Landscape Architect/Civil Engineer have reviewed and approved the submittals, the Contractor shall distribute the final submittal copies to the Owner as part of the close out documents.

1.3 AS-BUILT RECORDS
A. A set of Construction Documents shall be marked as As-Built Drawings and be maintained at the Project site by the Contractor for the purposes of making all changes, revisions, relocations, reroutes, or variances in the Work that differ from the Construction Documents. The As-Built Drawings shall be made accessible to all of the Contractor's subcontractors for recording any changes, field sketches, revisions, relocations, reroutes, or variances in the Work. The completed set of As-Built Drawings shall be transmitted to the Owner upon completion of the Work provided in a timely manner and in AutoCAD 2010 version or later, to the County. Field sketches and installation records, other than shop, fabrication, or field installation drawings, shall not be submitted separately but shall be recorded on the As-Built Drawing set only.

1.4 PROJECT MEETINGS
A. The Contractor shall arrange and conduct scheduled progress meetings determined by the Owner's Representative and prepare and distribute meeting minutes. Special meetings for the purposes of coordinating and monitoring the work progress, identifying problems, informing subcontractor and Project participants of project status, stressing safety, coordinating construction details and inspecting quality conformance shall be conducted as required to assure the smooth and uninterrupted progression of the Work.

1.5 FIELD OFFICE BUILDINGS, SHEDS, AND TEMPORARY STORAGE AREAS
A. The Contractor shall provide all temporary field offices and storage area enclosures to conduct the Work and properly administrate the Work. The Contractor may locate field offices and storage areas on site at Contractor's discretion, and subject to Owner Representative's location approval, but Contractor will have full responsibility to maintain access to the Work and the work of the Owner. Any relocation of the Contractor's temporary facilities required to provide access for installation of utilities or the Owner shall be done to maintain the schedule at no cost to the County. The appearance of field offices is subject to the reasonable approval of the County.

1.6 TEMPORARY PROJECT SIGN
A. The Contractor, may at its own expense design, fabricate and construct one (1) Project Identification Sign for the purpose of advertising the Project. Contractor to coordinate with Landscape Architect/Civil Engineer for rendered graphics of proposed site. The sign shall be constructed of exterior grade wood, with weather resistant graphics and hardware and shall be a maximum of 16 square feet. The design and content of the sign shall be subject to the approval of the County.
1.7 CONSTRUCTION SEQUENCING AND NOTIFICATION PLAN

A. The Contractor must submit to the Owner’s Representative, Landscape Architect and Owner a detailed plan, which shall delineate the sequence of the various construction activities that will occur on the Project Site, all road closure requirements (including closure time duration on a per block basis) and proposed measures to maintain reasonable and safe access for the stakeholders and business owners which may be affected by construction activities. The Construction Sequence and Lane closure plan shall be provided to the Owner’s representative at the time of the Contractor's first proposed Schedule submittal to the County, due within 7 days of the County providing the Contractor with a Notice to Proceed. The County at its sole discretion will determine the reasonableness of the Contractor’s plan to provide and maintain pedestrian and vehicular access. The Plan has to be approved by the Owner’s Representative, Landscape Architect and Owner before the Contractor will be allowed to commence work on the Project Site. Owner’s Representative to provide dates and limitations to site for Fairground events during the time of construction.

B. The Contractor shall designate only one (1) individual who will be assigned to the work throughout its entirety to be responsible for all communications with the stakeholders in the project area. The Contractor shall notify the stakeholders in writing at least thirty (30) days prior to the anticipated start of construction activities and again not less than seven (7) days prior to the actual start of construction activities. The Contractor may be required to fabricate and post signage in various locations on the project site advising the stakeholders in the project area of the forthcoming construction activity.

1.8 CONSTRUCTION PARKING

A. The Contractor shall be responsible for its employees’ and subcontractors’ vehicles while parked on or off the construction site. Any vehicle found to be owned by the Contractor’s employee or an employee of the Contractor's subcontractor parked illegally may be towed away by the County and charged to the Contractor by Change Order. The County reserves the right to deny parking privileges on the Project site to any individual who parks a vehicle improperly or operates any vehicle in an unsafe manner.

1.9 WATER SERVICE

A. If required for construction purposes, the Contractor will arrange for, or otherwise furnish, and pay for water required for the Work. The Contractor shall be responsible to provide and maintain connections, backwater valves, valves, and pipe that may be required to supply water at a point convenient to the work area. The locations of the connections shall be acceptable to Water Department.

1.10 TEMPORARY POWER, LIGHTING AND PHONE SERVICE

The Contractor will furnish and pay for electrical power and telephone service necessary for the Work including labor, equipment and materials required to make connections to power sources and to provide and pay for any required temporary electrical power and light at location of work. Temporary equipment and wiring for power, lighting and distribution requirements shall be in accordance with applicable provisions of governing laws, codes and ordinances. The Contractor shall maintain temporary wiring and related equipment so as not to constitute a hazard to persons or property. County may possibly provide electric to site. Temporary electrical power may be needed for portion of work.

1.11 TOILET FACILITIES

A. The Contractor shall arrange for, provide (per OSHA guidelines) and maintain temporary on-site sanitary toilet facilities for use by the Contractor and County for the duration of the Work.
1.12 WEATHER PROTECTION
A. The Contractor shall provide weather protection, including pumping water and temporary heat and ventilation as required during construction to protect the Work from damage due from freezing, frost, rain, dampness, excessive heat or other adverse elements and as required to maintain the continuous progression of the Work without stoppage due to the weather. This shall include hot and cold weather concrete placement protections recommended by the American Concrete Institute.

1.13 EXISTING SITE CONDITIONS
A. The information in this Bid Package is intended to orient the Contractor to the site. The Contractor will be responsible to thoroughly evaluate the site conditions for construction requirements. It is the responsibility of the Contractor in conjunction with the utility companies to verify the exact types and locations of existing utilities. All damage to existing utilities, caused by the Contractor, shall be repaired at Contractor’s expense, in accordance with the standards of the applicable City department or private utility company.

1.14 UTILITY SHUT-OFF REQUIREMENTS
A. The Contractor shall coordinate all utility shut-offs with the Utility Companies and departments to permit the proper and safe performance of the Work as scheduled. The Contractor shall have the full responsibility for contacting MISSDIG at least 72-hours prior to any subsurface excavation.

1.15 FIRE HYDRANT RELOCATION
A. Contractor to coordinate with University Project Management, Fire Marshal and any other required University or City Department to relocate any fire hydrant. The Fire hydrant to be relocated shall move directly east, using the same water line. Relocation of the hydrant requires all University standard equipment that meets all necessary life safety codes. Adjacent structures and Athletic Facilities along pedestrian corridor do not have sprinklers. Fire hydrant relocation shall be coordinated to have the water service shut off for a minimum period of time. Max 1 day. Contractor to coordinate.

1.16 PROTECTION
A. The Contractor shall provide site protection, traffic controls and barricades as required to secure the site from trespassers and the general public. The Contractor shall install, in conformance to the requirements of the governing road/street authority, traffic controls for all work performed in the rights-of-way including curb cuts and utility taps.

1.17 REPLACEMENT OF DAMAGED WORK
A. The Contractor shall be responsible to pay all costs for the timely (within schedule parameters) replacement or restoration of any portion of the Facility damaged by fire or other cause during construction to the extent that such damage is a result of the negligence or a faulty installation made by the Contractor or its subcontractors.
1.18 EMERGENCIES
A. In any emergency affecting the safety of persons or property, the Contractor shall act at its discretion to prevent threatened damage, injury or loss, provided that the Contractor shall have determined that there is not sufficient time to advise and consult with the County prior to taking such action.

1.19 FIRE HAZARDS
A. The Contractor shall take all necessary precautions to eliminate possible fire hazards and to prevent damage to construction work, equipment, temporary field offices, storage sheds, and other property. During construction, the Contractor shall provide fire extinguishers and fire hose in accordance with the appropriate OSHA and construction industry rules and regulations.

1.20 FLAMMABLE HAZARDS
A. Gasoline, benzene, other combustible materials, oils, solvents, or chemicals shall not be poured into sewers, manholes, or traps. All casual spills shall be immediately cleaned up and all contaminated soil removed from the site and legally disposed. Tarpaulins and other materials used for temporary enclosures, coverings and protection shall be flameproofed. The Contractor shall comply with County, State and Federal regulations with respect to barrels and tanks containing flammable or hazardous materials, and shall remove any such materials immediately at the request of the County.

1.21 EXPLOSIVE CHARGES
A. Any fastening device, powder activated stud gun or any other device or system of any kind using an explosive charge for activation may not be used in performing work at the Project site unless it is specifically approved by OSHA or the County Health Department. It shall be the responsibility of the Contractor to secure all permits and permissions without extra cost to the County and to assure the safe use of any such devices by trained individuals.

1.22 FIRST AID
A. A completely equipped first-aid kit shall be provided and maintained by the Contractor at the site in a clean orderly condition and shall be readily accessible at all times to all the Contractor's employees. The Contractor shall designate certain employees who are properly instructed to be in charge of first aid. At least one such employee shall be available at the site whenever work is being carried on.

1.23 HOURS OF WORK
A. The Contractor shall conduct the work during normal working hours in cooperation with the existing property owners and occupants. At the beginning of work on this Contract, the Contractor shall notify the County, in writing, the schedule of the days and work hours proposed for a normal workweek. The Contractor shall be responsible for contacting in advance all involved parties whenever the Contractor intends to depart from the normal workweek schedule and resolve to the satisfaction of the County any reasonable objections made. All costs incurred, due to the failure of the Contractor to properly notify involved parties, shall be paid by the Contractor or deducted from the Contractor's contract amount.

B. The Contractor shall plan and conduct the Work so as not to create a public nuisance or disturb the peace specifically for any residents near or adjacent to the Project site. Should the Contractor be stopped by order of a public authority from working at such times that are contrary to or in violation of any law, ordinance, permit, or license, the Contractor shall not be entitled to an extension of time or additional compensation due to such stoppage.

C. In an emergency, requiring work to be performed outside the normal work week schedule to save or protect life or property, the requirements for the twenty-four (24) hour notification will be waived. The Contractor shall notify the County as soon as the Contractor determines that an emergency condition exists necessitating the change in or extension of the normal hours of work. However, the Contractor's determination of the existence of the emergency is subject to the review and revision by the County.
D. The normal workweek schedule and/or daily hours of work may be altered as directed by the County, when, in its reasonable judgment, such alteration is necessary to maintain the required progress of the Work.

1.24 SANITARY REQUIREMENT
A. Committing unnecessary acts of nuisance on the Project site is prohibited. Any employee who violates such provisions shall be promptly removed from the Project by the Contractor and not be permitted to work on the project site without the written consent of the County.

1.25 CLEANLINESS OF PROJECT SITE AND STREET
A. The Work and all public or private property used in connection with the Work shall be kept in a neat, clean and orderly condition at all times. Stored materials shall be safely stacked and ordered. Waste materials, rubbish and debris shall removed daily and shall not be allowed to accumulate. No burning of rubbish is permitted.

B. The Contractor shall remove unused construction equipment, temporary buildings and excess materials from the site upon the reasonable request of the EDC. The site shall not be permitted to become a storage yard for the Contractor’s equipment and materials not directly involve in the Work. Any stored equipment or unnecessary materials stockpiled shall be removed from the Project site upon the request of the County.

C. During the performance of the Work, the Contractor shall daily inspect and maintain the Project site in a clean condition including control of dust, picking up scattered construction debris, and removal of splattered materials from the surfaces of the new construction. Should the Contractor fail to maintain proper cleanliness or order of the site the County, upon 48 hour notice to the Contractor, shall arrange for the cleaning and removal of extraneous materials accumulated at the site and shall have the right to deduct the costs incurred from the Contract value.

D. Trucks hauling loose material from or to the project site shall be tight and their loads trimmed and tarped to prevent spillage on the public streets. This requirement likewise applies to suppliers making deliveries to the Project site. The Contractor will be held responsible to require compliance by the Contractor’s suppliers. The County shall have the right to deny site access to any subcontractor or supplier who refuses to comply with this requirement. The Contractor shall promptly (daily as a minimum) clean streets, sidewalks and alleys dirtied by any cause arising from the Contractor’s operations. Should the Contractor fail to maintain proper street cleanliness, the County, upon notice to the Contractor will clean any such public right of ways and shall have the right to deduct the costs incurred from the Contract value.

1.26 DEWATERING
A. The Contractor shall dewater and keep dry all trenches and other excavated areas at the site by evenly grading the surface drainage to eliminate standing water. The Contractor shall be responsible to protect structural bearing subgrades and materials from ponding, standing water or erosion. Dewatering operations shall not be permitted to discharge water to any other private properties. The Contractor shall be responsible for securing Water Department permission prior to discharging any water from the site into public sewers.

1.27 SECURITY
A. The Contractor shall secure and protect from theft, loss or damage all materials and equipment used for or relating to the Work until final completion and acceptance by the County.

1.28 WORKING AREA
A. All the Work under this Contract shall be performed on the Project site. The Contractor shall access the Project site via City streets and rights-of-way. The Contractor shall review the legal loading limit for the access streets and rights-of-way and shall be responsible for coordinating deliveries and shipments that do not exceed the legal load limits.
B. The Contractor shall use Flagmen whenever trucks or equipment enter public roadways from the project site.

C. Should additional working or storage space be desired, the Contractor shall make all arrangements with any property owner and submit to the County written evidence that the Contractor has secured permission to use this property for construction purposes. The Contractor shall pay all expense in connection with its use, and in no way involves or obligates the County by such use.

1.29 SPECIAL SYSTEM INSPECTIONS
A. The Contractor, as part of the Work, shall coordinate all specialty manufacturer inspections and testing required to certify that the installation of the Work meets the manufacturer's conditions for warranty.

1.30 TIME OF STARTING AND COMPLETION OF WORK
A. The Contractor shall, carry on the construction operations continuously without stoppage so that all items of work are totally complete including punchlist in accordance with the agreed upon completion date. This shall not relieve the Contractor from the responsibility to coordinate the Work with County, and to sequence the Work including interrupting the Work as required by the County.

1.31 TESTING & INSPECTION
A. The University's separately contracted Construction Engineering & Inspection Consultant shall arrange and pay for all testing and inspection required to verify conformance of the Work with the Contract Documents. All testing and inspection shall be coordinated with the University.

1.32 SOIL EROSION AND SEDIMENT CONTROL
A. The Contractor shall install and maintain, for the duration of the Project, soil erosion protection measures as required by Wayne County. The Contractor shall provide other temporary soil erosion control as required to eliminate sedimentation from entering sewers and open ditches due to the Contractor's operations. The Contractor shall remove completely all soil erosion control measures from the site at the end of the Project.

B. The Contractor will promptly remove soil, debris, or other materials spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares by the Contractor’s equipment and operations.

C. The Contractor shall abide by the requirements of the "Authorized Public Agency" under the provisions of Section 11 of Act 347 of the Public Acts of 1972, "Soil Erosion and Sedimentation Control Act" as modified or superseded.

D. Current Soil Erosion and Sediment Control Plans included in set are approved by the Health Department.

1.33 DISCLAIMER OF SITE INFORMATION
A. By its own examinations, observations, investigations and tests the Contractor shall make its own determination of the existing site conditions. Information contained in this Bid Package is provided solely for the informational use of the Contractor. The County does not guarantee the accuracy or sufficiency of any site information.

1.34 UNIT PRICES
A. Unit prices, if established during the Project, shall include all permits, fees, labor, material, tools, supervision, equipment, taxes, insurance and bonding necessary for or incidental to the proper completion of the Work.
1.35 TRUCK TICKETS

A. Any excavated materials removed from the site shall be controlled for assurance of legal dumping by (3) part "Truck Tickets" for each load of material removed from the site. The Contractor shall note on each truck ticket the bid package number, date, location of excavation, trucking firms, quantity of material and time of departure for each outgoing truck. The Contractor shall record the disposal site and time of disposal on the "Truck Ticket" and shall obtain the signature of the recipient of the material in verification thereof and return the completed "Truck Ticket" to the County.

1.36 ENVIRONMENTAL COORDINATION

A. Owner shall make available to the Contractor any environmental reports or information in the Owner’s possession as reference information to assist in the Contractor’s required production of the Health and Safety Plan, as expressed in paragraph 1.3 of Section VII of the Bid Documents. Unless otherwise noted in the plans and specifications the Contractor shall assume that all excavated material in the right of way is contaminated and shall be taken to a licensed Class II landfill. If the Contractor encounters potential hazardous materials, the Contractor shall notify the EDC for inspection of the condition before proceeding with any Work in that area. The contractor shall continue with the orderly progression of work in non impacted areas. Subject to the nature of the hazardous material encountered and the Contractors qualifications, the EDC reserves the right to require the Contractor to perform any removal/remediation work for hazardous materials on a time and material basis, or negotiated basis according to the provisions of the Contract Documents.

1.37 PROTECTION OF THE PRIVATE AND EXISTING UTILITIES

A. The Contractor shall protect and maintain for the duration of the work all existing improvements and utilities that are to remain. The Contractor will immediately undertake and pay for the repair of any damaged existing improvements or utilities.

B. All unattended excavations, voids, pits, manholes or holes shall be barricaded immediately by the Contractor. Barriers shall be removed promptly by the Contractor when no longer required,

C. Precautions against fire, accidental explosion, excessive dust and accident shall be strictly enforced by the Contractor in cooperation with the County and the EDC.

D. The Contractor shall not allow salvaged material, debris, and trash to accumulate on the project site but shall require all such material to be hauled away on a regular, daily basis.

1.38 PROTECTION OUTSIDE THE PROJECT AREA

A. All existing areas outside the limits of the Work shall be protected from damage. All damage caused by the Contractor shall be corrected at the expense of the Contractor and to abide by City or County Standards.

B. During progress of work, the Contractor shall keep adjacent roads free of trash, debris, and salvage material resulting from the work.

C. The Contractor is advised that other construction activities may be performed by others within the Project area during this the performance of the Work under this Contract Agreement. The Contractor shall plan proposed trucking and all other vehicular routes accordingly in coordination with and at the reasonable direction of the County.

D. All construction traffic control signage and barricading shall conform to the standard requirements of the governmental body having jurisdiction over the street right of way.
1.39 TEMPORARY CONTROLS

A. Surface Water Control – The Contractor shall complete the work in such a manner so as not to entrap surface water on the site. Low areas caused by removals, shall be graded in such a manner to allow drainage to existing storm water structures. The Contractor shall be responsible for drying out and repairing any grade surfaces damaged due to the Contractor’s failure to properly grade the work area.

B. The Contractor shall secure and pay for all erosion control permits and conduct earth changes in a manner, which will effectively eliminate accelerated soil erosion and resulting sedimentation. Measures to be taken shall include but not be limited to:

C. Provide temporary soil erosion control to eliminate sedimentation from entering sewers and open ditches.

D. Remove sediment caused by accelerated soil erosion from runoff water before it leaves the site.

E. Maintain temporary soil erosion silt fences, sediment traps and control measures for the term of this contract.

F. Promptly remove soil, debris, or other material spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares during transit.

G. The Contractor shall utilize applicable soil erosion details, shown on Contract drawings, in implementing his work.

H. The Contractor shall utilize water trucks and other dust inhibiting methods to control fugitive dust emanating from the work activity performed under this scope of work. Truck and equipment wheels shall be cleaned before exiting the project area. Travel routes shall be established with the prior approval of the County to reduce dust in adjacent areas. Existing roads shall be used wherever practical based on street loading capacity.

1.40 SUSPECTED HAZARDOUS MATERIALS

A. In the event the Contractor encounters excavated materials that are suspected as hazardous, the Contractor shall notify the County for review, and through County’s Environmental Consultant the possible characterization and management of the suspect material. If it is determined that the suspect material is hazardous by the County’s environmental Consultant, the Consultant will provide a material handling protocol for the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONTRACTOR USE OF PREMISES

A. Confine operations at site to areas permitted by:

1. Law
2. Permits
3. Contract
4. Owner's Representative
5. Required use of adjacent existing buildings
6. Contract documents
B. Confer with Owner's Representative and obtain full knowledge of all site rules and regulations affecting work.

C. Conform to site rules and regulations while engaged in project construction.

D. Site rules and regulations take precedence over others that may exist outside such jurisdiction.

E. Employees On Site: The Owner's Representative may examine Contractor's list of employees, including those of his subcontractors and their agents for all employees working on site.

F. Vehicle use: Rigidly enforce the following:
   1. Keep all vehicles, mechanized or motorized equipment locked at all times when parked and unattended on Owner's premises.
   2. Do not, under any circumstance, leave any vehicle unattended with motor or engine running, or with ignition key in place.
   3. All traffic control subject to Owner's Representative approval.
   4. Contractor employee parking shall be limited to areas indicated by Owner's Representative.
   5. Contractor shall not park any vehicles within the dripline of trees.

G. Do not unreasonably encumber site with materials or equipment.

H. Assume full responsibility for protection safety and safekeeping of products stored on premises.

I. Move all stored products or equipment, which interferes with operations of Owner or other subcontractors.

J. Obtain and pay for use of additional storage or work area needed for operations.

K. Limit use of site for work and storage:
   1. To areas indicated on the drawings.
   2. To areas approved in advance by Owner's Representative.

L. The Contractor acknowledges that the Owner will use the adjacent sites and the Contractor must maintain staff and appropriate safety requirements. Contractor to work with Owner's Representative to coordinate with scheduled events. Owner's Representative to provide schedule.

3.2 DUTIES OF CONTRACTOR

A. Except as specifically noted, provide and pay for:
   1. Labor, materials and equipment.
   2. Tools, construction equipment and machinery.
   4. Other facilities and services necessary for proper execution and completion of work.

B. Secure and pay for as necessary for proper execution and completion of work, and as applicable at time of receipt of bids.
   1. Licenses.

C. Give required notices.

D. Promptly submit written notice to Professional Services Consultant of known or observed variances of Contract Documents from legal requirements.
   1. Appropriate modifications to Contract Documents will adjust necessary changes.
2. Assume responsibility for Work known to be contrary to such requirements.

E. Enforce strict discipline and good order among employees. Do not employ on Work:
   1. Unfit persons.
   2. Persons not skilled in assigned task.

F. Purchase and maintain insurance in accordance with the Contract Agreement.

G. Contractor shall protect existing site from damage. Contractor shall clean areas of construction debris, equipment, and material prior to Date of Completion for such area.

3.3 PERMITS
   A. See Section 003143 PERMIT APPLICATION

3.4 TIME OF COMPLETION
   A. Completion of work shall be in accordance with the schedule as indicated in the Bid Form.

3.5 JOB OPERATIONS
   A. Project Security:
      1. Take necessary precautions such as barrier to protect Owner's personnel, the public, in the area of construction.
      2. Securely close off all areas of construction after working hours to prevent entry by unauthorized persons.
      3. Provide barriers to prevent visitors from construction area.

3.6 WORK LIMITATIONS:
   A. Owner's personnel may occupy all spaces around where work will be done. Any work done during times of occupancy shall be limited in scope to prevent disturbing it.
   B. Give Owner's representative three days notice before starting Construction Work in any area.
   C. All work, including material storage, shall be limited to the project area.

3.7 PHOTOGRAPHY
   A. Starting on the 01st of the month following Notice to Proceed, and on the 01st of each subsequent month up to and the 01st of the month following the Substantial Completion Date eight color photographs are to be taken of the Site. One image from each following direction facing the improvements of the site: N, S, E, W, NE, NW, SE, SW. Pictures are to include the date taken on the photograph.
   B. By the 15th of each month delivery two sets of 8 x10 color prints of all photographs taken that month; one set to the Landscape Architect and one set to the Owner's Representative. Also deliver digital/electronic copies of the photographs to the Landscape Architect and Owner.
C. All rights, privileges, copyrights, ownership, etc to the pictures shall be transferred to the Architect and Owner so they each may use the images / photographs at their discretion now and in the future. A written release stating such is to be provided each month with each set of photographs.

D. Receipt of the photographs on the 15th of each month is prerequisite to the processing of that month's pay request.

3.8 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.

END OF SECTION
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 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "As Otherwise Direct": Used in relation to items to be determined after Contract by agreement between Owner, Architect, and Contractor, with input from other entities as appropriate.

D. "Certified": Guaranteed in writing over the signature of an authorized representative of the certifying organization.

E. "Directed": An instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

F. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

G. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

H. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

I. "Install": Operations including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations at Project site.

J. "N.I.C" or "NIC": Not in Contract.

K. "Necessary": That which is reasonably necessary to the proper completion of the Work.

L. "Per": In accordance with the requirements of.

M. "Products": Materials, equipment, or systems.

N. "Provide": Furnish and install, complete and ready for the intended use.

O. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
P. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

Q. "Replace": To put something new in place of.

R. "Required": Referring to requirements of the Contract Documents, unless its use clearly implies a different interpretation.

S. "Shown" or "Indicated": Appearing on the Drawings, unless their use clearly implies a different interpretation.

T. "Supply": Same as Furnish.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
REFERENCES

16. AIA - American Institute of Architects (The); www.aia.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
36. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
37. ARI - American Refrigeration Institute; (See AHRI).
39. ASCE - American Society of Civil Engineers; www.asce.org.
40. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
42. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
43. ASSE - American Society of Safety Engineers (The); www.asse.org.
54. BIA - Brick Industry Association (The); www.gobrick.com.
56. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
57. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
58. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwf.org.
59. CDA - Copper Development Association; www.copper.org.
60. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/
61. CDA - Canadian Electricity Association; www.electricity.ca.
63. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
64. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsedi.org.
69. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
70. CPA - Composite Panel Association; www.compositepanel.org.
71. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
73. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
74. CSA - Canadian Standards Association; www.csa.ca.
75. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
76. CSI - Construction Specifications Institute (The); www.csinet.org.
77. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
78. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
79. CWC - Composite Wood Council; (See CPA).
81. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. EIA - Electronic Industries Alliance; (See TIA).
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
82. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
83. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
90. GA - Gypsum Association; www.gypsum.org.
92. GS - Green Seal; www.greenseal.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
100. IAS - International Approval Services; (See CSA).
101. ICBO - International Conference of Building Officials; (See ICC).
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICFA - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRJ - International Concrete Repair Institute, Inc.; www.icri.org.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
114. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
115. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
116. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
117. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
120. ITU - International Telecommunication Union; www.itu.int/home.
121. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
122. LAMA - Laminating Materials Association; (See CPA).
125. MCA - Metal Construction Association; www.metalconstruction.org.
133. NAAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
134. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
139. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
140. NCMA - National Concrete Masonry Association; www.ncma.org.
142. NECA - National Electrical Contractors Association; www.necanet.org.
144. NEMA - National Electrical Manufacturers Association; www.nema.org.
146. NFHS - National Federation of State High School Associations; www.nfhs.org.
148. NFPA - NFPA International; (See NFPA).
151. NLGA - National Lumber Grades Authority; www.nlga.org.
152. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
154. NRCA - National Roofing Contractors Association; www.nrca.net.
158. NSSGA - National Stone, Sand & Gravel Association; www.sssa.org.
159. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
161. PCI - Precast/Prestressed Concrete Institute; www pci.org.
162. PDI - Plumbing & Drainage Institute; www.pdionline.org.
163. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
168. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
169. SDI - Steel Deck Institute; www.sdi.org.
170. SEI/ASCE - Structural Engineering Institute/Am erican Society of Civil Engineers; (See ASCE).
172. SII - Steel Joist Institute; www.steeljoist.org.
175. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
176. SPRFA - Spray Polyurethane Foam Alliance; www.spryfoam.org.
186. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
187. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
190. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
191. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
194. TPI - Turfgrass Producers International; www.turfgrass sod.org.
197. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
198. USAV - USA Volleyball; www.usavolleyball.org.
202. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
203. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
204. WDMA - Window & Door Manufacturers Association; www.wdma.com.
207. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's Representative, Landscape Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer, Water, and Electric Power Service: Use charges are specified in Section 011200 "Multiple Contract Summary."

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with IBC ADA requirements.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of at each return-air grille in system and remove at end of construction.

D. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner’s property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

   1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install land-based telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.

G. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Core i5 or i7.
4. Display: 24-inch LCD monitor with 256-Mb dedicated video RAM.
5. Full-size keyboard and mouse.
8. Productivity Software:
   a. Microsoft Office Professional, 2010 or higher, including Word, Excel, and Outlook.
   b. Adobe Reader 11.0 or higher.
c. WinZip 7.0 or higher.

9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.

10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum Mbps upload and Mbps download speeds at each computer.

11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.


13. Access to large format scanner.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.

2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.

2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."

3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.

2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

2. Remove snow and ice as required to minimize accumulations.
G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs as indicated on Drawings.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      a. Provide temporary, directional signs for construction personnel and visitors.
   3. Maintain and touch up signs so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

L. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
   1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
   1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and] requirements specified in Section 311000 "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of DEQ Construction General Permit or authorities having jurisdiction, whichever is more stringent.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Section 015639 “Temporary Tree and Plant Protection.”

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

I. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

K. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

N. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for hours are considered defective and require replacing.
b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

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

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION
SECTION 033000 – CAST-IN-PLACE CONCRETE

PART – 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section specifies requirements for concrete cast-in-place on the site.

B. The work includes cast-in-place concrete pavement, walkways bases, unit paver bases, foundations, structures, and thrust blocks.

1.3 REFERENCE STANDARDS

A. References herein are made in accordance with the following abbreviations and all work under this Section shall conform to the latest editions as applicable.

   1. American Concrete Institute (ACI):
       301 Specifications for Structural Concrete
       305R Hot Weather Concreting
       306R Cold Weather Concreting
       325.9R Guide for Construction of Concrete Pavements and Concrete Bases

   2. ASTM International (ASTM):
       A82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
       A1064 Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
       A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
       C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
       C33 Standard Specification for Concrete Aggregates
       C94 Standard Specification for Ready-Mixed Concrete
       C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
       C150 Standard Specification for Portland Cement
       C171 Standard Specification for Sheet Materials for Curing Concrete
       C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
       C260 Standard Specification for Air-Entraining Admixtures for Concrete
1.4 QUALITY ASSURANCE

A. Work, materials, and color of the wheelchair ramp paving shall conform to applicable sections of Americans with Disabilities Act (ADA) and State Standards, whichever is more stringent.

B. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features shown on the Drawings are approximate. Manufacturer's approved shop Drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size, and details.

1.5 SUBMITTALS

A. Submit description of methods and sequence of placement for each type of specially-finished concrete, including description of methods and sequence of placement.

B. Submit manufacturer’s product data for the following:
   1. Form release agent.
   2. Concrete coloring additive.
   3. Preformed joint filler.
   4. Concrete reinforcement specification data from manufacturer.
   5. Stamp and imprinting tools, manufacturer’s literature.
   6. Manufacturer’s literature for protective coating for sidewalks.
   7. Detectable Warning including manufacturer’s certification that product complies with ADA

1.6 TESTING

A. The Owner shall employ a qualified independent testing laboratory to inspect and test concrete paving and other cast-in-place concrete work.

B. When requested, Contractor shall prepare test specimens in accordance with ASTM C31, standard cylinder size 4-inch x 8 inch.

C. Testing of materials and installed work may occur at any time during progress of the work. Rejected materials and installed work shall be removed and replaced.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Steel reinforcing bars shall conform to ASTM A615, Grade 60, deformed.
   1. Bars employed as dowels shall be hot-rolled plain rounds.

B. Steel Wire: ASTM A82, plain cold drawn steel.
C. Welded Wire Reinforcement: Welded wire reinforcement shall conform to the applicable requirements of ASTM A1064. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.

D. Supports for Reinforcement: Bolsters, chairs, and other devices for spacing, supporting, and fastening reinforcing bars, and welded wire fabric in place shall be wire bar-type supports complying with CRSI Manual.
   1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI Class 1).

2.2 PORTLAND CEMENT CONCRETE
A. Portland cement concrete shall conform to the following:
   1. Maximum water-cement ratio shall be 0.45 conforming to ACI 316R.
   2. Concrete shall be air-entrained type conforming to ASTM C94. Air content by volume shall be 6 percent + 1.5 percent, tested in accordance with ASTM C260.
   3. Slump of concrete shall not be less than 3 inches nor greater than 4 inches, determined in accordance with ASTM C143.
   4. Cement for concrete shall be a Portland cement conforming to ASTM C150, Type I or II. Only one color of cement, all of the same manufacturer, shall be used for the work.
   5. Fine and coarse aggregates for concrete shall conform to ASTM C33.
   6. Concrete shall contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C494, Type A.
   7. Concrete shall contain no calcium chloride or admixtures containing calcium chloride. No admixtures other than those specified shall be used in the concrete without the specific written permission of the Engineer.

2.3 CONCRETE AGGREGATES
B. Coarse Aggregates: Coarse aggregates shall conform to ASTM C33, Parts 9 through 11 and Tables 2 and 3, with the following Class designations:
   1. Class 1S: For footings and foundations not exposed to the weather.
   2. Class 4S: For pavements, driveways, curbs, walkways, sidewalks, and retaining walls that are exposed to the weather.
   3. Class 1N: For pavements, driveways, curbs, walkways, sidewalks, and retaining walls that are not exposed to the weather.
C. Exposed Aggregate: Exposed aggregate for ADA curb ramps shall be selected, hard, durable, washed rounded stones free of deleterious reactivity to cement with graded sizes between 1/2 to 3/4 inch diameter nominal sieves.

2.4 COLORED CONCRETE
A. Color hardener and curing compound shall be manufactured and supplied by the Bomanite Corporation, 81 Encina Avenue, Palo Alto, CA 94301; tel. 800-854-2094, or approved equivalent.
   1. Color for concrete shall have visual contrast with surrounding paving.
   2. Curing compound shall be liquid applied.
B. Surface sealer shall be non-yellowing type which breathes water vapor, as manufactured by ProSoCo, Sika Chemical Corporation, Dural-International Corporation, or approved equivalent.

2.5 CURING MATERIALS FOR UNCOLORED CONCRETE

A. Curing shall be accomplished by the following methods.
   1. Moist curing with burlap covering.
   2. Curing paper, nonstaining, fiber reinforced laminated Kraft bituminous product conforming to ASTM C171. Four mil polyethylene sheeting may be substituted for curing paper.
   3. Curing compound, a resin-base, white pigmented compound conforming to ASTM C309, Type 2.

2.6 EXPANSION JOINTS

A. Expansion joint filler shall be preformed, nonbituminous type conforming to ASTM D1752, Type II, similar to Sealight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equivalent.
   1. Premolded filler shall be one piece for the full depth and width of the joint.

B. Smooth dowel shall be hot rolled plain steel dowel bonded at one end and operating in smooth close fitting sleeve (of same material) at the other end.

2.7 CONTROL JOINTS

A. Joint filler to be polyethylene foam with manufacturer’s recommended sealant.

2.8 FORMS

A. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms manufactured by Sonoco Products Company, General Products Division, ABS or PVC plastic reusable forms, or approved equivalent.

B. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Plywood shall conform to U.S. Product Standard PS-1 and APA Graded B-B (Concrete Form) Class I Exterior Grade plywood or B-B or A-C Class I high density overlay concrete form plywood. Formwork materials shall produce smooth, continuous, straight and level surfaces.

C. Forms for Unexposed Finish: Plywood, lumber, or metal, with lumber dressed on at least two edges and one side.

D. Form Ties: Prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, corner-locks, and other accessories as necessary.

E. Form Release Agent: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.

F. Imprinting Tools: Mats and tools used to stamp projecting texture and patterns onto plastic concrete surfaces and which shall be specifically designed with rigid back supports to enable a clean, sharp, stamping image. Stamps for curb ramps shall be designed to meet ADA detectable warning requirements.

2.9 FIBROUS REINFORCING

A. Material shall meet ASTM C1116 and shall be as manufactured by NyCon Incorporated, or approved equal.

B. Mix fibrous reinforcement in accordance with manufacturer’s instructions including product data and technical bulletins.
   1. Add fibrous reinforcement to concrete mix at the concrete batch facility.
   2. Adding and mixing fibrous reinforcement at the job site will not be allowed.

C. Provide job mix design data to show concrete mix will attain specified strength requirements.
2.10 EXPOSED CONCRETE PROTECTIVE COATING

A. Protective Coating shall be silane-siloxane product.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

A. The subgrade of areas to be paved shall be graded and compacted as specified in Section 321100, "BASE COURSES (PAVEMENT)".

B. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade, subbase, base, or pavement, subsequent backfill and compaction shall be performed as required by the Engineer and as specified in Section 312000, "EARTH MOVING".

C. Materials shall not be stored or stockpiled on subgrade.

D. Prepared subgrade will be inspected by the Engineer. Subgrade shall be approved for installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired.

3.2 BASE COURSE

A. Base course for concrete paving shall be pavement subbase course or gravel base materials specified in Section 321100, "BASE COURSES (PAVEMENT)" as shown on the Drawings.

B. Width of base course shall extend beyond edge of the proposed pavement as shown on the Drawings.

C. Material shall be placed in lifts no more than 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.
   1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade.
   2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
   3. Surface irregularities which exceed 1/2 inch as measured by means of a 10 foot long straightedge shall be regraded and recompacted.

D. Base course shall be compacted at optimum moisture content to not less than 95 percent of maximum density as determined by ASTM D1557.

E. The base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with the base course material.

3.3 STEEL REINFORCEMENT

A. Before being placed in position, reinforcing steel shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when required.

B. Any bar showing cracks after bending shall be discarded.

C. Unless otherwise shown on the Drawings, reinforcing shall extend within 2 inches of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 inches.

D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel shall be securely wired in the required position and shall be maintained in that position until concrete is placed.
and compacted. Chair bars and supports shall be installed in a number and arrangement approved by the Engineer.

3.4 FORMS

A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits.

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

B. Construct forms to provide for openings, offsets, sinkages, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required for the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent cement paste from leaking.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and other features for easy removal.

D. Chamfer exposed corners and edges, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

E. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.5 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork the anchorage devices and other embedded items required for work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.6 PREPARING FORM SURFACES

A. Coat contact surfaces of forms with an approved, nonresidual, low-VOC form-coating compound before placing reinforcement.

3.7 CONCRETE PLACING

A. Equipment, methods of mixing and placing, and precautions to be observed as to weather, and condition of base shall meet the requirements of ACI 316R.

B. The Engineer shall be notified of scheduled concrete placement sufficiently in advance of start of operation to allow preliminary inspection of the work, including subgrade, forms, and reinforcing steel.

C. Work shall not be performed during rainy weather or when temperature is less than 40°F (4.4°C).

D. Adjacent work shall be protected from stain and damage. Damaged and stained areas shall be replaced or repaired to equal their original conditions.

E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.

F. Concrete which has set or partially set, before placing shall not be used. Retempering of concrete will not be permitted.
G. Concrete shall be thoroughly vibrated, or otherwise consolidated to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

H. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 inch thick, shall be well scrubbed into the thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.8 FINISHING

A. Concrete surfaces shall be screeded and finished true to line and grade, and free of hollows and bumps. Surface shall be dense and smooth.

1. Finished concrete surface for concrete subbases shall be wood floated to a slightly rough surface. Surface shall not deviate more than 1/4 inch in 10 feet.

2. Finished concrete surfaces shall be wood floated and steel troweled, or broom finished, to a uniform surface. Surface shall not deviate more than 1/8 inch in 10 feet.

B. Horizontal surfaces of concrete surfaces which will be exposed shall be given a light broomed finish, with direction of grooves in concrete surface perpendicular to length of concrete band, slab, or pad. After concrete has set sufficiently to prevent coarse aggregate from being torn from surface, but before it has completely set, brooms shall be drawn across the surface to produce a pattern of small parallel grooves. Broomed surface shall be uniform, with no smooth, unduly rough or porous spots, or other irregularities. Coarse aggregate shall not be dislodged by brooming operation.

C. Vertical surfaces of concrete which will be exposed; refer to architectural concrete spec 033300 requirements.

D. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a 1/4- inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall at same time be finished to a 1/4-inch radius.

E. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

F. Sidewalks, walkways, accessible routes, and ramps shall be constructed and finished in accordance with the Americans with Disabilities Act (ADA) and state and local requirements. Provide protective coating in accordance with manufacturer’s recommendations.

G. Exposed Aggregate Finish: Expose coarse aggregate in pavement surfaces as follows.

1. Immediately after float finishing, spray-apply chemical surface retarder to pavement according to manufacturer’s written instructions.

2. Cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.

3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon-bristle broom.

4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.

3.9 CURING

A. Concrete shall be kept continuously damp from time of placement until end of specified curing period or cured by other methods. Water shall not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations, surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed
over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.

B. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing compound.

1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period, concrete surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.

2. Concrete cured with a curing compound shall have the compound applied at a rate of 200 square feet per gallon, in two applications perpendicular to each other.

3. Curing period shall be seven (7) days minimum.

C. Only if additional protection is absolutely required, the surface should remain uncovered after the seven (7) day period for at least four (4) days, after which time new and unwrinkled non-staining reinforced waterproof Kraft curing paper may be used.

3.10 EXPANSION JOINTS

A. Expansion joints shall be 1/2 inch wide and located to provide a maximum spacing of 50 feet between joints or where shown on the Drawings. Expansion joints shall be troweled in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full depth of the slab and full length of the expansion joint.

1. For concrete walks, pavements, and pads, depth of joint filler shall be placed to form a 1-1/4 inch deep recess for sealant and backer rod below finished concrete surface.

2. Use of multiple pieces to make up required depth and width of joint will not be permitted.

3.11 CONSTRUCTION JOINTS

A. Construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.

1. Butt joint with dowels or use a thickened edge joint if construction joints occur at control joint locations.

2. Keyed joints with tie-bars shall be used if the joint occurs at any other location.

3.12 CONTROL JOINTS

A. Control joints shall be tooled into the concrete slab, with 3-inch wide border and troweled edges, in pattern as shown on the Drawings. If no pattern is shown, then pattern shall result in square shape with a maximum area of 36 square feet. Joints shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab, but before slab has achieved its final set.

B. Scoring shall cut into slab surface at least 1 inch, but in no case not less than 25 percent of slab depth.

3.13 COLD WEATHER CONCRETING

A. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40°F. or is expected to fall to below 40°F. within 72 hours. The concrete, after placing, shall be protected by covering, heat, or both.

B. Details of handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. Procedures shall be in accordance with provisions of ACI 306R.
3.14 HOT WEATHER CONCRETING

A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. Every effort shall be made to minimize delays which will result in excessive mixing of the concrete after its arrival on-site.

B. During periods of excessively hot weather (95°F, or above), ingredients in the concrete shall be cooled with cold mixing water to maintain the temperature of the concrete at permissible levels in accordance with the provisions of ACI 305R. Any concrete with a temperature above 95°F., when ready for placement, will be rejected.

C. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. Records shall include checks on temperature of concrete when delivered to Project site and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

3.15 PROTECTION OF CONCRETE SURFACES

A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently.
SECTION 042200 - CONCRETE UNIT MASONRY

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. Concrete masonry units.
   2. Mortar and grout.
   3. Steel reinforcing bars.
   5. Embedded flashing.
   6. Miscellaneous masonry accessories.
   7. Masonry-cell fill.
B. Products Installed but not Furnished under This Section:
C. Related Requirements:
   1. Section 071900 "Water Repellents" for water repellents applied to unit masonry assemblies.
   2. Section 323223 "Segmental Retaining Walls" for dry-laid, concrete unit retaining walls.

1.3 DEFINITIONS
A. CMU(s): Concrete masonry unit(s).
B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Sustainable Design Submittals:
   1. Environmental Product Declaration: For each product.
   2. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer
C. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars.
      Comply with ACI 315. Show elevations of reinforced walls.
   3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
D. Samples for Initial Selection:
   1. Colored mortar.
   2. Weep holes/vents.
E. Samples for Verification: For each type and color of the following:
   1. Exposed CMUs.
   2. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS
A. Qualification Data: For testing agency.
B. Material Certificates: For each type and size of the following:
   1. Masonry units.
      a. Include data on material properties and material test reports substantiating compliance with requirements.
   2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
   2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE
A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
   1. Build sample panels for typical exterior wall in sizes approximately 48 inches (1200 mm) high by full thickness. This can be part of the total wall. To be approved by WSU prior to continuation of the wall.
   2. Protect approved sample panels from the elements with weather-resistant membrane.
   3. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
      a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.
C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS
A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days.
after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.


PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet (6 m) vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or
leaks on the back of test specimen.

a. **Products**: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   1) ACM Chemistries; RainBloc.
   2) BASF Construction Chemicals - Building Systems; Rheopel Plus.
   3) GCP Applied Technologies; Dry-Block.

C. Insulated CMUs: Where indicated, units shall contain rigid, specially shaped, cellular thermal insulation units complying with ASTM C 578, Type I, designed for installing in cores of masonry units.

D. CMUs: ASTM C 90.
   1. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.

E. Concrete Building Brick: ASTM C 55.
      a. Standard pattern, ground-face finish – see detail elevation
   2. Colors: Standard Gray

F. Pre-faced CMUs: Lightweight hollow concrete units complying with ASTM C 90, with manufacturer's standard smooth resinous facing complying with ASTM C 744.
   1. **Products**: Subject to compliance with requirements

### 2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.
   1. **Products**: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]: MATCH CMU WALL COLOR
      a. Cemex S.A.B. de C.V.; [Briksset, Type N] [Citadel, Type S] [Dixie, Type S] [Kosmortar, Type N] [Richmortar] [Victor Plastic Cement].
      b. Essroc, Italcementi Group; [Brixment] [Flamingo Color Masonry Cement] [Velvet].
      c. Holcim (US) Inc.; [Mortamix Masonry Cement] [Rainbow Mortamix Custom Buff Masonry Cement] [White Mortamix Masonry Cement].
      d. Lafarge North America Inc.; [Magnolia Masonry Cement] [Lafarge Masonry Cement] [Trinity White Masonry Cement].
      e. Lehigh Cement Company.; [Lehigh Masonry Cement] [Lehigh White Masonry Cement].

E. Mortar Cement: ASTM C 1329/C 1329M.
   1. **Products**: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. Lafarge North America Inc.; Lafarge Mortar Cement Retain "Mortar Pigments" Paragraph below for colored cement or for pigments added at Project site.
   2. **Products**: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. Davis Colors; True Tone Mortar Colors.
      b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
      c. Solomon Colors, Inc.; SGS Mortar Colors.

F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
   1. **Products**: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
      a. ACM Chemistries; RainBloc for Mortar.
      b. BASF Construction Chemicals - Building Systems; Rheopel Mortar Admixture.
      c. GCP Applied Technologies; Dry-Block Mortar Admixture.
2.6 REINFORCEMENT

A. See Concrete Spec for specific requirements on rebar

B. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

D. Contractor to provide information on 9 GA horizontal ties as submittal

E. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.
   1. Stainless-Steel Wire: ASTM A 580/A 580M, [Type 304] [Type 316].
   2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
   4. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, [Type 304] [Type 316].
   5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

F. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. See plans for Tie information.
      a. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
         1) Advanced Building Products Inc.; Peel-N-Seal.
         2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
         3) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
         4) GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
         5) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
         6) Hohmann & Barnard, Inc.; Sando-Seal.
         7) Polyguard Products, Inc.; [Polyguard 300] [Polyguard 400].
         8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
      b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

G. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from [neoprene] [urethane] [or] [PVC].

B. Preformed Control-Joint Gaskets: Made from [styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805] [or] [PVC, complying with ASTM D 2287, Type PVC-65406] and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.8 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. For exterior masonry, use masonry cementmortar.
   3. For reinforced masonry, use masonry cement mortar.
   4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
   5. For masonry below grade or in contact with earth, use Type S.
6. For reinforced masonry, use Type S
7. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

B. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

C. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.
1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that would impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:
1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and
control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.

5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.

7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS
A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in [running bond] [bond pattern indicated on Drawings]; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than [2 inches (50 mm)] [4 inches (100 mm)]. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors [48 inches (1200 mm)] <Insert spacing> o.c. unless otherwise indicated.
   3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal.
   4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING
A. Lay hollow CMUs as follows:
   1. Bed face shells in mortar and make head joints of depth equal to bed joints.
   2. Bed webs in mortar in all courses of piers, columns, and pilasters.
   3. Bed webs in mortar in grouted masonry, including starting course on footings.
   4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Wet joint surfaces thoroughly before applying mortar.
   3. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive air barriers, dampproofing or waterproofing unless otherwise indicated.

3.6 MASONRY-CELL FILL

A. Pour [loose-fill insulation] [lightweight-aggregate fill] into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet (6 m).

B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.7 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
   1. Space reinforcement not more than 16 inches (406 mm) o.c.
   2. Extending 12 inches (305 mm) beyond openings

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than [1/2 inch (13 mm)] [1 inch (25 mm)] [2 inches (50 mm)] wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry [as follows] [using one of the following methods]:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
C. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.10 **REINFORCED UNIT MASONRY INSTALLATION**

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.11 **FIELD QUALITY CONTROL**

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level [B] [C] in TMS 402/ACI 530/ASCE 5.
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for [mortar air content] and [compressive strength].

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.12 **REPAIRING, POINTING, AND CLEANING**

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleansed for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing
surfaces thoroughly with clear water.

5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
   3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200
SECTION 129300 - SITE FURNISHINGS

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.

PART 2 - PRODUCTS

2.1 NET SYSTEM

A. Tension batting Tunnel - Duel
   1. Tension cable Support – Aircraft cable with jaw tunbuckles
   2. Black powdered coat finish poles
   3. 8.625” x 0.322” steel pole
   4. Net provided by WSU
   5. Foundations engineered by SmithGroup in collaboration with Sportsfield Specialties

B. SportsField Specialties
   1. Terra Erickson
   2. 312-933-9680
   3. terickson@sportsfieldspecialties.com
   4. Or Approved Equal

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.
D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and $\frac{3}{4}$ inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION
END CABLE SUPPORT:  
1/4" X 7X19 GALV. AIRCRAFT CABLE

REAR CROSSBAR SUPPORT:  
4" (3/16" WALL) SQUARE STEEL TUBING

HSS 8.625" X 0.322" STEEL POLE

STANDARD: DIRECT POLE EMBEDMENT,  
OPTIONAL: 48" FORMED AND WELDED 11 GA. STEEL OCTAGONAL GROUND SLEEVE

13' H X 14' W BATTING TUNNEL NET,  
#36 BLACK NYLON 1-3/4" SQUARE MESH NET  
WITH BLACK VINYL ENCLOSED WEIGHTED  
1/4" GALVANIZED CHAIN BOTTOM AND  
TWO (2) 4' W X 13' H OPENINGS WITH  
CURTAIN STYLE EXTERIOR OVERLAP FLAPS

MODEL | SPORT | TYPE
--- | --- | ---
BTTBS | BASEBALL | SINGLE
BTTBD | BASEBALL | DOUBLE
BTTBT | BASEBALL | TRIPLE
BTTSS | SOFTBALL | SINGLE
BTTSO | SOFTBALL | DOUBLE
BTTST | SOFTBALL | TRIPLE

13'-0"  
4'-0"

NET LENGTH:  
BASEBALL: 75'  
SOFTBALL: 55'

FOUNDATION REQUIREMENTS VARY BASED ON LOCAL CODES AND SOIL CONDITIONS

SPORTSFIELD SPECIALTIES, INC. STRONGLY RECOMMENDS THE REMOVAL OF ALL NETS PRIOR TO EXPOSURE TO WINTER WEATHER, INCLUDING SNOW AND/OR ICE STORMS. WHENEVER POSSIBLE, THE NETS SHOULD ALSO BE LOWERED PRIOR TO ANY EXTREME WIND EVENTS. REMOVAL/LOWERING OF THE NETS WILL MITIGATE ANY UNFORESEEN DAMAGE TO THE POLES, NETS AND/OR ATTACHMENT HARDWARE. STORING NETS IN A DRY, PEST FREE LOCATION WILL HELP EXTEND THE LIFE OF THE NETS. SPORTSFIELD SPECIALTIES, INC. WILL NOT BE HELD LIABLE OR ASSUME RESPONSIBILITY FOR ANY DAMAGE TO THE NETS, POLES AND/OR CORRESPONDING ATTACHMENT HARDWARE IF THE NETS ARE NOT REMOVED/LOWERED PRIOR TO THE ABOVE DESCRIBED WIND AND/OR WEATHER EVENTS.
**TENSION BATTING TUNNEL**

**POLE AND GROUND SLEEVE LAYOUT**

**Note:** All measurements are center-to-center of ground sleeve/pole

<table>
<thead>
<tr>
<th>Model</th>
<th>Sport</th>
<th>Type</th>
<th>Net Length</th>
<th>Pole to Pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTTBS</td>
<td>Baseball</td>
<td>Single</td>
<td>75'</td>
<td>78'-8 5/8&quot;</td>
</tr>
<tr>
<td>BTTBD</td>
<td></td>
<td>Double</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTBT</td>
<td></td>
<td>Triple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTSS</td>
<td>Softball</td>
<td>Single</td>
<td>55'</td>
<td>58'-8 5/8&quot;</td>
</tr>
<tr>
<td>BTTSD</td>
<td></td>
<td>Double</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTST</td>
<td></td>
<td>Triple</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
YARN: 4400 Denier Nylon 6
PRODUCT WEIGHT: 35 oz / yd²
PILE HEIGHT: 0.34" 
TUFTING GAUGE: 3/16"
PRIMARY BACKING: 3.5 oz/yd²
SECONDARY BACKING: 17 oz/yd²
TOTAL WEIGHT: 55.5 oz/yd²
<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yarn</td>
<td>4400 Denier Nylon 6</td>
</tr>
<tr>
<td>Product Weight</td>
<td>35 oz/yd²</td>
</tr>
<tr>
<td>Pile Height</td>
<td>0.34&quot;</td>
</tr>
<tr>
<td>Tufting Gauge</td>
<td>3/16&quot;</td>
</tr>
<tr>
<td>Primary Backing</td>
<td>3.5 oz/yd²</td>
</tr>
<tr>
<td>Urethane Pre-Coat</td>
<td>17 oz/yd²</td>
</tr>
<tr>
<td>Pad/Cushion Thickness</td>
<td>5 mm</td>
</tr>
<tr>
<td>Pad Scrim / 13 PIC</td>
<td>4.5 oz/yd²</td>
</tr>
<tr>
<td>Total Weight</td>
<td>115 oz/yd² *</td>
</tr>
</tbody>
</table>

* Total Weight Tolerance does not account for Pad/Cushion. Pad/Cushion Tolerance (oz/yd²) is ± 15%.
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Perform all site sealant work as indicated on drawing and as specified herein.
2. Required applications of sealants include, but are not necessarily limited to, the following general locations:
   a. Curb and paving

1.2 QUALITY ASSURANCE

A. Manufacturers: Firms with not less than five years of successful experience in production of types of sealants required for this project.

1. Obtain elastomeric sealants from a manufacturer which will, upon request, send a qualified technical representatives to the project site for purpose of advising installer on proper procedures for use of products.

B. Installer: A firm with a minimum of five years of successful experience in application of type of materials required.

1.3 SUBMITTALS

A. Product Date: Submit manufacturer’s specification, recommendations and installation and instructions for each type of sealant and associated miscellaneous material required.

B. Samples: Submit three 12-inch long samples of each color required (except black) for each type of sealant exposed to view. Install sample between two strips of material similar to or representative of typical surfaces where compound will be used, held apart to represent typical joint widths and shape.

1.4 JOB CONDITIONS

A. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer’s recommended temperature range for installation. Proceed with the work only when the weather conditions are favorable for proper cure and development of high early bond strength. Where joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in lower third of the manufacturer’s recommended installation temperature range so that sealant will not be subject to excessive elongations and bond stress at subsequent low temperatures.

1.5 SPECIAL PROJECT WARRANT

A. Sealant Warranty: Provide written warranty, signed by manufacturer and installer agreeing to, within warranty period of six years after date of substantial completion replace/repair defective materials and workmanship defined to include: instances of leakage or water or air; failures in joint adhesion, material cohesion, abrasion resistance, strain resistance, or general durability; failure to perform as required and the general appearance of deterioration in any other manner not clearly specified in manufacturer’s published project literature as an inherent characteristic of the sealant material.
PART 2 - PRODUCTS

2.1 MATERIAL

A. Expansion Joints:
   1. All expansion joints without exception shall be resin impregnated, premolded fiberboard, conforming to the physical requirements of ASTM D 1752 with a removable poly-plastic top edge that after set in position, and the paving properly cured, the poly-plastic edge can be removed to accommodate joint sealant. Size, width and length as required and shown on drawings.

B. Provide manufacturer’s standard, non-modified two or more part, polyurethane-based elastomeric sealant; comply with either ASTM C920 Grade P, Class 50; self-leveling grade/type. Color to match adjacent surface color.

C. Provide product of one of the following manufacturers:
   1. Contech/Sonneborn
   2. Mameco International
   3. W. R. Meadows, Incorporated
   4. Pecora Corporation
   5. Products Research and Chemical Corporation
   6. Sika Chemical Corporation
   7. Toch/Carboline
   8. Tremco, Incorporated
   9. Dow

D. Color: Sika limestone color, or equal.

2.2 MISCELLANEOUS MATERIALS

A. Joint Cleaner: Provide type of joint cleaning compound recommended by sealant manufacturer for joint surfaces to be cleaned.

B. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.

C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

D. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer. Provide size and shape or rod which will control joint depth for sealant placement, break bond of sealant at bottom of joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize possibility of sealant extrusion when joint is compressed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The installer must examine joint surfaces, backing, and anchorage of units forming sealant rabbet, and conditions under which sealant work is to be performed, and notify Engineer in writing of conditions detrimental to proper completion of the work and performance by sealants. Do not proceed with sealant work until unsatisfactory conditions have been corrected in a manner acceptable to installer.
3.2 JOINT SURFACE PREPARATION

A. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture, and other substances which would interfere with bond of sealant.

B. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicated that alkalinity does not interfere with sealant bond and performance.

C. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution; rinse thoroughly with water and allow to dry before sealant installation.

D. Roughen joint surfaces in vitreous-coated and similar non-porous materials, where sealant manufacturer's data indicate lower bond strength than for porous surfaces. Rub with fine abrasive to produce a dull sheen.

3.3 INSTALLATION

A. Comply with sealant manufacturer’s printed instructions except where more stringent requirements are shown on specified and except where manufacturer’s technical representative directs otherwise.

B. Prime or seal joint surfaces where shown or recommended by sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

C. Install sealant backer rod for liquid sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.

D. Install bond breaker tape where shown and where required by manufacturer’s recommendations to ensure that elastomeric sealants will perform properly.

E. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete “wetting” of joint bond surface equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface an a vertical surface, fill joint to form a slight cove so that joint will not trap moisture and dirt.

F. Install sealants to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section or bead:

1. For sidewalks, pavements, and similar joints sealed with elastomeric sealant and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, and neither more than 5/8 inch deep nor less than 3/8 inch deep.
2. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but neither more than ½ inch deep, nor less than ¼ inch deep.

G. Spillage: Do not allow sealants to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces by primer/sealer.

H. Remove excess and spillage of sealants promptly as the work progresses. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes.

3.4 CURE AND PROTECTION

A. Cure sealants in compliance with manufacturer’s instructions and recommendations to obtain high early bond strength, internal cohesive strength, and surface durability. Do not cure in a manner which would significantly alter materials modules of elasticity of other characteristics.
B. Installer shall advise Engineer of procedures required for curing and protection of sealants during construction period so that they will be without deterioration or damage (other than normal wear and weathering) at time of Engineer acceptance.

END OF SECTION
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 all materials, labor and equipment for installation of synthetic turf and base as indicated on drawings.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver manufactured materials in original packages with seals unbroken and bearing manufacturer's labels indicating brand name and directions for storing.

B. Store manufactured materials in a clean, dry location, protected from the weather and deterioration, and complying with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

C. Store units on flat surfaces.

D. Protect UV-light sensitive materials from exposure to sunlight.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply surface system materials or components over wet, frozen, or excessively damp substrates if prohibited by manufacturer's written instructions or warranty requirements.

B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system to be performed according to manufacturer's written dimensions of other construction by field measurements.

1.5 WARRANTY

A. The Contractor shall provide its Manufacturer's Warranty which guarantees the usability and playability of the synthetic turf system for its intended use. The warranty coverage shall not be prorated nor limited to the amount of the usage.

B. The warranty must have the following characteristics:

1. Must provide full coverage for eight (8) years from the date of Substantial Completion
2. Must warranty materials and workmanship.
3. Must warrant that the materials installed meet or exceed the product specifications.
4. Must have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer a serviceable as a playable surface.
5. Manufacturer's warranty shall be supported by a third-party insurance policy for the full eight (8) year period. The insurance policy shall be pre-paid, direct with the owner, and non pro-rated. The insurance policy shall cover full labor and material replacement of the entire system including backing, fibers, infill, seams, inlays, adhesives, and nailer boards.

6. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.

1.6 SHOP DRAWINGS

A. Contractor to provide color rendered, computer designed shop drawings show turf colors, line markings and dimensions, roll lengths and seam locations.

PART 2 - PRODUCTS

2.1 SYNTHETIC TURF

A. Contractor shall provide Information and pricing from following company and product

B. Synthetic Turf Systems

a. 0.34” pile height
a. 35 oz/sq yd Product Weight
b. Total Weight 55.5 oz / sq yd
b. Shaw: Hitting Streak (or approved equal)

C. Pad

1) 35 oz / sy – Product Weight
2) 0.34” Pile Height
3) 115 oz / sq yd
4) Shaw: Strike One 5mm (or approved equal)

PART 3 - EXECUTION

3.1 GENERAL

A. The installation shall be performed in full compliance with approved shop drawings.

B. All installation operations shall be performed by personnel directly employed by the manufacturer, full familiar with the materials and their application, under the full-time direction and supervision of a qualified technical supervisor employed by the manufacturer of the synthetic turf. Installation supervisors shall have a minimum of five (5) years experience.

C. The surface to receive the synthetic turf shall be inspected and certified by the manufacturer as ready for the installation of the synthetic turf system. Contact Landscape Architect to schedule on-site meeting.

D. Adhesives for bonding knitted synthetic turf appropriately shall be as recommended by the synthetic turf manufacturer.
E. Cord for sewing seams of the turf shall be as recommended by the synthetic turf manufacturer.

3.2 BASE STONE CONSTRUCTION

A. The base stone slope gradation and direction shall match subgrade slope, unless otherwise noted.
   1. The geotextile fabric shall be installed under the stone base.
   2. The drain system shall be installed as indicated on the drawings.
   3. The base stone shall consist of open graded aggregate. The open graded aggregate material must be free draining consistent with the vertical draining requirements of the turf manufacturer.
   4. The finished grade of the base stone shall not vary more than ¼" when compared with a 50' taut string line. Any imperfections, divots, etc in the base stone will be repaired by the contractor and re-evaluated.

3.3 SYNTHETIC TURF INSTALLATION

A. The turf installer shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

B. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.

C. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the turf manufacturer. Seaming tape is to be constructed of high tenacity polyurethane coated, woven nylon. Inlaid markings shall be adhered to the seaming tape with a two-part, high strength polyurethane adhesive applied per the turf manufacturer's standard procedures for outdoor applications. All seams shall be transverse to the field direction; i.e., run perpendicularly across the field.

D. Prior to infill installation, Landscape Architect shall conduct a pre-fill inspection for the purpose of verifying striping seaming and other requirements. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment to produce a layered system of the manufacturer's standard infill products composed of a minimum 30% silica sand and maximum of 70% crumb rubber by weight. The turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a depth of 1-3/4 inches. The infill materials can only be applied when the turf fabric is bone dry.

3.4 FIELD MARKINGS

A. Field markings and decorations shall be installed in accordance with approved project shop drawings, and shall be in color as indicated on drawings.

B. All synthetic turf logos as indicated on the drawings shall be manufactured at the factory in (1) piece, with colors as noted on the drawings.

3.5 CLEAN UP

A. Contractor shall provide the labor, supplies and equipment, as necessary, for final cleaning of surfaces and installed items.

B. All usable remnants of new material shall become the property of the Wayne State University.
   1. Coordinate with WSU Project Manager, provide a minimum 10’ x 10’ square green attic stock.
   2. Dispose of off-site in accordance with waste management and disposal requirements.
C. The Contractor shall keep the area clean throughout the project and clear of debris.

D. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION
SECTION 329100 - SOIL PREPARATION (TOPSOIL)

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 specifies all soil materials designated as "Topsoil" on the drawings or in the specifications. Supply topsoil for landscape work seeding, sod, transplant areas, heritage rose area and planting) from both on-site and off-site sources.

1.3 REFERENCES

A. ASTM International, as referenced herein as ASTM.

B. US Department of Agriculture (USDA) Handbook No. 60 – Diagnosis and Improvement of Saline and Alkali Soils.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than 25 mm (one inch) in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 6.0 nor more than 7.0, and should be best suited to the region, climate and plant material specific to the project.

B. Obtain material from stockpiles established under Section 31 20 00, EARTH MOVING, subparagraph, Stripping Topsoil that meet the general requirements as stated above. Amend topsoil not meeting the pH range specified by the addition of pH Adjusters.

C. If sufficient topsoil is not available on the site to meet the depth as specified herein, the Contractor shall furnish additional topsoil. At least 10 days prior to topsoil delivery, notify the Owner’s Representative of the source(s) from which topsoil is to be furnished. Obtain topsoil from well drained areas. Additional topsoil shall meet the general requirements as stated above and comply with the requirements specified in Section 01 45 29, TESTING LABORATORY SERVICES and Part 1.4.E of this Section. Amend

D. See Planting Specification for planting mixtures.

E. Topsoil Sieve Chart

<table>
<thead>
<tr>
<th>Sieve Designation</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch screen</td>
<td>100</td>
</tr>
<tr>
<td>1/4 inch screen</td>
<td>97 - 100</td>
</tr>
<tr>
<td>No. 10 U.S.S. mesh sieve</td>
<td>95 - 100</td>
</tr>
<tr>
<td>No. 140 U.S.S.</td>
<td>15 – 35</td>
</tr>
</tbody>
</table>
PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Sampling: Each soil test unit shall be a composite of five to seven subsamples taken the full depth of proposed source for each acre of surface area. For on-site stockpiles, discard upper 6 inches of soil before sampling. For large stockpiles, partial excavation will be required for collection of representative samples. Include site plan verifying the locations of all topsoil sampling. Topsoil test reports shall be accompanied with each sample unit for review and approval by the Landscape Architect.

B. Testing methods and written recommendations when not references elsewhere, shall comply with USDA’s Handbook No. 60. Nutrient data to be given in parts per million (ppm) dry soil.

C. Topsoil shall be as defined in ASTM D5268.

D. Soil pH shall be tested in accordance with ASTM D4972.

E. Test for organic material by using ASTM D2974.

3.2 FINE GRADING

A. Contractor shall obtain Owner Representative’s written approval of previously completed rough grading work prior to commencing organic soil amendment incorporation work.

B. Immediately prior to dumping and spreading the approved organic soil amendment, the subgrade shall be cleaned of all stones greater than one inches (1”) and all debris or rubbish. Such material shall be removed from the site. Prior to spreading of the organic soil amendment, subgrades which are too compact to drain water and too compact based upon compaction tests shall be ripped with a claw one foot (1’) deep, pulled by a bulldozer two feet (2’) on center, both directions. Contractor shall then regrade surface.

C. Organic soil amendment material shall be placed and uniformly spread over approved finish sub-grades to a depth sufficiently greater than the specified depth so that after natural settlement and light rolling, the specified minimum compacted depth will have been provided and the completed work will conform to the lines, grades and elevations indicated with allowance for additional topsoil spreading for turfgrass areas in determining final elevations. Incorporate organic soil amendment by disc harrowing, rototilling or other means in a uniform manner. The depth of incorporation shall be based upon the organic content of the tested and approved organic soil amendment, so as to produce a finished soil with an organic matter content of between four (4) and six percent (6%). Supply additional organic soil amendment material, after in-place testing and approval, as may be needed to give the required organic matter content and finished grades under the Contract without additional cost to the Government.

D. Disturbed areas outside the limit of work shall be spread with four inch (4”) minimum depth of organic soil amendment material to the finished grade.

E. No subsoil or organic soil amendment material shall be handled in any way if it is in a wet or frozen condition.

F. Sufficient grade stakes shall be set for checking the finished grades. Stakes must be set in the bottom of swales and at the top of slopes. Connect contours and spot elevations with an even slope.

G. After organic soil amendment material has been incorporated into the subsoil, it shall be carefully prepared by scarifying or harrowing and hand raking. Remove all large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Remove all stones over one and one half inch (1-1/2”) diameter from the amended soil bed. The amended soil shall also be free of smaller stones in excessive quantities as determined by the Resident Engineer.
H. The whole surface shall then be compacted with a roller or other suitable means to achieve a maximum dry density of 88 to 90 percent in accordance with compaction standards of ASTM D1557 Method D. During the compaction process, all depressions caused by settlement or rolling shall be filled with additional organic soil amendment and the surface shall be regraded and rolled until presenting a smooth and even finish corresponding to the required grades.

END OF SECTION
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. Seeding
2. Hydroseeding
3. Sodding
4. Sprigging
5. Mulching
6. Erosion control blanket – slope stabilization
7. Turf renovation
8. Maintenance
9. Warranty

B. Related Requirements:

1. Section 311000 "Site Clearing" for stripping and using on-site topsoil.
2. Section 312000 "Earth Moving" for mass grading of the site.
3. Section 312500 "Soil Erosion and Sedimentation Control" for soil stabilization during construction.
4. Section 329100 "Soil Preparation (Topsoil)" for lawns and plant mixture amendment.
5. Section 329300 "Exterior Plantings" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.
6. Section 334600 "Subdrainage" for below-grade drainage of landscaped areas.

1.3 REFERENCES AND REGULATORY REQUIREMENTS

A. United States Department of Agriculture (USDA), Federal Seed Act - labeling and purity standards and miscellaneous requirements.
B. State Seed Laws – where applicable.
C. Association of Official Seed Analysts (AOSA): “Rules for Testing Seed”.
D. Turfgrass Producers International (TPI): Guidelines for Turfgrass Sod.

1.4 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.
B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
C. Pests: Living organisms that occur where they are not desired or that cause damage to grasses, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Pure Live Seed (PLS): \( \frac{\text{percent germination} \times \text{percent purity}}{100} = \text{Percent PLS} \)

E. Topsoil: Existing, on-site soil that has been modified with soil amendments and fertilizers to produce a soil mixture best for lawn growth. See Section 329110 "Soil Preparation-Topsoil" and drawing designations for topsoil.

F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before topsoil is placed.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data:

1. Erosion control blanket and anchors.
2. Fertilizers - from manufacturer.
3. Mycorrhizal inoculum.
5. Seeding and mulching equipment.
7. Lawn maintenance equipment.
9. Maintenance edge aggregate gradation analysis.

B. Source Quality Control:

1. Samples:
   a. Seed: Quart size sealable plastic bag
   b. Straw Mulch: 1 cubic foot (On-Site).

2. Test Report:
   a. Topsoil: Test reports including soil amendments and fertilization rates for each seed mix. Refer to Section 329100 Soil Preparation (Topsoil).

3. Certifications/Licenses:
   a. Certification of Grass Seed for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity (PLS), germination, weed seed, year of production, and date of packaging. Include identification of source, name and telephone number of supplier.
   b. Certification of sod from proposed sod supplier that identifies quality standard, turf species stating the botanical and common names, proportions of each species in the sod, composition of the root zone soil in which the sod has been grown, and date the sod was planted. Include identification of source, name and telephone number of supplier.
C. Field Quality Control:

1. Project Work Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a project work schedule to the Landscape Architect indicating dates for delivery, installation, and Substantial Completion for all landscape work. The Schedule shall be comprehensive and address procurement, delivery, and installations of irrigation, lawn areas of the site. For a large site, the schedule shall reflect a phased installation and shall include support graphics required to identify this phased approach. Refer to 1.10 below for a complete list of schedule requirements.

2. Maintenance Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a detailed typewritten approach and schedule for the warranty maintenance of all landscape activities outlined under 3.13 of this section. Coordinate landscape maintenance with other applicable Sections Section 329300 Exterior Plantings and combine all maintenance activities into one plan of action. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

3. Irrigation Plan: Prior to the issuance of Substantial Completion, submit a detailed typewritten approach and schedule that outlines watering requirements for maintaining the landscape as described herein. The Irrigation Plan shall be submitted in conjunction with the Maintenance Schedule. The plan shall address how the irrigation system will be operated during the warranty period, frequencies and durations that will be established to provide the correct watering rates for plants and lawns, inspection protocols and winterization procedures. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Landscape Architect and Owner's Representative. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period), and may be automated with a timer. Supply all water and equipment at the Contractor's expense from a source approved by the Owner's Representative. Reliance on natural precipitation will only be allowed with provision of recorded data from a rain gauge located within a 2-mile radius of the project site. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

4. Maintenance Report Forms: Using the approved Maintenance Schedule and Irrigation Plan as the framework for all maintenance activities (plant maintenance, and seed bed maintenance and irrigation operations). The Contractor shall provide detailed maintenance report forms for each site visit. The reports shall be completed by the on-site maintenance superintendent performing the work prior to leaving the site and shall be submitted monthly as back-up to each invoice. Office prepared reports will not be permitted and payment for this work will only be made by the Owner when proof of completed specified maintenance has been provided. Each report shall include the following:

   a. Date of activity.
   b. Length of time on site (start time and finish time).
   c. Name and signature of the maintenance superintendent.
   d. Number of personnel performing the work.
   e. Site climatic conditions (rain, wind, temperature, etc.)
   f. Detailed description of maintenance activities performed by area.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. Include list of at least three similar projects completed in the last 5 years by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

2. Provide resumes of field technician (foreman) responsible for managing the purchase and installation of all materials. Separate resumes shall be provided for the seeding, planting, irrigation and maintenance technicians.

3. License certificates for pesticide applicator.
1.8 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor shall be a company specializing in seeding, sodding, exterior landscape, installations and maintenance, having a minimum 5 years’ experience in projects of the scope and scale being specified.

2. Installer’s field technician: The installer shall provide a full-time supervisor on site when work is in progress.

3. Maintenance field technician: The maintenance activities for all turf areas shall be performed by skilled employees of the landscape installer. Subcontractors specializing in landscape and turf maintenance will not be permitted unless approved in writing by the Owner's Representative.


1.9 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding". Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Straw Mulch: Straw mulch shall be stored off the ground under a cover that provides protection from moisture and humidity.

D. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk materials with appropriate certificates.

1.10 SCHEDULING

A. Work Schedule:

1. Upon authorization to proceed with the work, submit a project work schedule indicating the dates of each of the following items:

   a. Submittal schedule.
   b. Delivery of materials to the site.
   c. Layout of seed bed locations on the site.
   d. Installation including; topsoil placement, fine grading, seeding and sodding.
   e. Substantial Completion of the work.

2. Update schedule monthly to reflect progress of the work.

B. Seasonal Limitations:

1. Seed mixes shall be installed during planting seasons normally recognized in the job locality.
2. Cool Season Grasses: Install during the spring and fall only when soil temperatures are between 50 and 65 degrees Fahrenheit and air temperatures is 60 to 75 degrees Fahrenheit.
   a. Approximate spring installation: Between April 1 and May 15.
   b. Approximate fall installation: Between August 15 and September 30 but no later than 60 days before the first average annual frost date.

3. Dormant seeding: Due to construction operations and schedules, if contractor cannot install seed/sod between April 1 and May 15, Contractor to seed/sod and provide irrigation to the area with Owner Representative's Approval.

4. If special circumstances warrant installation outside the normal installation season, submit a written request to the Owner’s Representative describing conditions and stating the proposed variance. Seeding/Sodding outside the specified seasons may extend warranty obligations and will be dependent upon the extent of the variance.

5. Weather limitations: Proceed with seeding and sodding only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

6. Coordination with Plantings: Plant trees, shrubs, and other plants after finish grades but prior to lawn installation unless otherwise indicated. When planting trees, shrubs, and other plants after lawn installation, protect completed areas, and promptly repair damage caused by planting operations.

1.11 WARRANTY, MAINTENANCE AND ACCEPTANCE

A. Substantial Completion:
   1. The Substantial Completion inspection shall occur in Spring 2020. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion or correction.
   2. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
   3. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
   4. Substantial Completion will be provided for all lawn areas complying with the following:
      a. Landscape Architect approval of all specified submittals.
      b. The work shall be 100% complete (including all site preparation, earthwork, topsoil, seeding, sodding, mulching, erosion control blanket, planting, irrigation and clean-up), and ready for inspection.
   5. After receiving a Notice of Substantial Completion, warrant and maintain all lawn areas in a vigorous, well-kept condition until Final Acceptance.

B. Final Acceptance:
   1. Approximately two weeks prior to the expiration of the warranty and maintenance period (or sooner if plantings are included in the inspection), the Owner’s Representative will conduct an inspection of all lawn areas, plantings, irrigation system and review all previously submitted maintenance report forms to verify all completed maintenance activities. There shall be thorough documentation previously submitted by the contractor and field observations made by the Owner or Landscape Architect that the specified maintenance has occurred. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
   2. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
   3. Final Acceptance will be based upon Owner approval and the work having:
      a. Uniform finished grades conforming to the drawings and free of erosion.
b. All maintenance items completed and documented by Contractor through maintenance report forms.

c. Satisfactory Seeded Lawn: At end of warranty and maintenance period, a healthy, uniform well-rooted, even-colored, close stand of grass has been established, free of weeds, disease and insect problems, and surface irregularities, with 100% coverage of the specified species.

d. Satisfactory Sodded Lawn: At end of warranty and maintenance period, a healthy, well-rooted, even-colored, viable lawn, free of weeds, disease and insect problems, open joints, bare or dead areas, and surface irregularities.

4. Areas which do not meet the contract requirements shall be regraded as needed and seeded, mulched, sodded. Use specified materials and procedures to reestablish lawn that does not comply with requirements and continue maintenance at no cost to the Owner until lawn is satisfactory.

5. Final Acceptance and the end of the warranty period for the lawns will occur only after all punch list items have been satisfactorily completed and the site is left in the condition specified under Cleanup and Protection.

C. Warranty and Maintenance Period:

1. The end of the warranty and maintenance period shall be:

   a. 1 year following University acceptance of the project

      1) When the initial warranty and maintenance period has not elapsed before end of growing season (October 31), or if lawns are not fully established, continue maintenance during next growing season until all maintenance and warranty obligations have been met.

2. The Contractor will not be held responsible for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents beyond landscape installer's control which result from floods, hail storms, winds over 100 miles per hour, fires or vandalism, unless Contractor has not completed specified installation in a manner that could have protected the landscaping from these phenomena.

3. If, in the opinion of the Owner’s Representative it is advisable to extend the warranty and maintenance period for an additional growing season, the contractor will be notified of such requirement by the Owner. Improper execution of the installation and/or failure to perform and document the specified maintenance in accordance with contract requirement shall be the basis for extending the period of establishment for a second growing season. All specified maintenance and warranty requirements will be required during this extended period and all costs shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA’s “Rules for Testing Seeds” for purity and germination tolerances.

B. Other varieties that those specified may be submitted for approval to Landscape Architect, but they must be newer, more improved cultivars than what is listed.

C. Dormant seeding shall only be permitted if approved by Landscape Architect in writing. Apply seed at a rate that is 25 percent higher than the rates specified below.

D. Seed Species:
1. The University prefers to use a Sun and Partial Shade Blend. If contractor would like to suggest a different blend for the restoration around the perimeter of the synthetic turf field, please contact the Landscape Architect.

2. Quality: Seed of grass species as listed below for solar exposure, with not less than 90 percent germination, not less than 98 percent pure seed, and not more than 0.3 percent weed seed:

3. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   a. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

4. Sun and Partial Shade Blend: Proportioned by weight as follows:
   a. 60 percent Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   b. 30 percent fine fescue (Festuca), a minimum two varieties; chewing and creeping red.
   c. 10 percent perennial ryegrass (Lolium perenne).
   d. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

5. Shade Blend: Proportioned by weight as follows:
   a. 65 percent fine fescues (Festuca), a minimum of three varieties consisting of chewing, creeping red and hard.
   b. 25 percent Kentucky bluegrass (Poa pratensis), a minimum two turf type varieties.
   c. 10 percent perennial ryegrass (Lolium perenne), use shade tolerant variety.
   d. Install at a rate of 6 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

6. Shade and Sun Fescue Blend: Proportioned by weight as follows:
   a. 100% turf type tall fescue (Festuca) consisting of a minimum 3 improved varieties.
   b. All varieties shall be labeled endophyte free or contain beneficial endophytes.
   c. Install at a rate of 8 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

2.2 TURFGRASS SOD

A. Provide an approved nursery grown, Number 1 Quality/Premium sod, complying with “Specifications for Turfgrass Sod Materials” in TPI’s “Guideline Specifications to Turfgrass Sodding”. Furnish sod comprised of the specified species and of uniform density, color, and texture, strongly rooted, weed free and capable of vigorous growth and development once installed. Sod shall be 2 years old and shall have been grown at a sod nursery in a mineral-based root zone. Sod grown on peat (organic soil) will not be approved. Sod shall be free of objectionable grassy and broad leaf weeds.

B. Thickness and width of sod shall be kept to strict dimensions, with width being 24” and containing 90-degree angle cut edges. Netting associated with harvest must be removed before installation.

C. Turfgrass Sod Species: Sod of grass species as follows, with not more than 0.5 percent weed seed:

1. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.

2. Sun and Partial Shade: Proportioned by weight as follows:
   a. 60 percent Kentucky bluegrass (Poa pratensis), a minimum of two improved turf type varieties.
   b. 40 percent chewing red fescue (Festuca rubra variety) a minimum of two varieties.

3. Shade: Proportioned by weight as follows:
   a. 60 percent fine fescues (Festuca), a minimum of two varieties; chewing, creeping red and
b. 40 percent Kentucky bluegrass (Poa pratensis), a minimum of two turf type varieties.

D. Turfgrass-Sod Species: Proprietary blend as follows: <insert sod product name and supplier>.

E. Sod Stakes: Sod Stakes shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer spacing and installation instructions.

2.3 STRAW MULCH

A. Straw Mulch: Provide stalks from oats, wheat, rye, barley or rice that are free of weeds, air-dry, clean, mildew- and seed-free, threshed straw of wheat, rye, oats, or barley.

1. Straw shall be in an air dry condition and suitable for placing with commercial mulch blowing equipment.

B. Tackifier

1. Hydraulically applied tackifier shall be an organic based or polymeric emulsion blend designed for use over long-fibered mulch (straw). Tackifier shall:
   a. Be powder or liquid based
   b. Achieve a drying time between 12 and 18 hours
   c. Minimum 4 month longevity after application

2. Asphalt Emulsion tackifier is not permitted.

2.4 HYDRAULIC MULCH

A. Hydraulic mulch is not permitted.

B. Hydraulic Mulch: Provide biodegradable, cellulose fiber mulch made from 100% post-consumer recycled paper, or a combination of 70% recycled wood fiber and 30% post-consumer recycled paper cellulose fiber. Mulch should be processed to contain no growth or germination-inhibiting factors, nontoxic and dyed an appropriate color to facilitate visual metering of the application of materials. On an air-dry weight basis, provide hydroseeding mulch containing not more than 12 percent moisture, plus or minus three percent at the time of manufacture, with a pH range from 3.5 to 5.0 for wood/cellulose fiber blends and from 5.0 to 9.0 for 100% cellulose fiber mulch. Provide hydraulic mulch manufactured so that:

1. After addition and agitation in slurry tanks with the fibers, tackifier and water, the material will become uniformly suspended to form an homogeneous slurry. Mixing the lawn seed, fertilizers and soil amendments is prohibited.
2. When hydraulically sprayed on the ground, the material will form a blotter-like cover.
3. The cover will allow the absorption of moisture and allow rainfall or applied water to percolate to the underlying soil.

C. Hydraulic Mulch Tackifier

1. Binding agent shall clear and non-staining and result in a stabilized fiber matrix consisting of wood and/or paper fibers and a stabilizing emulsion that includes a hydro-colloidal tackifier and polycarbonate flocculant specific to hydraulic mulch applications.
2. Use products as recommended by fiber-mulch manufacturer for slurry application.
3. Asphalt Emulsion tackifier is not permitted.
2.5 EROSION CONTROL BLANKET

A. Erosion Control Blanket - [Type 1]: Intended for use on flat surfaces or slopes 4:1 (H:V) or greater where only sheet flow will be encountered.

1. Straw/jute blanket shall be constructed with a 100% agricultural straw matrix (0.5 lbs per square yard), with jute or cotton netting on top and bottom, sewn together with biodegradable cloth thread. The blanket shall be 100% biodegradable, and have a typical functional longevity of 12 months after installation. Plastic netting will not be permitted.

B. Erosion Control Blanket - [Type 2]: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 8 feet per second (fps).

1. Straw/coconut fiber blanket shall be constructed with 70% agricultural straw (0.35 lbs per square yard), and 30% coconut (coir) fiber matrix (0.15 lbs per square yard), with 100% woven jute netting on the top and bottom, sewn together with biodegradable cloth thread. The Blanket shall be 100% biodegradable, and have a typical functional longevity of 18 months after installation. Plastic netting will not be permitted.

C. Erosion Control Blanket - Type 3: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 10 feet per second (fps).

1. Coconut fiber blanket shall be constructed with 100% coconut (coir) fiber matrix (0.50 lbs per square yard), with 100% woven coir fiber netting on top and 100% woven jute netting on the bottom, sewn together with biodegradable cloth thread. The Blanket shall be 100% biodegradable, and have a typical functional longevity of 24 months after installation. Plastic netting will not be permitted.

D. Fasteners: Fasteners shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer’s spacing and installation instructions.

2.6 EQUIPMENT

A. Tiller:

1. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 2:1 (H:V): A minimum D-7 size tractor with a mounted ripper consisting of 3 to 5 tines spaced a maximum 24 inches apart. Tines shall be equipped with 12 inch wide winged ripper points and shall be capable of penetrating subsoils up to 24 inches deep in one pass.

2. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 4:1 (H:V): A tractor mounted disk harrow consisting of 6 – 12 offset disks weighing a minimum 1,800 pounds each. The harrow shall be capable of penetrating subsoils up to 18 inches deep in one pass.

B. Fine Grading: Hand rake, tractor mounted york rake or other similar equipment.

C. Hydroleeder: Hydroseeding will not be permitted.

D. Hydroleeder: A truck-mounted, hydraulically driven variable speed agitation seeder that effectively shoots an aqueous mixture of seed, fertilizer, and mulch over broad areas through a discharge boom and hydraulic hose. Minimum tank capacity shall be 1,000 gallons.

E. Drop Spreader with Cultipacker, as manufactured by Brillion or John Deere or equivalent.

F. Broadcast Seeding: A spinning-disc type broadcaster with a calibration gauge (hand held and tractor mounted) shall be used to broadcast the seed over the designated areas.
G. Seed Imprinting Equipment: Used with spinning-disc type broadcaster to lightly cover or press seed into the soil. A tractor or all-terrain vehicle mounted dragging devise consisting of anchor chains, disk chains, cables, chain harrow or other similar equipment.

H. Straw Mulcher: A power mulcher that thrashes and separates, then evenly distributes the straw at a capacity between 2 and 20 tons per hour, with a discharge distance between 35 and 100 feet in still air.

I. Crimping Device: A mulch disc or other mechanical anchoring/crimping device for use in anchoring straw mulch into place, such as a Reinco Model MD-96 or equivalent, having flat discs with notched edges spaced 8” apart to impress mulch 1-3” down into soil.

2.7 WATER

A. Water for lawns shall be available from on-site sources.

B. Water shall be free of wastewater effluent or other hazardous chemicals

2.8 TOPSOIL

A. Refer to Section 329100

2.9 SOIL AMENDMENTS

A. Peat shall be a product having at least 95% organic content consisting of sphagnum peat moss with a pH range of 3.0 – 4.0 and Von Post decomposition value of H1 – H3, or low-lime reed-sedge peat with a pH range of 4.0 to 5.0 and Von Post decomposition value of H4 – H6. Product shall be free of sticks, wood or other debris.

B. Compost shall be a heavily decomposed mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings or other compostable materials. Manure is not suitable for use. The compost shall have a dark brown or black color, be capable of supporting plant growth without ongoing addition of fertilizers or other soil amendments and shall not have an objectionable odor. The compost shall be free of plastic, glass, metal and other physical contaminants, as well as viable weed seeds and other plant parts capable of reproducing (except airborne weed species). Composting facility shall be tested in accordance with the United States Composting Council, Seal of Testing Assurance (STA) following procedures as outlined in the Test Methods for the Examination of Composting and Compost protocols (TMECC).

1. pH: 5.5 to 8.
2. Moisture content: 35 to 55 percent by weight. No visible free water or dust is produced when handling it.
3. Sieve analysis: 100 percent passing ¾ inch screen.
4. Soluble salt content: Less than 5 percent.
5. Organic matter content: Minimum 60 percent.

C. Sand shall be clean, coarse, ungraded, meeting the requirements of ASTM C33 for fine aggregates.

D. pH Adjusters:

1. Lime shall be finely ground agricultural grade dolomitic limestone containing not less than 85% calcium and magnesium carbonates conforming to ASTM C602, Class T or O.
2. Elemental sulfur shall be granular, biodegradable, horticultural grade material containing at least 90% sulfur, with a minimum of 99% passing through No. 6 sieve and a maximum of 10% passing
through No. 40 sieve.

E. Mycorrhizal Inoculum:

1. Mycorrhizal fungi in the inoculant shall be available as propagules, i.e., spores, root fragments and hyphae. The inoculant shall contain highly selected strains of low host specificity endo- and ectomycorrhizal fungi combined with other beneficial fungi (Trichoderma), humic acids, biostimulants, beneficial bacteria, soluble sea kelp, and yucca plant extracts, as manufactured by Horticultural Alliance or approved equal. The selection of inoculants shall be based upon fungal partners that are compatible with the specified turf grasses.

2.10 FERTILIZER

A. Fertilizer shall be a complete fertilizer of neutral character, consisting of fast and slow-release nitrogen and shall be applied at the rates and formulations that release nutrients when new plants can effectively draw them from the soil.

1. The percentages of slow release and fast release nitrogen shall be adjusted based on the time of year fertilizers are being applied.
2. For fall seeding, the percentage of slow-release nitrogen shall be higher that spring seeding since a high percentage of fast-release nitrogen will be mostly lost by runoff or infiltration before plant uptake.

B. Composition: The percentages by weight shall be determined per recommendations of the soil testing reports for lawns.

2.11 PESTICIDES

A. General: Pesticide and herbicides shall be registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides and herbicides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within seeded areas at the soil level.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General:

1. The Contractor shall establish a quantifiable system to be employed in the field for measuring areas, weighing products and calibrating equipment on a daily basis to ensure all products are installed at the specified rates of application.
2. Prior to beginning work, examine and verify the acceptability of the project site and notify the Owner's Representative of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
3. Identify areas of subsoil compaction prior to placement of topsoil.
4. Verify that no foreign or deleterious material has been deposited in soil within a planting area.
5. Where lawn installation occurs in close proximity to other site improvements, provide adequate protection to all features prior to commencing work. Promptly repair any items damaged during installation operations to their original condition.

6. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

7. Suspend spoil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

8. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

9. If lawn areas die or are rejected due to non-conformity to contract requirements, they must be removed from the site immediately and replaced before Substantial Completion.

B. Utilities: Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand-excavate to minimize possibility of damage.

C. Coordination with Other Work:

1. The Contractor shall coordinate work with other contractors or trades to determine the appropriate sequence of landscape installation with respect to other work on the site.

2. Completed work installed out of construction sequence which is subsequently disturbed by the completion of work by other trades shall be repaired by the landscape installer at no cost to the Owner.

3. Maintain grade stakes and layout controls set by others until removal is mutually agreed upon by all parties concerned.

3.2 SUBGRADE PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by lawn installation operations.

B. Install erosion control measures, if necessary, to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties, natural resources and walkways.

C. Vegetation Removal: Strip and dispose of organic debris and root mat.

D. Topsoil stripping, stockpiling: Refer to Section 311000 - Site Clearing.

E. Maintain subgrade in areas to be topsoiled in a uniform condition so as to prevent future depressions. Prior to placing topsoil;

1. Till all subsoils to a minimum depth of 18-inches with approved equipment to remove all compacted subsoils. Tilling shall be complete breaking thoroughly fracturing. Perform tilling in two directions, one perpendicular to the other.

2. Upon completion of tilling, the subsoils will require light compaction and leveling to prevent ponding of water and settlement after topsoil placement. As a final operation, a light-weight tracked dozer shall be employed that will remove surface irregularities and prevent excessive settlement. During this procedure, the surface of the subsoil on slopes greater that 4:1 (H:V) shall be imprinted with tracks from the dozer. Imprinting shall be perpendicular to the slope and shall be approximately one-inch deep.

3. Do not proceed with topsoil placement until subgrade tilling and imprinting is completed to the satisfaction of the Landscape Architect.

4. Repair disturbances to previously graded areas and remove surplus subgrade material associated with any landscape construction.

F. If the prepared subgrade is eroded or compacted by rainfall prior to topsoil placement, rework the surface as specified.

G. In locations where existing topsoil has not been removed, till entire area in accordance with paragraph E above. Do not till within dripline of existing trees.
3.3 PLACING TOPSOIL, SOIL AMENDMENTS AND FERTILIZER

A. Provide, fertilize and amend topsoil in accordance with testing laboratory recommendations specified under Section 329113 "Soil Preparation (Topsoil)".

B. Uniformly distribute topsoil on lawn areas so that after light compaction and finish grading, a uniform depth of 4-inches is achieved. Reduce elevation of planting soil to allow for thickness of sod. Placement shall include spreading, cultivating, lightly compacting, dragging and grading to the conditions specified below.

C. Topsoil, when placed, shall be dry enough so as not to puddle or bond. Do not place topsoil when the subgrade is frozen, excessively wet, extremely dry or in a condition otherwise detrimental to proper grading or lawn operation.

D. Following topsoil placement but prior to finish grading, broadcast all soil amendments and fertilizer and rototill into the topsoil. The coverage areas for soil amendments and fertilizer shall be carefully calculated by the installer and fully blended into the entire topsoil profile. Do not incorporate soil amendments and fertilizer more than 5 days in advance of seeding.

E. Mycorrhizal Inoculum:

1. Rototill two granular pounds per 1,000 square feet of seed bed into the top four to six inches of topsoil or as recommended by supplier.

3.4 PRE-INSTALLATION PREPARATION

A. Finish Grading:

1. Immediately before lawn installation scarify, loosen, float, and drag topsoil as necessary to bring it to the proper condition. Remove all foreign matter larger than 1" in diameter. There shall be no visible plants, roots, debris or any foreign material present prior to installation.

2. Finished grades shall slope to drain, be free of depressions or other irregularities, lightly compacted to prevent settlement, and shall be uniform in slope between grading controls and the elevations indicated.

3. Finished grade for seeded lawn areas shall meet existing grades at contract limits and be ½" below top of curbs, walk paving, and metal edging if used.

4. Finished grade for sodded areas shall meet existing grades at contract limits and be 1" below top of curbs, walk paving, and metal edging if used.

B. Before lawn installation obtain Landscape Architect's acceptance of finish grading. Restore seedbed areas if eroded or otherwise disturbed after finish grading.

3.5 SEEDING AND MULCHING

A. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.

B. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean seeding, dragging, mulching, crimping and tackifier.

C. Seeding Procedures:

1. Do not sow seed when weather conditions are unfavorable, such as during drought or high winds.

2. Perform seeding with only approved equipment. Do not broadcast or drop seed when wind velocity exceeds 10 mph.
3. Sow the seed uniformly at a rates specified under 2.1 of this section. For dormant seeding, increase seeding rates by 25% if (accepted by Owner's Representative).
4. Do not use wet seed or seed that is moldy or otherwise damaged.
5. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucers, plant beds and other seed beds.
6. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
7. Immediately following seeding, rake, drag or float all seed beds to provide a light covering of topsoil approximately 1/8 inch deep. When using equipment that lightly injects the seed into the soil, include equipment that lightly rolls the seed bed to provide good moisture contact between the seed and soil.
8. Maintain soil moisture in accordance with 3.11 below.

D. Mulching Procedures:

1. Do not use any straw that contains weeds and other plants that will contaminate the seed beds with unspecified plants. Carefully inspect each bale of straw prior to spreading and any bales observed to be contaminated with weeds shall be removed from the site on a daily basis.
2. Do not mechanically blow straw when wind speeds exceed 10 mph.
3. Remove all straw that has been deposited outside the limits of seeding and on adjacent pavement, plant beds and tree saucers.
4. Spread straw mulch evenly at the rate of approximately 2 tons dry straw per acre. Place all mulch over all seeded areas within 24 hours after seeding. A mechanical blower or hand spreading shall be used to apply mulch material, provided the machine has been specifically designed and approved for this purpose. Mulch shall be uniform in thickness and cover resulting in a blanket of straw approximately 1 ½ inches loose thickness with little to no visible soil.
5. Slopes 4:1 or steeper and drainage swales shall be stabilized with erosion control blanket in accordance with 3.12 below.
6. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with 3.12 below at no additional cost to the Owner.

E. Anchoring Mulch Procedures:

1. Anchor the mulch by using both an approved crimping device and applying tackifier on the mulched surface immediately following mulching operation.
2. Mulch shall be crimped in all seed beds where slopes are less than 4:1 (H:V) and of sufficient width to allow equipment to perform crimping without damaging the finish seed bed. Crimp all locations in two directions. When finished, straw shall be anchored one to two inches into the seed bed in rows no more than eight inches apart.
3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.
4. Any seed and mulch displaced due to improper crimping and bonding with tackifier shall be immediately replaced to the specified condition at no additional cost to the Owner.

3.6 HYDROSEEDING AND HYDROMULCHING

A. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
B. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.
C. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean, seeding, mulching, crimping and tackifier.
D. Hydroseeding and mulching shall be installed as a two-step process.
1. **Step One:** Apply the seed and water slurry at the specified seed-sowing rate, with a light application of an approved hydraulic fiber mulch tracer.

2. **Step Two:** Apply the specified straw mulch and tackifier at specified rate, see 3.5 D and E above. Combining both steps into one will not be permitted.

E. **Hydroseeding – Step One Procedures:**

1. Fertilizer and soil amendments shall be applied as specified under 3.3 above and shall not be included within the step one slurry.

2. Apply seed on the previously prepared bed at the rates specified under 2.1 of this section. For dormant seeding, increase seeding rates by 25%.

3. Water used shall be obtained from fresh water source, and shall be free from injurious chemicals and other toxic substances at all times. Identify to the Owner all sources of water at least two weeks prior to use. The Owner, at his/her discretion, may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content.

4. Mixtures shall be constantly agitated from the time they are combined until they are finally applied to the seed bed. Once combined, mixtures shall be used within 8 hours.

5. Apply slurry uniformity and at the prescribed rate, avoiding misses and overlapping areas, gauging quantities of mixtures to measured application areas. Checks on the rate and uniformity of application may be made by the Landscape Architect observing the degree of wetting, or by distributing test sheets and observing the quantity of seed deposited thereon.

6. Direct application nozzle sufficiently upward so that the mixture falls to the ground in a uniform shower. Never direct spray toward the ground in a manner that produces erosion or runoff. Discontinue application during periods of high wind that affect the ability to properly apply the seed at a uniform cover.

7. Maintain soil moisture in accordance with 3.11 below.

F. **Mulching – Step Two Procedures:**

1. Hydromulch is not permitted. Apply straw mulch and erosion control blanket and anchor to soil as specified under 3.5 above.

2. Mulch all seeded areas with specified hydraulic mulch following the same requirements outlined under 3.6 E above.

3. Hydraulic mulch shall be applied at the following rates:

   a. 100% cellulose fibers: 2,000 lb/acre on slopes flatter than 4:1 (H:V).
   
   b. 70% wood fiber / 30% cellulose fiber: 2,500 lb/acre of slopes flatter than 4:1 (H:V).

4. Slopes 4:1 or steeper shall be stabilized with erosion control blanket in accordance with 3.12 below.

5. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with 3.12 below at no additional cost to the Owner.

G. **Anchoring Mulch Procedures:**

1. Spray hydraulic mulch tackifier concurrent with or immediately after mulching following the same requirements outlined under 3.6 E above.

2. Use only an approved tackifier applied at the rate recommended by the manufacturer.

3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.

4. Any seed and mulch displaced due to improper installation of tackifier shall be immediately replaced to the specified condition at no additional cost to the Owner.
3.7 TURF RENOVATION

A. All preparation work shall be conducted in accordance with 3.1 through 3.4 above. Following surface preparation, lawn installation shall be completed in accordance with the applicable lawn installation methods specified above. Blend newly seeded areas into adjacent existing lawns.

B. Renovate existing lawns where indicated. In areas where diseased or contaminated lawns are identified, remove existing topsoil and dispose off site.

C. Renovate lawns damaged by Contractor's operations, such as storage of materials, haul roads or other areas outside the limits of work.

D. Renovate lawns where topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations has occurred. Remove existing topsoil and dispose off-site.

E. Mow, dethatch, core aerate, and rake existing turf where identified.

F. Maintain soil moisture in accordance with 3.11 below.

3.8 WATERING

A. Watering Procedures:

1. Immediately following lawn installation water all bed areas thoroughly and immediately with a fine mist until soil is soaked to a depth of at least 2-inches or as indicated above. Puddling of water or allowing the seedbed to dry is unacceptable.

2. For seeded areas, maintain soil in a moist condition (in hot dry weather irrigation may be required 2-4 times per day) until seeds have sprouted and reached a height of 1-inch. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering. Provide irrigation to moisten soil to a depth of 4" to encourage deeper rooting.

3. For sodded areas, begin watering the entire area within 24 hours of installation and water daily for the first two weeks; twice a day in hot dry weather. Keep soil in all areas moist but not soaked to 2-inches below the bottoms of the plants. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering until Final Acceptance. During this period, moisten soil to a minimum depth of 4" to encourage deeper rooting.

4. Watering at accelerated rates that dislodge seed and mulch materials or cause erosion shall be immediately repaired at no cost to the Owner.

3.9 EROSION CONTROL BLANKET

A. Erosion Control Blanket Procedures:

1. Install erosion control blanket as indicated in on the Plans and all seed beds with slopes 4:1 (H:V) or steeper.

2. Immediately following seeding, erosion control blanket shall be rolled out in place in the direction of the slope fall line. The material shall be applied without stretching and shall lie smoothly but loosely on the soil surface. Installers shall minimize walking directly on the seed or topsoil bed either before or after the blanket is applied.

3. All ends shall be buried a minimum of 4 inches deep and the trench shall be firmly tamped after closing.

4. In cases where roll ends join, the up-slope piece shall overlap the down-slope piece by at least 18 inches.

5. Anchor edges prior to backfilling trench, all overlaps at 12-inch intervals, and the center of each panel on 3-foot intervals.

6. The upslope ends of the blanket shall be buried a minimum of 6 inches deep and anchored at 12-inch intervals prior to backfilling trench.
7. Reseed all disturbed edges immediately following straw blanket installation and work seed into blanket.

3.10 MAINTENANCE

A. General: Maintain and establish lawn areas by watering, fertilizing, pest and weed control, litter removal, mowing, trimming, repairs, and performing other operations as required to establish healthy, viable lawn. Maintenance shall also include grade repair, seeding, sodding all associated soil amendments and fertilizers.

B. Provide all maintenance under the supervision of a skilled employee of the lawn installer. The skilled maintenance supervisor shall be: capable of operating the automatic irrigation system controller, conducting turf diagnostics to identify the presence of disease, insect and fertility problems, and directing a maintenance crew in the performance of horticultural maintenance practices identified below. Maintenance requirements identified below shall be the basis for information to be included in the Maintenance Schedule and Irrigation Plan identified under 1.5.C of this section and thoroughly documented under the required Maintenance Report Forms to verify the work has been properly performed.

1. Failure to perform and submit factual Maintenance Report Forms could result in non-payment for said services and require the extension of the warranty and maintenance period an additional year at the Contractor’s expense.

C. Provide all equipment, materials, labor and services to maintain the landscape beginning immediately after each area is installed and continuing until Final Acceptance and the end of the warranty period. During this period, perform the following:

1. Inspect the entire landscape at least once per week during the growing season and perform needed maintenance promptly.
2. Prior to each mowing, collect all debris, litter and miscellaneous materials accumulating on the site and remove from the site.
3. Irrigation: Irrigate all turf areas to maintain optimum moisture within the root zone as specified under 3.11 above. When using an automatic sprinkler system, the lawn installer responsible for maintenance shall bear full responsibility to set each zone to the correct frequency and duration.
4. Mow all lawns weekly during the growing season and as described below. Mowing frequencies shall be adjusted based on cutting requirements and may require more frequent visits during high growth periods. Use mulching mower only with sharpened blades and alternate direction of each mowing session to prevent rutting.
5. Fertilize as described below.
6. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Apply herbicides and pesticides as described below.
7. Remove leaves bi-weekly during the fall as they accumulate on the lawns. Bag and dispose off-site. Do not mow in advance of leaf removal.
8. Repair bare, eroded or settled areas and restore to provide a uniformly smooth lawn with the specified grasses. Provide same materials and installation procedures as those used in the original installation.
9. Reclaim/replace soil materials and turf damaged or lost in areas of subsidence. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth lawn.
10. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

D. Mowings: Mow turf as soon as top growth is tall enough to cut. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. At the time of each mowing, adjust mowing equipment to meet this requirement. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass, fescue to a height of 2-1/2 to 3-inches.
2. For sodded lawns wait at least 2 weeks after installation for first mowing.
3. Mowing heights may increase during the hot summer months based on regional conditions.
4. Collect all grass clippings if mowings are not sufficiently timed to allow for composting into the existing lawn and accumulations of clippings can be observed on the surface of the grass. Collection and off-site disposal shall be performed at no additional cost to the Owner.

3.11 POST-INSTALLATION FERTILIZATION

A. Apply fertilizers at the time of season, rate of application and grade of N-P-K that maximizes the health of the lawn and minimizes the potential run-off of fertilizers to adjacent waterways and groundwater. Avoid the use of phosphorus unless site soils are deficient of this nutrient.

B. During the warranty and maintenance period, fertilize warm season grasses three times and cool season grasses two times during the growing season.

C. Test site topsoil in early-spring and base actual rates on testing recommendations.

D. Apply fertilizer during the following dates;

1. Spring (April / May): Cool season grasses: After the second spring mowing apply fertilizer at a rate of 1 lb. actual nitrogen per 1,000 square feet of lawn. Nitrogen shall be 70% slow-release. Avoid the use of phosphorous and apply at 4-0-1 ratio of N-P-K.
2. Fall (September/October): Warm and cool season grasses: 8 weeks following application of spring apply fertilizer at a rate of 1.5 lbs. actual nitrogen per 1,000 square feet of lawn. Nitrogen shall be water soluble, quick release. Avoid the use of phosphorous and apply at 3-0-1 ratio of N-P-K.

3.12 PESTICIDE APPLICATION

A. Apply pesticides, and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Protect newly seeded areas from stormwater flows discharging from paved surfaces until grass establishment. Additional water diversion and erosion control measures such as wattles and check dams may be utilized at Contractor's discretion and expense.

E. Remove nondegradable erosion-control measures after grass establishment period.
END OF SECTION
1.2 SUBMITTAL OF SHOP DRAWINGS

A. The Contractor shall submit the requisite shop drawings and catalog documents for any material or equipment proposed to be utilized in the performance of the Work to the Owner's Construction Engineering Inspection Consultant, which shall distribute the Submittals to the Landscape Architect/Civil Engineer with a copy to the Owner. The Contractor shall transmit said submittals to the Landscape Architect/Civil Engineer in a form and manner that would allow the Landscape Architect/Civil Engineer to review the submittals in an efficient and timely manner. The Design Engineer will review each submittal for compliance with the Contract Documents. If a submittal is found to be non-compliant, then the submittal will be returned to the Contractor to be corrected. Finally, after the Landscape Architect/Civil Engineer have reviewed and approved the submittals, the Contractor shall distribute the final submittal copies to the Owner as part of the close out documents.

1.3 AS-BUILT RECORDS

A. A set of Construction Documents shall be marked as As-Built Drawings and be maintained at the Project site by the Contractor for the purposes of making all changes, revisions, relocations, reroutes, or variances in the Work that differ from the Construction Documents. The As-Built Drawings shall be made accessible to all of the Contractor's subcontractors for recording any changes, field sketches, revisions, relocations, reroutes, or variances in the Work. The completed set of As-Built Drawings shall be transmitted to the Owner upon completion of the Work provided in a timely manner and in AutoCADD 2010 version or later, to the County. Field sketches and installation records, other than shop, fabrication, or field installation drawings, shall not be submitted separately but shall be recorded on the As-Built Drawing set only.

1.4 PROJECT MEETINGS

A. The Contractor shall arrange and conduct scheduled progress meetings determined by the Owner’s Representative and prepare and distribute meeting minutes. Special meetings for the purposes of coordinating and monitoring the work progress, identifying problems, informing subcontractor and Project participants of project status, stressing safety, coordinating construction details and inspecting quality conformance shall be conducted as required to assure the smooth and uninterrupted progression of the Work.

1.5 FIELD OFFICE BUILDINGS, SHEDS, AND TEMPORARY STORAGE AREAS

A. The Contractor shall provide all temporary field offices and storage area enclosures to conduct the Work and properly administrate the Work. The Contractor may locate field offices and storage areas on site at Contractor’s discretion, and subject to Owner Representative’s location approval, but Contractor will have full responsibility to maintain access to the Work and the work of the Owner. Any relocation of the Contractor’s temporary facilities required to provide access for installation of utilities or the Owner shall be done to maintain the schedule at no cost to the County. The appearance of field offices is subject to the reasonable approval of the County.

1.6 TEMPORARY PROJECT SIGN

A. The Contractor, may at its own expense design, fabricate and construct one (1) Project Identification Sign for the purpose of advertising the Project. Contractor to coordinate with Landscape Architect/Civil Engineer for rendered graphics of proposed site. The sign shall be constructed of exterior grade wood, with weather resistant graphics and hardware and shall be a maximum of 16 square feet. The design and content of the sign shall be subject to the approval of the County.
1.7 CONSTRUCTION SEQUENCING AND NOTIFICATION PLAN

A. The Contractor must submit to the Owner’s Representative, Landscape Architect and Owner a detailed plan, which shall delineate the sequence of the various construction activities that will occur on the Project Site, all road closure requirements (including closure time duration on a per block basis) and proposed measures to maintain reasonable and safe access for the stakeholders and business owners which may be affected by construction activities. The Construction Sequence and Lane closure plan shall be provided to the Owner’s representative at the time of the Contractor's first proposed Schedule submittal to the County, due within 7 days of the County providing the Contractor with a Notice to Proceed. The County at its sole discretion will determine the reasonableness of the Contractor’s plan to provide and maintain pedestrian and vehicular access. The Plan has to be approved by the Owner’s Representative, Landscape Architect and Owner before the Contractor will be allowed to commence work on the Project Site. Owner’s Representative to provide dates and limitations to site for Fairground events during the time of construction.

B. The Contractor shall designate only one (1) individual who will be assigned to the work throughout its entirety to be responsible for all communications with the stakeholders in the project area. The Contractor shall notify the stakeholders in writing at least thirty (30) days prior to the anticipated start of construction activities and again not less than seven (7) days prior to the actual start of construction activities. The Contractor may be required to fabricate and post signage in various locations on the project site advising the stakeholders in the project area of the forthcoming construction activity.

1.8 CONSTRUCTION PARKING

A. The Contractor shall be responsible for its employees’ and subcontractors’ vehicles while parked on or off the construction site. Any vehicle found to be owned by the Contractor’s employee or an employee of the Contractor’s subcontractor parked illegally may be towed away by the County and charged to the Contractor by Change Order. The County reserves the right to deny parking privileges on the Project site to any individual who parks a vehicle improperly or operates any vehicle in an unsafe manner.

1.9 WATER SERVICE

A. If required for construction purposes, the Contractor will arrange for, or otherwise furnish, and pay for water required for the Work. The Contractor shall be responsible to provide and maintain connections, backwater valves, valves, and pipe that may be required to supply water at a point convenient to the work area. The locations of the connections shall be acceptable to Water Department.

1.10 TEMPORARY POWER, LIGHTING AND PHONE SERVICE

The Contractor will furnish and pay for electrical power and telephone service necessary for the Work including labor, equipment and materials required to make connections to power sources and to provide and pay for any required temporary electrical power and light at location of work. Temporary equipment and wiring for power, lighting and distribution requirements shall be in accordance with applicable provisions of governing laws, codes and ordinances. The Contractor shall maintain temporary wiring and related equipment so as not to constitute a hazard to persons or property. County may possibly provide electric to site. Temporary electrical power may be needed for portion of work.

1.11 TOILET FACILITIES

A. The Contractor shall arrange for, provide (per OSHA guidelines) and maintain temporary on-site sanitary toilet facilities for use by the Contractor and County for the duration of the Work.
1.12 WEATHER PROTECTION

A. The Contractor shall provide weather protection, including pumping water and temporary heat and ventilation as required during construction to protect the Work from damage due to freezing, frost, rain, dampness, excessive heat or other adverse elements and as required to maintain the continuous progression of the Work without stoppage due to the weather. This shall include hot and cold weather concrete placement protections recommended by the American Concrete Institute.

1.13 EXISTING SITE CONDITIONS

A. The information in this Bid Package is intended to orient the Contractor to the site. The Contractor will be responsible to thoroughly evaluate the site conditions for construction requirements. It is the responsibility of the Contractor in conjunction with the utility companies to verify the exact types and locations of existing utilities. All damage to existing utilities, caused by the Contractor, shall be repaired at Contractor’s expense, in accordance with the standards of the applicable City department or private utility company.

1.14 UTILITY SHUT-OFF REQUIREMENTS

A. The Contractor shall coordinate all utility shut-offs with the Utility Companies and departments to permit the proper and safe performance of the Work as scheduled. The Contractor shall have the full responsibility for contacting MISSDIG at least 72-hours prior to any subsurface excavation.

1.15 FIRE HYDRANT RELOCATION

A. Contractor to coordinate with University Project Management, Fire Marshal and any other required University or City Department to relocate any fire hydrant. The Fire hydrant to be relocated shall move directly east, using the same water line. Relocation of the hydrant requires all University standard equipment that meets all necessary life safety codes. Adjacent structures and Athletic Facilities along pedestrian corridor do not have sprinklers. Fire hydrant relocation shall be coordinated to have the water service shut off for a minimum period of time. Max 1 day. Contractor to coordinate.

1.16 PROTECTION

A. The Contractor shall provide site protection, traffic controls and barricades as required to secure the site from trespassers and the general public. The Contractor shall install, in conformance to the requirements of the governing road/street authority, traffic controls for all work performed in the rights-of-way including curb cuts and utility taps.

1.17 REPLACEMENT OF DAMAGED WORK

A. The Contractor shall be responsible to pay all costs for the timely (within schedule parameters) replacement or restoration of any portion of the Facility damaged by fire or other cause during construction to the extent that such damage is a result of the negligence or a faulty installation made by the Contractor or its subcontractors.
1.18 EMERGENCIES  
A. In any emergency affecting the safety of persons or property, the Contractor shall act at its discretion to prevent threatened damage, injury or loss, provided that the Contractor shall have determined that there is not sufficient time to advise and consult with the County prior to taking such action.

1.19 FIRE HAZARDS  
A. The Contractor shall take all necessary precautions to eliminate possible fire hazards and to prevent damage to construction work, equipment, temporary field offices, storage sheds, and other property. During construction, the Contractor shall provide fire extinguishers and fire hose in accordance with the appropriate OSHA and construction industry rules and regulations.

1.20 FLAMMABLE HAZARDS  
A. Gasoline, benzene, other combustible materials, oils, solvents, or chemicals shall not be poured into sewers, manholes, or traps. All casual spills shall be immediately cleaned up and all contaminated soil removed from the site and legally disposed. Tarpaulins and other materials used for temporary enclosures, coverings and protection shall be flameproofed. The Contractor shall comply with County, State and Federal regulations with respect to barrels and tanks containing flammable or hazardous materials, and shall remove any such materials immediately at the request of the County.

1.21 EXPLOSIVE CHARGES  
A. Any fastening device, powder activated stud gun or any other device or system of any kind using an explosive charge for activation may not be used in performing work at the Project site unless it is specifically approved by OSHA or the County Health Department. It shall be the responsibility of the Contractor to secure all permits and permissions without extra cost to the County and to assure the safe use of any such devices by trained individuals.

1.22 FIRST AID  
A. A completely equipped first-aid kit shall be provided and maintained by the Contractor at the site in a clean orderly condition and shall be readily accessible at all times to all the Contractor’s employees. The Contractor shall designate certain employees who are properly instructed to be in charge of first aid. At least one such employee shall be available at the site whenever work is being carried on.

1.23 HOURS OF WORK  
A. The Contractor shall conduct the work during normal working hours in cooperation with the existing property owners and occupants. At the beginning of work on this Contract, the Contractor shall notify the County, in writing, the schedule of the days and work hours proposed for a normal workweek. The Contractor shall be responsible for contacting in advance all involved parties whenever the Contractor intends to depart from the normal workweek schedule and resolve to the satisfaction of the County any reasonable objections made. All costs incurred, due to the failure of the Contractor to properly notify involved parties, shall be paid by the Contractor or deducted from the Contractor’s contract amount.

B. The Contractor shall plan and conduct the Work so as not to create a public nuisance or disturb the peace specifically for any residents near or adjacent to the Project site. Should the Contractor be stopped by order of a public authority from working at such times that are contrary to or in violation of any law, ordinance, permit, or license, the Contractor shall not be entitled to an extension of time or additional compensation due to such stoppage.

C. In an emergency, requiring work to be performed outside the normal work week schedule to save or protect life or property, the requirements for the twenty-four (24) hour notification will be waived. The Contractor shall notify the County as soon as the Contractor determines that an emergency condition exists necessitating the change in or extension of the normal hours of work. However, the Contractor’s determination of the existence of the emergency is subject to the review and revision by the County.
D. The normal workweek schedule and/or daily hours of work may be altered as directed by the County, when, in its reasonable judgment, such alteration is necessary to maintain the required progress of the Work.

1.24 SANITARY REQUIREMENT

A. Committing unnecessary acts of nuisance on the Project site is prohibited. Any employee who violates such provisions shall be promptly removed from the Project by the Contractor and not be permitted to work on the project site without the written consent of the County.

1.25 CLEANLINESS OF PROJECT SITE AND STREET

A. The Work and all public or private property used in connection with the Work shall be kept in a neat, clean and orderly condition at all times. Stored materials shall be safely stacked and ordered. Waste materials, rubbish and debris shall removed daily and shall not be allowed to accumulate. No burning of rubbish is permitted.

B. The Contractor shall remove unused construction equipment, temporary buildings and excess materials from the site upon the reasonable request of the EDC. The site shall not be permitted to become a storage yard for the Contractor's equipment and materials not directly involve in the Work. Any stored equipment or unnecessary materials stockpiled shall be removed from the Project site upon the request of the County.

C. During the performance of the Work, the Contractor shall daily inspect and maintain the Project site in a clean condition including control of dust, picking up scattered construction debris, and removal of splattered materials from the surfaces of the new construction. Should the Contractor fail to maintain proper cleanliness or order of the site the County, upon 48 hour notice to the Contractor, shall arrange for the cleaning and removal of extraneous materials accumulated at the site and shall have the right to deduct the costs incurred from the Contract value.

D. Trucks hauling loose material from or to the project site shall be tight and their loads trimmed and tarped to prevent spillage on the public streets. This requirement likewise applies to suppliers making deliveries to the Project site. The Contractor will be held responsible to require compliance by the Contractor's suppliers. The County shall have the right to deny site access to any subcontractor or supplier who refuses to comply with this requirement. The Contractor shall promptly (daily as a minimum) clean streets, sidewalks and alleys dirtied by any cause arising from the Contractor's operations. Should the Contractor fail to maintain proper street cleanliness, the County, upon notice to the Contractor will clean any such public right of ways and shall have the right to deduct the costs incurred from the Contract value.

1.26 DEWATERING

A. The Contractor shall dewater and keep dry all trenches and other excavated areas at the site by evenly grading the surface drainage to eliminate standing water. The Contractor shall be responsible to protect structural bearing subgrades and materials from ponding, standing water or erosion. Dewatering operations shall not be permitted to discharge water to any other private properties. The Contractor shall be responsible for securing Water Department permission prior to discharging any water from the site into public sewers.

1.27 SECURITY

A. The Contractor shall secure and protect from theft, loss or damage all materials and equipment used for or relating to the Work until final completion and acceptance by the County.

1.28 WORKING AREA

A. All the Work under this Contract shall be performed on the Project site. The Contractor shall access the Project site via City streets and rights-of-way. The Contractor shall review the legal loading limit for the access streets and rights-of-way and shall be responsible for coordinating deliveries and shipments that do not exceed the legal load limits.
B. The Contractor shall use Flagmen whenever trucks or equipment enter public roadways from the project site.

C. Should additional working or storage space be desired, the Contractor shall make all arrangements with any property owner and submit to the County written evidence that the Contractor has secured permission to use this property for construction purposes. The Contractor shall pay all expense in connection with its use, and in no way involves or obligates the County by such use.

1.29 SPECIAL SYSTEM INSPECTIONS

A. The Contractor, as part of the Work, shall coordinate all specialty manufacturer inspections and testing required to certify that the installation of the Work meets the manufacturer’s conditions for warranty.

1.30 TIME OF STARTING AND COMPLETION OF WORK

A. The Contractor shall carry on the construction operations continuously without stoppage so that all items of work are totally complete including punchlist in accordance with the agreed upon completion date. This shall not relieve the Contractor from the responsibility to coordinate the Work with County, and to sequence the Work including interrupting the Work as required by the County.

1.31 TESTING & INSPECTION

A. The University’s separately contracted Construction Engineering & Inspection Consultant shall arrange and pay for all testing and inspection required to verify conformance of the Work with the Contract Documents. All testing and inspection shall be coordinated with the University.

1.32 SOIL EROSION AND SEDIMENT CONTROL

A. The Contractor shall install and maintain, for the duration of the Project, soil erosion protection measures as required by Wayne County. The Contractor shall provide other temporary soil erosion control as required to eliminate sedimentation from entering sewers and open ditches due to the Contractor’s operations. The Contractor shall remove completely all soil erosion control measures from the site at the end of the Project.

B. The Contractor will promptly remove soil, debris, or other materials spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares by the Contractor’s equipment and operations.

C. The Contractor shall abide by the requirements of the “Authorized Public Agency” under the provisions of Section 11 of Act 347 of the Public Acts of 1972, “Soil Erosion and Sedimentation Control Act” as modified or superseded.

D. Current Soil Erosion and Sediment Control Plans included in set are approved by the Health Department.

1.33 DISCLAIMER OF SITE INFORMATION

A. By its own examinations, observations, investigations and tests the Contractor shall make its own determination of the existing site conditions. Information contained in this Bid Package is provided solely for the informational use of the Contractor. The County does not guarantee the accuracy or sufficiency of any site information.

1.34 UNIT PRICES

A. Unit prices, if established during the Project, shall include all permits, fees, labor, material, tools, supervision, equipment, taxes, insurance and bonding necessary for or incidental to the proper completion of the Work.
1.35 TRUCK TICKETS

A. Any excavated materials removed from the site shall be controlled for assurance of legal dumping by (3) part "Truck Tickets" for each load of material removed from the site. The Contractor shall note on each truck ticket the bid package number, date, location of excavation, trucking firms, quantity of material and time of departure for each outgoing truck. The Contractor shall record the disposal site and time of disposal on the "Truck Ticket" and shall obtain the signature of the recipient of the material in verification thereof and return the completed "Truck Ticket" to the County.

1.36 ENVIRONMENTAL COORDINATION

A. Owner shall make available to the Contractor any environmental reports or information in the Owner’s possession as reference information to assist in the Contractor’s required production of the Health and Safety Plan, as expressed in paragraph 1.3 of Section VII of the Bid Documents. Unless otherwise noted in the plans and specifications the Contractor shall assume that all excavated material in the right of way is contaminated and shall be taken to a licensed Class II landfill. If the Contractor encounters potential hazardous materials, the Contractor shall notify the EDC for inspection of the condition before proceeding with any Work in that area. The contractor shall continue with the orderly progression of work in non impacted areas. Subject to the nature of the hazardous material encountered and the Contractors qualifications, the EDC reserves the right to require the Contractor to perform any removal/remediation work for hazardous materials on a time and material basis, or negotiated basis according to the provisions of the Contract Documents.

1.37 PROTECTION OF THE PRIVATE AND EXISTING UTILITIES

A. The Contractor shall protect and maintain for the duration of the work all existing improvements and utilities that are to remain. The Contractor will immediately undertake and pay for the repair of any damaged existing improvements or utilities.

B. All unattended excavations, voids, pits, manholes or holes shall be barricaded immediately by the Contractor. Barriers shall be removed promptly by the Contractor when no longer required.

C. Precautions against fire, accidental explosion, excessive dust and accident shall be strictly enforced by the Contractor in cooperation with the County and the EDC.

D. The Contractor shall not allow salvaged material, debris, and trash to accumulate on the project site but shall require all such material to be hauled away on a regular, daily basis.

1.38 PROTECTION OUTSIDE THE PROJECT AREA

A. All existing areas outside the limits of the Work shall be protected from damage. All damage caused by the Contractor shall be corrected at the expense of the Contractor and to abide by City or County Standards.

B. During progress of work, the Contractor shall keep adjacent roads free of trash, debris, and salvage material resulting from the work.

C. The Contractor is advised that other construction activities may be performed by others within the Project area during this the performance of the Work under this Contract Agreement. The Contractor shall plan proposed trucking and all other vehicular routes accordingly in coordination with and at the reasonable direction of the County.

D. All construction traffic control signage and barricading shall conform to the standard requirements of the governmental body having jurisdiction over the street right of way.
1.39 TEMPORARY CONTROLS

A. Surface Water Control – The Contractor shall complete the work in such a manner so as not to entrap surface water on the site. Low areas caused by removals, shall be graded in such a manner to allow drainage to existing storm water structures. The Contractor shall be responsible for drying out and repairing any grade surfaces damaged due to the Contractor's failure to properly grade the work area.

B. The Contractor shall secure and pay for all erosion control permits and conduct earth changes in a manner, which will effectively eliminate accelerated soil erosion and resulting sedimentation. Measures to be taken shall include but not be limited to:

C. Provide temporary soil erosion control to eliminate sedimentation from entering sewers and open ditches.

D. Remove sediment caused by accelerated soil erosion from runoff water before it leaves the site.

E. Maintain temporary soil erosion silt fences, sediment traps and control measures for the term of this contract.

F. Promptly remove soil, debris, or other material spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares during transit.

G. The Contractor shall utilize applicable soil erosion details, shown on Contract drawings, in implementing his work.

H. The Contractor shall utilize water trucks and other dust inhibiting methods to control fugitive dust emanating from the work activity performed under this scope of work. Truck and equipment wheels shall be cleaned before exiting the project area. Travel routes shall be established with the prior approval of the County to reduce dust in adjacent areas. Existing roads shall be used wherever practical based on street loading capacity.

1.40 SUSPECTED HAZARDOUS MATERIALS

A. In the event the Contractor encounters excavated materials that are suspected as hazardous, the Contractor shall notify the County for review, and through County's Environmental Consultant the possible characterization and management of the suspect material. If it is determined that the suspect material is hazardous by the County's environmental Consultant, the Consultant will provide a material handling protocol for the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONTRACTOR USE OF PREMISES

A. Confine operations at site to areas permitted by:

   1. Law
   2. Permits
   3. Contract
   4. Owner's Representative
   5. Required use of adjacent existing buildings
   6. Contract documents
B. Confer with Owner's Representative and obtain full knowledge of all site rules and regulations affecting work.

C. Conform to site rules and regulations while engaged in project construction.

D. Site rules and regulations take precedence over others that may exist outside such jurisdiction.

E. Employees On Site: The Owner's Representative may examine Contractor's list of employees, including those of his subcontractors and their agents for all employees working on site.

F. Vehicle use: Rigidly enforce the following:
   1. Keep all vehicles, mechanized or motorized equipment locked at all times when parked and unattended on Owner's premises.
   2. Do not, under any circumstance, leave any vehicle unattended with motor or engine running, or with ignition key in place.
   3. All traffic control subject to Owner's Representative approval.
   4. Contractor employee parking shall be limited to areas indicated by Owner's Representative.
   5. Contractor shall not park any vehicles within the dripline of trees.

G. Do not unreasonably encumber site with materials or equipment.

H. Assume full responsibility for protection safety and safekeeping of products stored on premises.

I. Move all stored products or equipment, which interferes with operations of Owner or other subcontractors.

J. Obtain and pay for use of additional storage or work area needed for operations.

K. Limit use of site for work and storage:
   1. To areas indicated on the drawings.
   2. To areas approved in advance by Owner's Representative.

L. The Contractor acknowledges that the Owner will use the adjacent sites and the Contractor must maintain staff and appropriate safety requirements. Contractor to work with Owner's Representative to coordinate with scheduled events. Owner's Representative to provide schedule.

3.2 DUTIES OF CONTRACTOR

A. Except as specifically noted, provide and pay for:
   1. Labor, materials and equipment.
   2. Tools, construction equipment and machinery.
   4. Other facilities and services necessary for proper execution and completion of work.

B. Secure and pay for as necessary for proper execution and completion of work, and as applicable at time of receipt of bids.
   1. Licenses.

C. Give required notices.

D. Promptly submit written notice to Professional Services Consultant of known or observed variances of Contract Documents from legal requirements.
   1. Appropriate modifications to Contract Documents will adjust necessary changes.
2. Assume responsibility for Work known to be contrary to such requirements.

E. Enforce strict discipline and good order among employees. Do not employ on Work:
   1. Unfit persons.
   2. Persons not skilled in assigned task.

F. Purchase and maintain insurance in accordance with the Contract Agreement.

G. Contractor shall protect existing site from damage. Contractor shall clean areas of construction debris, equipment, and material prior to Date of Completion for such area.

3.3 PERMITS

A. See Section 003143 PERMIT APPLICATION

3.4 TIME OF COMPLETION

A. Completion of work shall be in accordance with the schedule as indicated in the Bid Form.

3.5 JOB OPERATIONS

A. Project Security:
   1. Take necessary precautions such as barrier to protect Owner's personnel, the public, in the area of construction.
   2. Securely close off all areas of construction after working hours to prevent entry by unauthorized persons.
   3. Provide barriers to prevent visitors from construction area.

3.6 WORK LIMITATIONS:

A. Owner's personnel may occupy all spaces around where work will be done. Any work done during times of occupancy shall be limited in scope to prevent disturbing it.

B. Give Owner's representative three days notice before starting Construction Work in any area.

C. All work, including material storage, shall be limited to the project area.

3.7 PHOTOGRAPHY

A. Starting on the 01st of the month following Notice to Proceed, and on the 01st of each subsequent month up to and the 01st of the month following the Substantial Completion Date eight color photographs are to be taken of the Site. One image from each following direction facing the improvements of the site: N, S, E, W, NE, NW, SE, SW Pictures are to include the date taken on the photograph.

B. By the 15th of each month delivery two sets of 8 x10 color prints of all photographs taken that month; one set to the Landscape Architect and one set to the Owner's Representative. Also deliver digital/electronic copies of the photographs to the Landscape Architect and Owner.
C. All rights, privileges, copyrights, ownership, etc to the pictures shall be transferred to the Architect and Owner so they each may use the images/photographs at their discretion now and in the future. A written release stating such is to be provided each month with each set of photographs.

D. Receipt of the photographs on the 15th of each month is prerequisite to the processing of that month’s pay request.

3.8 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.

END OF SECTION
SECTION 014200 - REFERENCES

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 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "As Otherwise Direct": Used in relation to items to be determined after Contract by agreement between Owner, Architect, and Contractor, with input from other entities as appropriate.

D. "Certified": Guaranteed in writing over the signature of an authorized representative of the certifying organization.

E. "Directed": An instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

F. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

G. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

H. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

I. "Install": Operations including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations at Project site.

J. "N.I.C" or "NIC": Not in Contract.

K. "Necessary": That which is reasonably necessary to the proper completion of the Work.

L. "Per": In accordance with the requirements of.

M. "Products": Materials, equipment, or systems.

N. "Provide": Furnish and install, complete and ready for the intended use.

O. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
P. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

Q. "Replace": To put something new in place of.

R. "Required": Referring to requirements of the Contract Documents, unless its use clearly implies a different interpretation.

S. "Shown" or "Indicated": Appearing on the Drawings, unless their use clearly implies a different interpretation.

T. "Supply": Same as Furnish.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
16. AIA - American Institute of Architects (The); www.aia.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
34. ARP - Architectural Precast Association; www.archprecast.org.
36. API - Air-Conditioning & Refrigeration Institute; (See AHRI).
37. ARI - American Refrigeration Institute; (See AHRI).
39. ASCE - American Society of Civil Engineers; www.asce.org.
40. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
42. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
44. ASTM - ASTM International; www.astm.org.
47. ARI - American Refrigeration Institute; (See AHRI).
49. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
50. BI - Bakers Industry Sanitation Standards Committee; www.bissc.org.
51. BIA - Brick Industry Association (The); www.gobrick.com.
53. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
55. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwf.org.
56. CDA - Copper Development Association; www.copper.org.
57. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/
58. CEA - Canadian Electrical Association; www.cea.org.
60. CFFA - Canadian Fibre Fabrics and Film Association, Inc.; www.cffafabricsandfilm.com.
61. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
63. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
64. CISC - Canadian Standards Association; www.csa.ca.
65. CTP - Construction Specifications Institute (The); www.cscanet.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWI - Composite Wood Council; (See CPA).
70. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. EIA - Electronic Industries Alliance; (See TIA).
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
82. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
83. FiBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
90. GA - Gypsum Association; www.gypsum.org.
92. GS - Green Seal; www.greenseal.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
100. IAS - International Approval Services; (See CSA).
101. ICBO - International Conference of Building Officials; (See ICC).
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICOPA - International Cast Polymer Alliance; www.icpahq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
114. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
115. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
116. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
117. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
120. ITU - International Telecommunication Union; www.itu.int/home.
121. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
122. LMA - Laminating Materials Association; (See CPA).
125. MCA - Metal Construction Association; www.metalconstruction.org.
133. NAAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
134. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
139. NCMA - National Concrete Masonry Association; www.ncma.org.
140. NEBB - National Environmental Balancing Bureau; www.nebb.org.
143. NEMA - National Electrical Manufacturers Association; www.nema.org.
144. NETA - InterNational Electrical Testing Association; www.netaworld.org.
147. NFPA - NFPA International; (See NFPA).
150. NLGA - National Lumber Grades Authority; www.nlga.org.
151. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
156. NSPE - National Society of Professional Engineers; www.nspe.org.
158. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
160. PCI - Precast/Prestressed Concrete Institute; www pci.org.
162. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); http://www.plasa.org.
166. SAE - SAE International; www.sae.org.
168. SCTE - Society of Cable Television Engineers; www.scte.org.
169. SDI - Steel Deck Institute; www.sdi.org.
170. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
171. SEII/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
175. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
176. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
177. SPIA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
186. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
187. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
190. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
191. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
194. TPI - Turfgrass Producers International; www.turfgrass sod.org.
197. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
198. USAV - USA Volleyball; www.usavolleyball.org.
202. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
203. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
204. WDMA - Window & Door Manufacturers Association; www.wdma.com.
206. WSRCA - Western States Roofing Contractors Association; www.wsrcacom.
207. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES
   A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's Representative, Landscape Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
   B. Sewer, Water, and Electric Power Service: Use charges are specified in Section 011200 "Multiple Contract Summary."

1.4 QUALITY ASSURANCE
   A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
   B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
   C. Accessible Temporary Egress: Comply with IBC ADA requirements.

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

PART 2 - PRODUCTS

2.1 EQUIPMENT
   A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of at each return-air grille in system and remove at end of construction.

D. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install land-based telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.

G. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Core i5 or i7.
4. Display: 24-inch LCD monitor with 256-Mb dedicated video RAM.
5. Full-size keyboard and mouse.
6. Network Connectivity:.
8. Productivity Software:
   a. Microsoft Office Professional, 2010 or higher, including Word, Excel, and Outlook.
   b. Adobe Reader 11.0 or higher.
c. WinZip 7.0 or higher.

9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.

10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum Mbps upload and Mbps download speeds at each computer.

11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.


13. Access to large format scanner.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.

2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.

2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."

3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.

2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

2. Remove snow and ice as required to minimize accumulations.
G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
   a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touch up signs so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

L. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and] requirements specified in Section 311000 "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of DEQ Construction General Permit or authorities having jurisdiction, whichever is more stringent.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

I. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
   1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

K. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

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

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for hours are considered defective and require replacing.
b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

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

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

  1. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

  2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION
SECTION 033000 – CAST-IN-PLACE CONCRETE

PART – 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section specifies requirements for concrete cast-in-place on the site.
B. The work includes cast-in-place concrete pavement, walkways bases, unit paver bases, foundations, structures, and thrust blocks.

1.3 REFERENCE STANDARDS

A. References herein are made in accordance with the following abbreviations and all work under this Section shall conform to the latest editions as applicable.

1. American Concrete Institute (ACI):
   301 Specifications for Structural Concrete
   305R Hot Weather Concreting
   306R Cold Weather Concreting
   325.9R Guide for Construction of Concrete Pavements and Concrete Bases

2. ASTM International (ASTM):
   A82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
   A1064 Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
   A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
   C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
   C33 Standard Specification for Concrete Aggregates
   C94 Standard Specification for Ready-Mixed Concrete
   C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
   C150 Standard Specification for Portland Cement
   C171 Standard Specification for Sheet Materials for Curing Concrete
   C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
   C260 Standard Specification for Air-Entraining Admixtures for Concrete
C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
C494 Standard Specification for Chemical Admixtures for Concrete
C1116 Standard Specification for Fiber-Reinforced Concrete

3. Concrete Reinforcing Steel Institute (CRSI):

4. United States Department of Justice - Americans with Disabilities Act (ADA):

1.4 QUALITY ASSURANCE
A. Work, materials, and color of the wheelchair ramp paving shall conform to applicable sections of Americans with Disabilities Act (ADA) and State Standards, whichever is more stringent.
B. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features shown on the Drawings are approximate. Manufacturer's approved shop Drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size, and details.

1.5 SUBMITTALS
A. Submit description of methods and sequence of placement for each type of specially-finished concrete, including description of methods and sequence of placement.
B. Submit manufacturer’s product data for the following:
   1. Form release agent.
   2. Concrete coloring additive.
   3. Preformed joint filler.
   4. Concrete reinforcement specification data from manufacturer.
   5. Stamp and imprinting tools, manufacturer’s literature.
   6. Manufacturer’s literature for protective coating for sidewalks.
   7. Detectable Warning including manufacturer’s certification that product complies with ADA.

1.6 TESTING
A. The Owner shall employ a qualified independent testing laboratory to inspect and test concrete paving and other cast-in-place concrete work.
B. When requested, Contractor shall prepare test specimens in accordance with ASTM C31, standard cylinder size 4-inch x 8 inch.
C. Testing of materials and installed work may occur at any time during progress of the work. Rejected materials and installed work shall be removed and replaced.

PART 2 - PRODUCTS
2.1 STEEL REINFORCEMENT
A. Steel reinforcing bars shall conform to ASTM A615, Grade 60, deformed.
   1. Bars employed as dowels shall be hot-rolled plain rounds.
B. Steel Wire: ASTM A82, plain cold drawn steel.
C. Welded Wire Reinforcement: Welded wire reinforcement shall conform to the applicable requirements of ASTM A1064. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.

D. Supports for Reinforcement: Bolsters, chairs, and other devices for spacing, supporting, and fastening reinforcing bars, and welded wire fabric in place shall be wire bar-type supports complying with CRSI Manual.
1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI Class 1).

2.2 PORTLAND CEMENT CONCRETE
A. Portland cement concrete shall conform to the following:
1. Maximum water-cement ratio shall be 0.45 conforming to ACI 316R.
2. Concrete shall be air-entrained type conforming to ASTM C94. Air content by volume shall be 6 percent + 1.5 percent, tested in accordance with ASTM C260.
3. Slump of concrete shall not be less than 3 inches nor greater than 4 inches, determined in accordance with ASTM C143.
4. Cement for concrete shall be a Portland cement conforming to ASTM C150, Type I or II. Only one color of cement, all of the same manufacturer, shall be used for the work.
5. Fine and coarse aggregates for concrete shall conform to ASTM C33.
6. Concrete shall contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C494, Type A.
7. Concrete shall contain no calcium chloride or admixtures containing calcium chloride. No admixtures other than those specified shall be used in the concrete without the specific written permission of the Engineer.

2.3 CONCRETE AGGREGATES
B. Coarse Aggregates: Coarse aggregates shall conform to ASTM C33, Parts 9 through 11 and Tables 2 and 3, with the following Class designations:
1. Class 1S: For footings and foundations not exposed to the weather.
2. Class 4S: For pavements, driveways, curbs, walkways, sidewalks, and retaining walls that are exposed to the weather.
3. Class 1N: For pavements, driveways, curbs, walkways, sidewalks, and retaining walls that are not exposed to the weather.
C. Exposed Aggregate: Exposed aggregate for ADA curb ramps shall be selected, hard, durable, washed rounded stones free of deleterious reactivity to cement with graded sizes between 1/2 to 3/4 inch diameter nominal sieves.

2.4 COLORED CONCRETE
A. Color hardener and curing compound shall be manufactured and supplied by the Bomanite Corporation, 81 Encina Avenue, Palo Alto, CA 94301; tel. 800-854-2094, or approved equivalent.
1. Color for concrete shall have visual contrast with surrounding paving.
2. Curing compound shall be liquid applied.
B. Surface sealer shall be non-yellowing type which breathes water vapor, as manufactured by ProSoCo, Sika Chemical Corporation, Dural-International Corporation, or approved equivalent.

2.5 CURING MATERIALS FOR UNCOLORED CONCRETE
A. Curing shall be accomplished by the following methods.
   1. Moist curing with burlap covering.
   2. Curing paper, nonstaining, fiber reinforced laminated Kraft bituminous product conforming to ASTM C171. Four mil polyethylene sheeting may be substituted for curing paper.
   3. Curing compound, a resin-base, white pigmented compound conforming to ASTM C309, Type 2.

2.6 EXPANSION JOINTS
A. Expansion joint filler shall be preformed, nonbituminous type conforming to ASTM D1752, Type II, similar to Sealight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equivalent.
   1. Premolded filler shall be one piece for the full depth and width of the joint.
B. Smooth dowel shall be hot rolled plain steel dowel bonded at one end and operating in smooth close fitting sleeve (of same material) at the other end.

2.7 CONTROL JOINTS
A. Joint filler to be polyethylene foam with manufacturer's recommended sealant.

2.8 FORMS
A. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms manufactured by Sonoco Products Company, General Products Division, ABS or PVC plastic reusable forms, or approved equivalent.
B. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Plywood shall conform to U.S. Product Standard PS-1 and APA Graded B-B (Concrete Form) Class I Exterior Grade plywood or B-B or A-C Class I high density overlay concrete form plywood. Formwork materials shall produce smooth, continuous, straight and level surfaces.
C. Forms for Unexposed Finish: Plywood, lumber, or metal, with lumber dressed on at least two edges and one side.
D. Form Ties: Prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, corner-locks, and other accessories as necessary.
E. Form Release Agent: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.
F. Imprinting Tools: Mats and tools used to stamp projecting texture and patterns onto plastic concrete surfaces and which shall be specifically designed with rigid back supports to enable a clean, sharp, stamping image. Stamps for curb ramps shall be designed to meet ADA detectable warning requirements.

2.9 FIBROUS REINFORCING
A. Material shall meet ASTM C1116 and shall be as manufactured by NyCon Incorporated, or approved equal.
B. Mix fibrous reinforcement in accordance with manufacturer’s instructions including product data and technical bulletins.
   1. Add fibrous reinforcement to concrete mix at the concrete batch facility.
   2. Adding and mixing fibrous reinforcement at the job site will not be allowed.
C. Provide job mix design data to show concrete mix will attain specified strength requirements.
2.10 EXPOSED CONCRETE PROTECTIVE COATING

A. Protective Coating shall be silane-siloxane product.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

A. The subgrade of areas to be paved shall be graded and compacted as specified in Section 321100, “BASE COURSES (PAVEMENT)”.

B. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade, subbase, base, or pavement, subsequent backfill and compaction shall be performed as required by the Engineer and as specified in Section 312000, “EARTH MOVING”.

C. Materials shall not be stored or stockpiled on subgrade.

D. Prepared subgrade will be inspected by the Engineer. Subgrade shall be approved for installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired.

3.2 BASE COURSE

A. Base course for concrete paving shall be pavement subbase course or gravel base materials specified in Section 321100, “BASE COURSES (PAVEMENT)” as shown on the Drawings.

B. Width of base course shall extend beyond edge of the proposed pavement as shown on the Drawings.

C. Material shall be placed in lifts no more than 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.

1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade.

2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.

3. Surface irregularities which exceed 1/2 inch as measured by means of a 10 foot long straightedge shall be regraded and recompacted.

D. Base course shall be compacted at optimum moisture content to not less than 95 percent of maximum density as determined by ASTM D1557.

E. The base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with the base course material.

3.3 STEEL REINFORCEMENT

A. Before being placed in position, reinforcing steel shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when required.

B. Any bar showing cracks after bending shall be discarded.

C. Unless otherwise shown on the Drawings, reinforcing shall extend within 2 inches of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 inches.

D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel shall be securely wired in the required position and shall be maintained in that position until concrete is placed...
and compacted. Chair bars and supports shall be installed in a number and arrangement approved by the Engineer.

3.4 FORMS

A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits.

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

B. Construct forms to provide for openings, offsets, sinkages, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required for the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent cement paste from leaking.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and other features for easy removal.

D. Chamfer exposed corners and edges, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

E. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.5 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork the anchorage devices and other embedded items required for work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.6 PREPARING FORM SURFACES

A. Coat contact surfaces of forms with an approved, nonresidual, low-VOC form-coating compound before placing reinforcement.

3.7 CONCRETE PLACING

A. Equipment, methods of mixing and placing, and precautions to be observed as to weather, and condition of base shall meet the requirements of ACI 316R.

B. The Engineer shall be notified of scheduled concrete placement sufficiently in advance of start of operation to allow preliminary inspection of the work, including subgrade, forms, and reinforcing steel.

C. Work shall not be performed during rainy weather or when temperature is less than 40°F. (4.4°C.).

D. Adjacent work shall be protected from stain and damage. Damaged and stained areas shall be replaced or repaired to equal their original conditions.

E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.

F. Concrete which has set or partially set, before placing shall not be used. Retempering of concrete will not be permitted.
G. Concrete shall be thoroughly vibrated, or otherwise consolidated to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

H. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 inch thick, shall be well scrubbed into the thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.8 FINISHING

A. Concrete surfaces shall be screeded and finished true to line and grade, and free of hollows and bumps. Surface shall be dense and smooth.

1. Finished concrete surface for concrete subbases shall be wood floated to a slightly rough surface. Surface shall not deviate more than 1/4 inch in 10 feet.

2. Finished concrete surfaces shall be wood floated and steel troweled, or broom finished, to a uniform surface. Surface shall not deviate more than 1/8 inch in 10 feet.

B. Horizontal surfaces of concrete surfaces which will be exposed shall be given a light broomed finish, with direction of grooves in concrete surface perpendicular to length of concrete band, slab, or pad. After concrete has set sufficiently to prevent coarse aggregate from being torn from surface, but before it has completely set, brooms shall be drawn across the surface to produce a pattern of small parallel grooves. Broomed surface shall be uniform, with no smooth, unduly rough or porous spots, or other irregularities. Coarse aggregate shall not be dislodged by brooming operation.

C. Vertical surfaces of concrete which will be exposed; refer to architectural concrete spec 033300 requirements.

D. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a 1/4-inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall at same time be finished to a 1/4-inch radius.

E. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

F. Sidewalks, walkways, accessible routes, and ramps shall be constructed and finished in accordance with the Americans with Disabilities Act (ADA) and state and local requirements. Provide protective coating in accordance with manufacturer’s recommendations.

G. Exposed Aggregate Finish: Expose coarse aggregate in pavement surfaces as follows.

1. Immediately after float finishing, spray-apply chemical surface retarder to pavement according to manufacturer’s written instructions.

2. Cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.

3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon-bristle broom.

4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.

3.9 CURING

A. Concrete shall be kept continuously damp from time of placement until end of specified curing period or cured by other methods. Water shall not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations, surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed
over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.

B. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing compound.

1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period, concrete surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.

2. Concrete cured with a curing compound shall have the compound applied at a rate of 200 square feet per gallon, in two applications perpendicular to each other.

3. Curing period shall be seven (7) days minimum.

C. Only if additional protection is absolutely required, the surface should remain uncovered after the seven (7) day period for at least four (4) days, after which time new and unwrinkled non-staining reinforced waterproof Kraft curing paper may be used.

3.10 EXPANSION JOINTS

A. Expansion joints shall be 1/2 inch wide and located to provide a maximum spacing of 50 feet between joints or where shown on the Drawings. Expansion joints shall be troweled in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full depth of the slab and full length of the expansion joint.

1. For concrete walks, pavements, and pads, depth of joint filler shall be placed to form a 1-1/4 inch deep recess for sealant and backer rod below finished concrete surface.

2. Use of multiple pieces to make up required depth and width of joint will not be permitted.

3.11 CONSTRUCTION JOINTS

A. Construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.

1. Butt joint with dowels or use a thickened edge joint if construction joints occur at control joint locations.

2. Keyed joints with tie-bars shall be used if the joint occurs at any other location.

3.12 CONTROL JOINTS

A. Control joints shall be tooled into the concrete slab, with 3-inch wide border and troweled edges, in pattern as shown on the Drawings. If no pattern is shown, then pattern shall result in square shape with a maximum area of 36 square feet. Joints shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab, but before slab has achieved its final set.

B. Scoring shall cut into slab surface at least 1 inch, but in no case not less than 25 percent of slab depth.

3.13 COLD WEATHER CONCRETING

A. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40°F. or is expected to fall to below 40°F. within 72 hours. The concrete, after placing, shall be protected by covering, heat, or both.

B. Details of handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. Procedures shall be in accordance with provisions of ACI 306R.
3.14 HOT WEATHER CONCRETING

A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. Every effort shall be made to minimize delays which will result in excessive mixing of the concrete after its arrival on-site.

B. During periods of excessively hot weather (95°F., or above), ingredients in the concrete shall be cooled with cold mixing water to maintain the temperature of the concrete at permissible levels in accordance with the provisions of ACI 305R. Any concrete with a temperature above 95°F., when ready for placement, will be rejected.

C. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. Records shall include checks on temperature of concrete when delivered to Project site and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

3.15 PROTECTION OF CONCRETE SURFACES

A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently.

END OF SECTION
SECTION 042200 - CONCRETE UNIT MASONRY

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. Concrete masonry units.
   2. Mortar and grout.
   3. Steel reinforcing bars.
   5. Embedded flashing.
   6. Miscellaneous masonry accessories.
   7. Masonry-cell fill.

B. Products Installed but not Furnished under This Section:

C. Related Requirements:
   1. Section 071900 "Water Repellents" for water repellents applied to unit masonry assemblies.
   2. Section 323223 "Segmental Retaining Walls" for dry-laid, concrete unit retaining walls.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).
B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Sustainable Design Submittals:
   1. Environmental Product Declaration: For each product.

   2. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer

C. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars.
      Comply with ACI 315. Show elevations of reinforced walls.
   3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

D. Samples for Initial Selection:
   1. Colored mortar.
   2. Weep holes/vents.

E. Samples for Verification: For each type and color of the following:
   1. Exposed CMUs.
   2. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.
B. Material Certificates: For each type and size of the following:
   1. Masonry units.
      a. Include data on material properties and material test reports substantiating compliance with requirements.
   2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE
A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
1. Build sample panels for typical exterior wall in sizes approximately 48 inches (1200 mm) high by full thickness. This can be part of the total wall. To be approved by WSU prior to continuation of the wall.
2. Protect approved sample panels from the elements with weather-resistant membrane.
3. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.
C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS
A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days.
after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.


PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet (6 m) vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or
leaks on the back of test specimen.

a. **Products:** Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   1) ACM Chemistries: RainBloc.
   3) GCP Applied Technologies; Dry-Block.

C. Insulated CMUs: Where indicated, units shall contain rigid, specially shaped, cellular thermal insulation units complying with ASTM C 578, Type I, designed for installing in cores of masonry units.

D. CMUs: ASTM C 90.
   1. **Size (Width):** Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.

E. Concrete Building Brick: ASTM C 55.
   1. **Size (Actual Dimensions):** 7-5/8 inches wide by 11-5/8 inches x 15-5/8 inches
      a. Standard pattern, ground-face finish – see detail elevation
   2. **Colors:** Standard Gray

F. Pre-faced CMUs: Lightweight hollow concrete units complying with ASTM C 90, with manufacturer’s standard smooth resinous facing complying with ASTM C 744.
   1. **Products:** Subject to compliance with requirements

2.5 **MORTAR AND GROUT MATERIALS**

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.
   1. **Products:** Subject to compliance with requirements, [provide the following] [provide one of the following] available products that may be incorporated into the Work include, but are not limited to, the following: MATCH CMU WALL COLOR
      a. Cemex S.A.B. de C.V.; Brikset, Type N [Citadel, Type S] [Dixie, Type S] [Kosmortar, Type N] [Richmortar] [Victor Plastic Cement].
      b. Essroc, Italcementi Group; Brixment [Flamingo Color Masonry Cement] [Velvet].
      c. Holcim (US) Inc.; [Mortamix Masonry Cement] [Rainbow Mortamix Custom Buff Masonry Cement] [White Mortamix Masonry Cement].
      d. Lafarge North America Inc.; [Magnolia Masonry Cement] [Lafarge Masonry Cement] [Trinity White Masonry Cement].
      e. Lehigh Cement Company; [Lehigh Masonry Cement] [Lehigh White Masonry Cement].

E. Mortar Cement: ASTM C 1329/C 1329M.
   1. **Products:** Subject to compliance with requirements, [provide the following] [provide one of the following] available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Lafarge North America Inc.; Lafarge Mortar CementRetain "Mortar Pigments" Paragraph below for colored cement or for pigments added at Project site.
   2. **Products:** Subject to compliance with requirements, [provide the following] [provide one of the following] available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Davis Colors; True Tone Mortar Colors.
      b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
      c. Solomon Colors, Inc.; SGS Mortar Colors.

F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
   1. **Products:** Subject to compliance with requirements, [provide the following] [provide one of the following] available products that may be incorporated into the Work include, but are not limited to, the following:
      a. ACM Chemistries; RainBloc for Mortar.
      b. BASF Construction Chemicals - Building Systems; Rheopel Mortar Admixture.
      c. GCP Applied Technologies; Dry-Block Mortar Admixture.
G. Water: Potable.

2.6 REINFORCEMENT

A. See Concrete Spec for specific requirements on rebar

B. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

D. Contractor to provide information on 9 GA horizontal ties as submittal

E. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.
   1. Stainless-Steel Wire: ASTM A 580/A 580M, [Type 304] [Type 316].
   2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
   4. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, [Type 304] [Type 316].
   5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

F. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. See plans for Tie information.
      a. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
         1) Advanced Building Products Inc.; Peel-N-Seal.
         2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
         3) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
         4) GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
         5) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
         6) Hohmann & Barnard, Inc.; Sando-Seal.
         7) Polyguard Products, Inc.; [Polyguard 300] [Polyguard 400].
         8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
      b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

G. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer’s standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from [neoprene] [urethane] [or] [PVC].

B. Preformed Control-Joint Gaskets: Made from [styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805] [or] [PVC, complying with ASTM D 2287, Type PVC-6506] and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.8 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. For exterior masonry, use masonry cement mortar.
   3. For reinforced masonry, use masonry cement mortar.
   4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
   5. For masonry below grade or in contact with earth, use Type S.
6. For reinforced masonry, use Type S
7. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior
   load-bearing walls; for interior nonload-bearing partitions; and for other applications where another
   type is not indicated, use Type N.

B. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply
      with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, for specified 28-day compressive strength
      indicated, but not less than 2000 psi (14 MPa).
   3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C
      143/C 143M.

C. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written
   instructions.
   1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and
   other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to
      performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that would impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations
   of piping.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment,
   complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit
   adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow
   units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where
   possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or
      minus 1/4 inch (6 mm).
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2
      inch (12 mm).
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus
      1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10
      feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level
      by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch
      (12-mm) maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3
      m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and
control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.

5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.

7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).

2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).

3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).

4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in [running bond] [bond pattern indicated on Drawings]; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than [2 inches (50 mm)] [4 inches (100 mm)]. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.

2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors [48 inches (1200 mm)] <Insert spacing> o.c. unless otherwise indicated.

3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.

2. Bed webs in mortar in all courses of piers, columns, and pilasters.

3. Bed webs in mortar in grouted masonry, including starting course on footings.

4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes:
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Wet joint surfaces thoroughly before applying mortar.
   3. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive air barriers, dampproofing or waterproofing unless otherwise indicated.

3.6 MASONRY-CELL FILL

A. Pour loose-fill insulation [lightweight-aggregate fill] into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet (6 m).

B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.7 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm):
   1. Space reinforcement not more than 16 inches (406 mm) o.c.
   2. Extending 12 inches (305 mm) beyond openings

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than [1/2 inch (13 mm)] [1 inch (25 mm)] [2 inches (50 mm)] wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry [as follows] [using one of the following methods]:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
3. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level [B] [C] in TMS 402/ACI 530/ASCE 5.
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for [mortar air content] [and] [compressive strength].

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleared for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing...
surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
   3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200
SECTION 129300 - SITE FURNISHINGS

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.

PART 2 - PRODUCTS

2.1 NET SYSTEM

A. Tension batting Tunnel - Duel
   1. Tension cable Support – Aircraft cable with jaw tunbuckles
   2. Black powdered coat finish poles
   3. 8.625" x 0.322" steel pole
   4. Net provided by WSU
   5. Foundations engineered by SmithGroup in collaboration with Sportsfield Specialties

B. SportsField Specialties
   1. Terra Erickson
   2. 312-933-9680
   3. terickson@sportsfieldspecialties.com
   4. Or Approved Equal

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer’s written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.
D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings 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, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION
SPORTSFIELD SPECIALTIES
www.sportfield specialties.com

Custom Sizes and Designs
Available Upon Request

Tension Cable Support:
1/4" X 7X19 GALV. AIRCRAFT CABLE

End Cable Support:
1/4" X 7X19 GALV. AIRCRAFT CABLE

Rear Crossbar Support:
4" (3/16" WALL) SQUARE STEEL TUBING

Standard: Direct Pole Embedment.
Optional: 48" Formed and Welded II GA. STEEL OCTAGONAL GROUND SLEEVE

Finish Grade

HSS 8.625" X 0.322"

Steel Pole

13'H X 14'W BATTING TUNNEL NET,
#36 BLACK NYLON 1-3/4" SQUARE MESH NET
WITH BLACK VINYL ENCLOSED WEIGHTED
1/4" GALVANIZED CHAIN BOTTOM AND
TWO (2) 4'W X 13'H OPENINGS WITH CURTAIN STYLE EXTERIOR OVERLAP FLAPS

Single Tunnel

Double Tunnel

Triple Tunnel

Net Length:
Baseball: 75'
Softball: 55'

4'-0"

13'-0"

FOUNDATION REQUIREMENTS
VARY BASED ON LOCAL CODES AND SOIL CONDITIONS

SPORTSFIELD SPECIALTIES, INC. STRONGLY RECOMMENDS THE REMOVAL OF ALL NETS PRIOR TO EXPOSURE TO WINTER WEATHER, INCLUDING SNOW AND/OR ICE STORMS. WHENEVER POSSIBLE, THE NETS SHOULD ALSO BE LOWERED PRIOR TO ANY EXTREME WIND EVENTS. REMOVAL/Lowering of the nets will mitigate any unforeseen damage to the poles, nets and/or attachment hardware. Storing nets in a dry, pest free location will help extend the life of the nets. Sportfield Specialties, Inc. will not be held liable or assume responsibility for any damage to the nets, poles and/or corresponding attachment hardware if the nets are not removed/lowered prior to the above described wind and/or weather events.

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SPORTSFIELD SPECIALTIES INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SPORTSFIELD SPECIALTIES INC. IS PROHIBITED.
**TENSION BATTING TUNNEL**

**POLE AND GROUND SLEEVE LAYOUT**

**Note:** All measurements are center-to-center of ground sleeve/pole

<table>
<thead>
<tr>
<th>MODEL</th>
<th>SPORT</th>
<th>TYPE</th>
<th>NET LENGTH</th>
<th>POLE TO POLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTTBS</td>
<td>BASEBALL</td>
<td>SINGLE</td>
<td>75'</td>
<td>78'-8 5/8&quot;</td>
</tr>
<tr>
<td>BTTBD</td>
<td></td>
<td>DOUBLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTBT</td>
<td></td>
<td>TRIPLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTSS</td>
<td>SOFTBALL</td>
<td>SINGLE</td>
<td>55'</td>
<td>58'-8 5/8&quot;</td>
</tr>
<tr>
<td>BTTSD</td>
<td></td>
<td>DOUBLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTTST</td>
<td></td>
<td>TRIPLE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Finish Grade**

4"-0"

GROUND SLEEVE
OR
DIRECT EMBEDMENT
YARN: 4400 Denier Nylon 6
PRODUCT WEIGHT: 35 oz / yd²
PILE HEIGHT: 0.34”
TUFTING GUAGE: 3/16”
PRIMARY BACKING: 3.5 oz/yd²
SECONDARY BACKING: 17 oz/yd²
TOTAL WEIGHT: 55.5 oz/yd²
<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>YARN</td>
<td>4400 Denier Nylon 6</td>
</tr>
<tr>
<td>PRODUCT WEIGHT</td>
<td>35 oz / yd²</td>
</tr>
<tr>
<td>PILE HEIGHT</td>
<td>0.34”</td>
</tr>
<tr>
<td>TUFTING GAUGE</td>
<td>3/16”</td>
</tr>
<tr>
<td>PRIMARY BACKING</td>
<td>3.5 oz/yd²</td>
</tr>
<tr>
<td>URETHANE PRE-COAT</td>
<td>17 oz/yd²</td>
</tr>
<tr>
<td>PAD/CUSHION THICKNESS</td>
<td>5 mm</td>
</tr>
<tr>
<td>PAD SCRIM / 13 PIC</td>
<td>4.5 oz/yd²</td>
</tr>
<tr>
<td>TOTAL WEIGHT</td>
<td>115 oz/yd² *</td>
</tr>
</tbody>
</table>

* Total Weight Tolerance does not account for Pad/Cushion. Pad/Cushion Tolerance (oz/yd²) is ± 15%.
SECTION 321373 – SITE JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Perform all site sealant work as indicated on drawing and as specified herein.
2. Required applications of sealants include, but are not necessarily limited to, the following general locations:
   a. Curb and paving

1.2 QUALITY ASSURANCE

A. Manufacturers: Firms with not less than five years of successful experience in production of types of sealants required for this project.
   1. Obtain elastomeric sealants from a manufacturer which will, upon request, send a qualified technical representatives to the project site for purpose of advising installer on proper procedures for use of products.

B. Installer: A firm with a minimum of five years of successful experience in application of type of materials required.

1.3 SUBMITTALS

A. Product Date: Submit manufacturer’s specification, recommendations and installation and instructions for each type of sealant and associated miscellaneous material required.

B. Samples: Submit three 12-inch long samples of each color required (except black) for each type of sealant exposed to view. Install sample between two strips of material similar to or representative of typical surfaces where compound will be used, held apart to represent typical joint widths and shape.

1.4 JOB CONDITIONS

A. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer’s recommended temperature range for installation. Proceed with the work only when the weather conditions are favorable for proper cure and development of high early bond strength. Where joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in lower third of the manufacturer’s recommended installation temperature range so that sealant will not be subject to excessive elongations and bond stress at subsequent low temperatures.

1.5 SPECIAL PROJECT WARRANT

A. Sealant Warranty: Provide written warranty, signed by manufacturer and installer agreeing to, within warranty period of six years after date of substantial completion replace/repair defective materials and workmanship defined to include: instances of leakage or water or air; failures in joint adhesion, material cohesion, abrasion resistance, strain resistance, or general durability; failure to perform as required and the general appearance of deterioration in any other manner not clearly specified in manufacturer’s published project literature as an inherent characteristic of the sealant material.
PART 2 - PRODUCTS

2.1 MATERIAL

A. Expansion Joints:

1. All expansion joints without exception shall be resin impregnated, premolded fiberboard, conforming to the physical requirements of ASTM D 1752 with a removable poly-plastic top edge that after set in position, and the paving properly cured, the poly-plastic edge can be removed to accommodate joint sealant. Size, width and length as required and shown on drawings.

B. Provide manufacturer’s standard, non-modified two or more part, polyurethane-based elastomeric sealant; comply with either ASTM C920 Grade P, Class 50; self-leveling grade/type. Color to match adjacent surface color.

C. Provide product of one of the following manufacturers:

1. Contech/Sonneborn
2. Mameco International
3. W. R. Meadows, Incorporated
4. Pecora Corporation
5. Products Research and Chemical Corporation
6. Sika Chemical Corporation
7. Toch/Carboline
8. Tremco, Incorporated
9. Dow

D. Color: Sika limestone color, or equal.

2.2 MISCELLANEOUS MATERIALS

A. Joint Cleaner: Provide type of joint cleaning compound recommended by sealant manufacturer for joint surfaces to be cleaned.

B. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.

C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

D. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer. Provide size and shape or rod which will control joint depth for sealant placement, break bond of sealant at bottom of joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize possibility of sealant extrusion when joint is compressed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The installer must examine joint surfaces, backing, and anchorage of units forming sealant rabbet, and conditions under which sealant work is to be performed, and notify Engineer in writing of conditions detrimental to proper completion of the work and performance by sealants. Do not proceed with sealant work until unsatisfactory conditions have been corrected in a manner acceptable to installer.
3.2 JOINT SURFACE PREPARATION

A. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture, and other substances which would interfere with bond of sealant.

B. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer’s printed instructions indicated that alkalinity does not interfere with sealant bond and performance.

C. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution; rinse thoroughly with water and allow to dry before sealant installation.

D. Roughen joint surfaces in vitreous-coated and similar non-porous materials, where sealant manufacturer’s data indicate lower bond strength than for porous surfaces. Rub with fine abrasive to produce a dull sheen.

3.3 INSTALLATION

A. Comply with sealant manufacturer’s printed instructions except where more stringent requirements are shown on specified and except where manufacturer’s technical representative directs otherwise.

B. Prime or seal joint surfaces where shown or recommended by sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

C. Install sealant backer rod for liquid sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.

D. Install bond breaker tape where shown and where required by manufacturer’s recommendations to ensure that elastomeric sealants will perform properly.

E. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete “wetting” of joint bond surface equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface an a vertical surface, fill joint to form a slight cove so that joint will not trap moisture and dirt.

F. Install sealants to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section or bead:

1. For sidewalks, pavements, and similar joints sealed with elastomeric sealant and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, and neither more than 5/8 inch deep nor less than 3/8 inch deep.
2. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but neither more than ½ inch deep, nor less than ¼ inch deep.

G. Spillage: Do not allow sealants to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces by primer/sealer.

H. Remove excess and spillage of sealants promptly as the work progresses. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes.

3.4 CURE AND PROTECTION

A. Cure sealants in compliance with manufacturer’s instructions and recommendations to obtain high early bond strength, internal cohesive strength, and surface durability. Do not cure in a manner which would significantly alter materials modules of elasticity of other characteristics.
B. Installer shall advise Engineer of procedures required for curing and protection of sealants during construction period so that they will be without deterioration or damage (other than normal wear and weathering) at time of Engineer acceptance.

END OF SECTION
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 all materials, labor and equipment for installation of synthetic turf and base as indicated on drawings.

1.3 DELIVERY, STORAGE, AND HANDLING
A. Deliver manufactured materials in original packages with seals unbroken and bearing manufacturer's labels indicating brand name and directions for storing.
B. Store manufactured materials in a clean, dry location, protected from the weather and deterioration, and complying with manufacturer's written instructions for minimum and maximum temperature requirements for storage.
C. Maximum temperature requirements for storage.
D. Store units on flat surfaces.
E. Protect UV-light sensitive materials from exposure to sunlight.

1.4 PROJECT CONDITIONS
A. Environmental Limitations: Do not apply surface system materials or components over wet, frozen, or excessively damp substrates if prohibited by manufacturer's written instructions or warranty requirements.
B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system to be performed according to manufacturer's written dimensions of other construction by field measurements.

1.5 WARRANTY
A. The Contractor shall provide its Manufacturer's Warranty which guarantees the usability and playability of the synthetic turf system for its intended use. The warranty coverage shall not be prorated nor limited to the amount of the usage.
B. The warranty must have the following characteristics:
   1. Must provide full coverage for eight (8) years from the date of Substantial Completion
   2. Must warranty materials and workmanship.
   3. Must warrant that the materials installed meet or exceed the product specifications.
   4. Must have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer a serviceable as a playable surface.
5. Manufacturer's warranty shall be supported by a third-party insurance policy for the full eight (8) year period. The insurance policy shall be pre-paid, direct with the owner, and non pro-rated. The insurance policy shall cover full labor and material replacement of the entire system including backing, fibers, infill, seams, inlays, adhesives, and nailer boards.

6. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.

1.6 SHOP DRAWINGS

A. Contractor to provide color rendered, computer designed shop drawings show turf colors, line markings and dimensions, roll lengths and seam locations.

PART 2 - PRODUCTS

2.1 SYNTHETIC TURF

A. Contractor shall provide information and pricing from the following company and product

B. Synthetic Turf Systems

a. 0.34" pile height
b. 35 oz/sq yd Product Weight
b. Total Weight 55.5 oz / sq yd
b. Shaw: Hitting Streak (or approved equal)

C. Pad

1) 35 oz / sy – Product Weight
2) 0.34” Pile Height
3) 115 oz / sq yd
4) Shaw: Strike One 5mm (or approved equal)

PART 3 - EXECUTION

3.1 GENERAL

A. The installation shall be performed in full compliance with approved shop drawings.

B. All installation operations shall be performed by personnel directly employed by the manufacturer, full familiar with the materials and their application, under the full-time direction and supervision of a qualified technical supervisor employed by the manufacturer of the synthetic turf. Installation supervisors shall have a minimum of five (5) years experience.

C. The surface to receive the synthetic turf shall be inspected and certified by the manufacturer as ready for the installation of the synthetic turf system. Contact Landscape Architect to schedule on-site meeting.

D. Adhesives for bonding knitted synthetic turf appropriately shall be as recommended by the synthetic turf manufacturer.
E. Cord for sewing seams of the turf shall be as recommended by the synthetic turf manufacturer.

3.2 BASE STONE CONSTRUCTION

A. The base stone slope gradation and direction shall match subgrade slope, unless otherwise noted.

1. The geotextile fabric shall be installed under the stone base.
2. The drain system shall be installed as indicated on the drawings.
3. The base stone shall consist of open graded aggregate. The open graded aggregate material must be free draining consistent with the vertical draining requirements of the turf manufacturer.
4. The finished grade of the base stone shall not vary more than ¼" when compared with a 50' taut string line. Any imperfections, divots, etc in the base stone will be repaired by the contractor and re-evaluated.

3.3 SYNTHETIC TURF INSTALLATION

A. The turf installer shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

B. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.

C. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the turf manufacturer. Seaming tape is to be constructed of high tenacity polyurethane coated, woven nylon. Inlaid markings shall be adhered to the seaming tape with a two-part, high strength polyurethane adhesive applied per the turf manufacturer's standard procedures for outdoor applications. All seams shall be transverse to the field direction; i.e., run perpendicularly across the field.

D. Prior to infill installation, Landscape Architect shall conduct a pre-fill inspection for the purpose of verifying striping seaming and other requirements. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment to produce a layered system of the manufacturer's standard infill products composed of a minimum 30% silica sand and maximum of 70% crumb rubber by weight. The turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a depth of 1-3/4 inches. The infill materials can only be applied when the turf fabric is bone dry.

3.4 FIELD MARKINGS

A. Field markings and decorations shall be installed in accordance with approved project shop drawings, and shall be in color as indicated on drawings.

B. All synthetic turf logos as indicated on the drawings shall be manufactured at the factory in (1) piece, with colors as noted on the drawings.

3.5 CLEAN UP

A. Contractor shall provide the labor, supplies and equipment, as necessary, for final cleaning of surfaces and installed items.

B. All usable remnants of new material shall become the property of the Wayne State University.

1. Coordinate with WSU Project Manager, provide a minimum 10’ x 10’ square green attic stock.
2. Dispose of off-site in accordance with waste management and disposal requirements.
C. The Contractor shall keep the area clean throughout the project and clear of debris.

D. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION
SECTION 329100 - SOIL PREPARATION (TOPSOIL)

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 specifies all soil materials designated as “Topsoil” on the drawings or in the specifications. Supply topsoil for landscape work seeding, sod, transplant areas, heritage rose area and planting) from both on-site and off-site sources.

1.3 REFERENCES

A. ASTM International, as referenced herein as ASTM.

B. US Department of Agriculture (USDA) Handbook No. 60 – Diagnosis and Improvement of Saline and Alkali Soils.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than 25 mm (one inch) in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 6.0 nor more than 7.0, and should be best suited to the region, climate and plant material specific to the project.

B. Obtain material from stockpiles established under Section 31 20 00, EARTH MOVING, subparagraph, Stripping Topsoil that meet the general requirements as stated above. Amend topsoil not meeting the pH range specified by the addition of pH Adjusters.

C. If sufficient topsoil is not available on the site to meet the depth as specified herein, the Contractor shall furnish additional topsoil. At least 10 days prior to topsoil delivery, notify the Owner’s Representative of the source(s) from which topsoil is to be furnished. Obtain topsoil from well drained areas. Additional topsoil shall meet the general requirements as stated above and comply with the requirements specified in Section 01 45 29, TESTING LABORATORY SERVICES and Part 1.4.E of this Section. Amend

D. See Planting Specification for planting mixtures.

E. Topsoil Sieve Chart

<table>
<thead>
<tr>
<th>Sieve Designation</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch screen</td>
<td>100</td>
</tr>
<tr>
<td>1/4 inch screen</td>
<td>97 - 100</td>
</tr>
<tr>
<td>No. 10 U.S.S. mesh sieve</td>
<td>95 - 100</td>
</tr>
<tr>
<td>No. 140 U.S.S.</td>
<td>15 – 35</td>
</tr>
</tbody>
</table>
PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Sampling: Each soil test unit shall be a composite of five to seven subsamples taken the full depth of proposed source for each acre of surface area. For on-site stockpiles, discard upper 6 inches of soil before sampling. For large stockpiles, partial excavation will be required for collection of representative samples. Include site plan verifying the locations of all topsoil sampling. Topsoil test reports shall be accompanied with each sample unit for review and approval by the Landscape Architect.

B. Testing methods and written recommendations when not references elsewhere, shall comply with USDA's Handbook No. 60. Nutrient data to be given in parts per million (ppm) dry soil.

C. Topsoil shall be as defined in ASTM D5268.

D. Soil pH shall be tested in accordance with ASTM D4972.

E. Test for organic material by using ASTM D2974.

3.2 FINE GRADING

A. Contractor shall obtain Owner Representative's written approval of previously completed rough grading work prior to commencing organic soil amendment incorporation work.

B. Immediately prior to dumping and spreading the approved organic soil amendment, the subgrade shall be cleaned of all stones greater than one inches (1") and all debris or rubbish. Such material shall be removed from the site. Prior to spreading of the organic soil amendment, subgrades which are too compact to drain water and too compact based upon compaction tests shall be ripped with a claw one foot (1') deep, pulled by a bulldozer two feet (2') on center, both directions. Contractor shall then regrade surface.

C. Organic soil amendment material shall be placed and uniformly spread over approved finish sub-grades to a depth sufficiently greater than the specified depth so that after natural settlement and light rolling, the specified minimum compacted depth will have been provided and the completed work will conform to the lines, grades and elevations indicated with allowance for additional topsoil spreading for turfgrass areas in determining final elevations. Incorporate organic soil amendment by disc harrowing, rototilling or other means in a uniform manner. The depth of incorporation shall be based upon the organic content of the tested and approved organic soil amendment, so as to produce a finished soil with an organic matter content of between four (4) and six percent (6%). Supply additional organic soil amendment material, after in-place testing and approval, as may be needed to give the required organic matter content and finished grades under the Contract without additional cost to the Government.

D. Disturbed areas outside the limit of work shall be spread with four inch (4") minimum depth of organic soil amendment material to the finished grade.

E. No subsoil or organic soil amendment material shall be handled in any way if it is in a wet or frozen condition.

F. Sufficient grade stakes shall be set for checking the finished grades. Stakes must be set in the bottom of swales and at the top of slopes. Connect contours and spot elevations with an even slope.

G. After organic soil amendment material has been incorporated into the subsoil, it shall be carefully prepared by scarifying or harrowing and hand raking. Remove all large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Remove all stones over one and one half inch (1-1/2") diameter from the amended soil bed. The amended soil shall also be free of smaller stones in excessive quantities as determined by the Resident Engineer.
H. The whole surface shall then be compacted with a roller or other suitable means to achieve a maximum dry density of 88 to 90 percent in accordance with compaction standards of ASTM D1557 Method D. During the compaction process, all depressions caused by settlement or rolling shall be filled with additional organic soil amendment and the surface shall be regraded and rolled until presenting a smooth and even finish corresponding to the required grades.
SECTION 3292000 - LAWNS

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. Seeding
2. Hydroseeding
3. Sodding
4. Sprigging
5. Mulching
6. Erosion control blanket – slope stabilization
7. Turf renovation
8. Maintenance
9. Warranty

B. Related Requirements:

1. Section 311000 "Site Clearing" for stripping and using on-site topsoil.
2. Section 312000 "Earth Moving" for mass grading of the site.
3. Section 312500 "Soil Erosion and Sedimentation Control" for soil stabilization during construction.
4. Section 329100 "Soil Preparation (Topsoil)" for lawns and plant mixture amendment.
5. Section 329300 "Exterior Plantings" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.
6. Section 334600 "Subdrainage" for below-grade drainage of landscaped areas.

1.3 REFERENCES AND REGULATORY REQUIREMENTS

A. United States Department of Agriculture (USDA), Federal Seed Act - labeling and purity standards and miscellaneous requirements.

B. State Seed Laws – where applicable.

C. Association of Official Seed Analysts (AOSA): “Rules for Testing Seed”.

D. Turfgrass Producers International (TPI): Guidelines for Turfgrass Sod.

1.4 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
C. Pests: Living organisms that occur where they are not desired or that cause damage to grasses, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Pure Live Seed (PLS): \( \frac{\text{percent germination} \times \text{percent purity}}{100} = \text{Percent PLS} \)

E. Topsoil: Existing, on-site soil that has been modified with soil amendments and fertilizers to produce a soil mixture best for lawn growth. See Section 329110 "Soil Preparation-Topsoil" and drawing designations for topsoil.

F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before topsoil is placed.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data:

1. Erosion control blanket and anchors.
2. Fertilizers - from manufacturer.
3. Mycorrhizal inoculum.
5. Seeding and mulching equipment.
7. Lawn maintenance equipment.
9. Maintenance edge aggregate gradation analysis.

B. Source Quality Control:

1. Samples:
   a. Seed: Quart size sealable plastic bag
   b. Straw Mulch: 1 cubic foot (On-Site).

2. Test Report:
   a. Topsoil: Test reports including soil amendments and fertilization rates for each seed mix. Refer to Section 329100 Soil Preparation (Topsoil).

3. Certifications/Licenses:
   a. Certification of Grass Seed for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity (PLS), germination, weed seed, year of production, and date of packaging. Include identification of source, name and telephone number of supplier.
   b. Certification of sod from proposed sod supplier that identifies quality standard, turf species stating the botanical and common names, proportions of each species in the sod, composition of the root zone soil in which the sod has been grown, and date the sod was planted. Include identification of source, name and telephone number of supplier.
C. Field Quality Control:

1. Project Work Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a project work schedule to the Landscape Architect indicating dates for delivery, installation, and Substantial Completion for all landscape work. The Schedule shall be comprehensive and address procurement, delivery, and installations of irrigation, lawn areas of the site. For a large site, the schedule shall reflect a phased installation and shall include support graphics required to identify this phased approach. Refer to 1.10 below for a complete list of schedule requirements.

2. Maintenance Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a detailed typewritten approach and schedule for the warranty maintenance of all landscape activities outlined under 3.13 of this section. Coordinate landscape maintenance with other applicable Sections Section 329300 Exterior Plantings and combine all maintenance activities into one plan of action. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

3. Irrigation Plan: Prior to the issuance of Substantial Completion, submit a detailed typewritten approach and schedule that outlines watering requirements for maintaining the landscape as described herein. The Irrigation Plan shall be submitted in conjunction with the Maintenance Schedule. The plan shall address how the irrigation system will be operated during the warranty period, frequencies and durations that will be established to provide the correct watering rates for plants and lawns, inspection protocols and winterization procedures. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Landscape Architect and Owner's Representative. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period), and may be automated with a timer. Supply all water and equipment at the Contractor’s expense from a source approved by the Owner's Representative. Reliance on natural precipitation will only be allowed with provision of recorded data from a rain gauge located within a 2-mile radius of the project site. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

4. Maintenance Report Forms: Using the approved Maintenance Schedule and Irrigation Plan as the framework for all maintenance activities (plant maintenance, and seed bed maintenance and irrigation operations). The Contractor shall provide detailed maintenance report forms for each site visit. The reports shall be completed by the on-site maintenance superintendent performing the work prior to leaving the site and shall be submitted monthly as back-up to each invoice. Office prepared reports will not be permitted and payment for this work will only be made by the Owner when proof of completed specified maintenance has been provided. Each report shall include the following:

   a. Date of activity.
   b. Length of time on site (start time and finish time).
   c. Name and signature of the maintenance superintendent.
   d. Number of personnel performing the work.
   e. Site climatic conditions (rain, wind, temperature, etc.)
   f. Detailed description of maintenance activities performed by area.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. Include list of at least three similar projects completed in the last 5 years by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners’ contact persons.

2. Provide resumes of field technician (foreman) responsible for managing the purchase and installation of all materials. Separate resumes shall be provided for the seeding, planting, irrigation and maintenance technicians.

3. License certificates for pesticide applicator.
1.8 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor shall be a company specializing in seeding, sodding, exterior landscape, installations and maintenance, having a minimum 5 years’ experience in projects of the scope and scale being specified.
2. Installer’s field technician: The installer shall provide a full-time supervisor on site when work is in progress.
3. Maintenance field technician: The maintenance activities for all turf areas shall be performed by skilled employees of the landscape installer. Subcontractors specializing in landscape and turf maintenance will not be permitted unless approved in writing by the Owner's Representative.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding". Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Straw Mulch: Straw mulch shall be stored off the ground under a cover that provides protection from moisture and humidity.

D. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.10 SCHEDULING

A. Work Schedule:

1. Upon authorization to proceed with the work, submit a project work schedule indicating the dates of each of the following items:
   a. Submittal schedule.
   b. Delivery of materials to the site.
   c. Layout of seed bed locations on the site.
   d. Installation including; topsoil placement, fine grading, seeding and sodding.
   e. Substantial Completion of the work.

2. Update schedule monthly to reflect progress of the work.

B. Seasonal Limitations:

1. Seed mixes shall be installed during planting seasons normally recognized in the job locality.
2. Cool Season Grasses: Install during the spring and fall only when soil temperatures are between 50 and 65 degrees Fahrenheit and air temperatures is 60 to 75 degrees Fahrenheit.
   a. Approximate spring installation: Between April 1 and May 15.
   b. Approximate fall installation: Between August 15 and September 30 but no later than 60 days before the first average annual frost date.

3. Dormant seeding: Due to construction operations and schedules, if contractor cannot install seed/sod between April 1 and May 15, Contractor to seed/sod and provide irrigation to the area with Owner Representative’s Approval.

4. If special circumstances warrant installation outside the normal installation season, submit a written request to the Owner’s Representative describing conditions and stating the proposed variance. Seeding/Sodding outside the specified seasons may extend warranty obligations and will be dependent upon the extent of the variance.

5. Weather limitations: Proceed with seeding and sodding only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

6. Coordination with Plantings: Plant trees, shrubs, and other plants after finish grades but prior to lawn installation unless otherwise indicated. When planting trees, shrubs, and other plants after lawn installation, protect completed areas, and promptly repair damage caused by planting operations.

1.11 WARRANTY, MAINTENANCE AND ACCEPTANCE

A. Substantial Completion:

1. The Substantial Completion inspection shall occur in Spring 2020. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion or correction.
2. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
3. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
4. Substantial Completion will be provided for all lawn areas complying with the following:
   a. Landscape Architect approval of all specified submittals.
   b. The work shall be 100% complete (including all site preparation, earthwork, topsoil, seeding, sodding, mulching, erosion control blanket, planting, irrigation and clean-up), and ready for inspection.
5. After receiving a Notice of Substantial Completion, warrant and maintain all lawn areas in a vigorous, well-kept condition until Final Acceptance.

B. Final Acceptance:

1. Approximately two weeks prior to the expiration of the warranty and maintenance period (or sooner if plantings are included in the inspection), the Owner’s Representative will conduct an inspection of all lawn areas, plantings, irrigation system and review all previously submitted maintenance report forms to verify all completed maintenance activities. There shall be thorough documentation previously submitted by the contractor and field observations made by the Owner or Landscape Architect that the specified maintenance has occurred. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
2. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
3. Final Acceptance will be based upon Owner approval and the work having:
   a. Uniform finished grades conforming to the drawings and free of erosion.
b. All maintenance items completed and documented by Contractor through maintenance report forms.

c. Satisfactory Seeded Lawn: At end of warranty and maintenance period, a healthy, uniform well-rooted, even-colored, close stand of grass has been established, free of weeds, disease and insect problems, and surface irregularities, with 100% coverage of the specified species.

d. Satisfactory Sodded Lawn: At end of warranty and maintenance period, a healthy, well-rooted, even-colored, viable lawn, free of weeds, disease and insect problems, open joints, bare or dead areas, and surface irregularities.

4. Areas which do not meet the contract requirements shall be regraded as needed and seeded, mulched, sodded. Use specified materials and procedures to reestablish lawn that does not comply with requirements and continue maintenance at no cost to the Owner until lawn is satisfactory.

5. Final Acceptance and the end of the warranty period for the lawns will occur only after all punch list items have been satisfactorily completed and the site is left in the condition specified under Cleanup and Protection.

C. Warranty and Maintenance Period:

1. The end of the warranty and maintenance period shall be:

   a. 1 year following University acceptance of the project

      1) When the initial warranty and maintenance period has not elapsed before end of growing season (October 31), or if lawns are not fully established, continue maintenance during next growing season until all maintenance and warranty obligations have been met.

2. The Contractor will not be held responsible for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents beyond landscape installer's control which result from floods, hail storms, winds over 100 miles per hour, fires or vandalism, unless Contractor has not completed specified installation in a manner that could have protected the landscaping from these phenomena.

3. If, in the opinion of the Owner’s Representative it is advisable to extend the warranty and maintenance period for an additional growing season, the contractor will be notified of such requirement by the Owner. Improper execution of the installation and/or failure to perform and document the specified maintenance in accordance with contract requirement shall be the basis for extending the period of establishment for a second growing season. All specified maintenance and warranty requirements will be required during this extended period and all costs shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Other varieties that those specified may be submitted for approval to Landscape Architect, but they must be newer, more improved cultivars than what is listed.

C. Dormant seeding shall only be permitted if approved by Landscape Architect in writing. Apply seed at a rate that is 25 percent higher than the rates specified below.

D. Seed Species:
1. The University prefers to use a Sun and Partial Shade Blend. If contractor would like to suggest a different blend for the restoration around the perimeter of the synthetic turf field, please contact the Landscape Architect.

2. Quality: Seed of grass species as listed below for solar exposure, with not less than 90 percent germination, not less than 98 percent pure seed, and not more than 0.3 percent weed seed:

3. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   a. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

4. Sun and Partial Shade Blend: Proportioned by weight as follows:
   a. 60 percent Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
   b. 30 percent fine fescue (Festuca), a minimum two varieties; chewing and creeping red.
   c. 10 percent perennial ryegrass (Lolium perenne).
   d. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

5. Shade Blend: Proportioned by weight as follows:
   a. 65 percent fine fescues (Festuca), a minimum of three varieties consisting of chewing, creeping red and hard.
   b. 25 percent Kentucky bluegrass (Poa pratensis), a minimum two turf type varieties.
   c. 10 percent perennial ryegrass (Lolium perenne), use shade tolerant variety.
   d. Install at a rate of 6 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

6. Shade and Sun Fescue Blend: Proportioned by weight as follows:
   a. 100% turf type tall fescue (Festuca) consisting of a minimum 3 improved varieties.
   b. All varieties shall be labeled endophyte free or contain beneficial endophytes.
   c. Install at a rate of 8 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

2.2 TURFGRASS SOD

A. Provide an approved nursery grown, Number 1 Quality/Premium sod, complying with “Specifications for Turfgrass Sod Materials” in TPI’s “Guideline Specifications to Turfgrass Sodding”. Furnish sod comprised of the specified species and of uniform density, color, and texture, strongly rooted, weed free and capable of vigorous growth and development once installed. Sod shall be 2 years old and shall have been grown at a sod nursery in a mineral-based root zone. Sod grown on peat (organic soil) will not be approved. Sod shall be free of objectionable grassy and broad leaf weeds.

B. Thickness and width of sod shall be kept to strict dimensions, with width being 24” and containing 90-degree angle cut edges. Netting associated with harvest must be removed before installation.

C. Turfgrass Sod Species: Sod of grass species as follows, with not more than 0.5 percent weed seed:

1. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.
2. Sun and Partial Shade: Proportioned by weight as follows:
   a. 60 percent Kentucky bluegrass (Poa pratensis), a minimum of two improved turf type varieties.
   b. 40 percent chewing red fescue (Festuca rubra variety) a minimum of two varieties.

3. Shade: Proportioned by weight as follows:
   a. 60 percent fine fescues (Festuca), a minimum of two varieties; chewing, creeping red and
b. 40 percent Kentucky bluegrass (Poa pratensis), a minimum of two turf type varieties.

D. Turfgrass-Sod Species: Proprietary blend as follows: <insert sod product name and supplier>.

E. Sod Stakes: Sod Stakes shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer spacing and installation instructions.

2.3 STRAW MULCH

A. Straw Mulch: Provide stalks from oats, wheat, rye, barley or rice that are free of weeds, air-dry, clean, mildew- and seed-free, threshed straw of wheat, rye, oats, or barley.

1. Straw shall be in an air dry condition and suitable for placing with commercial mulch blowing equipment.

B. Tackifier

1. Hydraulically applied tackifier shall be an organic based or polymeric emulsion blend designed for use over long-fibered mulch (straw). Tackifier shall:
   a. Be powder or liquid based
   b. Achieve a drying time between 12 and 18 hours
   c. Minimum 4 month longevity after application

2. Asphalt Emulsion tackifier is not permitted.

2.4 HYDRAULIC MULCH

A. Hydraulic mulch is not permitted.

B. Hydraulic Mulch: Provide biodegradable, cellulose fiber mulch made from 100% post-consumer recycled paper, or a combination of 70% recycled wood fiber and 30% post-consumer recycled paper cellulose fiber. Mulch should be processed to contain no growth or germination-inhibiting factors, nontoxic and dyed an appropriate color to facilitate visual metering of the application of materials. On an air-dry weight basis, provide hydroseeding mulch containing not more than 12 percent moisture, plus or minus three percent at the time of manufacture, with a pH range from 3.5 to 5.0 for wood/cellulose fiber blends and from 5.0 to 9.0 for 100% cellulose fiber mulch. Provide hydraulic mulch manufactured so that:

1. After addition and agitation in slurry tanks with the fibers, tackifier and water, the material will become uniformly suspended to form an homogeneous slurry. Mixing the lawn seed, fertilizers and soil amendments is prohibited.
2. When hydraulically sprayed on the ground, the material will form a blotter-like cover.
3. The cover will allow the absorption of moisture and allow rainfall or applied water to percolate to the underlying soil.

C. Hydraulic Mulch Tackifier

1. Binding agent shall clear and non-staining and result in a stabilized fiber matrix consisting of wood and/or paper fibers and a stabilizing emulsion that includes a hydro-colloidal tackifier and polycarbonate flocculant specific to hydraulic mulch applications.
2. Use products as recommended by fiber-mulch manufacturer for slurry application.
3. Asphalt Emulsion tackifier is not permitted.
2.5 EROSION CONTROL BLANKET

A. Erosion Control Blanket - [Type 1]: Intended for use on flat surfaces or slopes 4:1 (H:V) or greater where only sheet flow will be encountered.

1. Straw/jute blanket shall be constructed with a 100% agricultural straw matrix (0.5 lbs per square yard), with jute or cotton netting on top and bottom, sewn together with biodegradable cloth thread. The blanket shall be 100% biodegradable, and have a typical functional longevity of 12 months after installation. Plastic netting will not be permitted.

B. Erosion Control Blanket - [Type 2]: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 8 feet per second (fps).

1. Straw/coconut fiber blanket shall be constructed with 70% agricultural straw (0.35 lbs per square yard), and 30% coconut (coir) fiber matrix (0.15 lbs per square yard), with 100% woven jute netting on the top and bottom, sewn together with biodegradable cloth thread. The Blanket shall be 100% biodegradable, and have a typical functional longevity of 18 months after installation. Plastic netting will not be permitted.

C. Erosion Control Blanket - Type 3: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 10 feet per second (fps).

1. Coconut fiber blanket shall be constructed with 100% coconut (coir) fiber matrix (0.50 lbs per square yard), with 100% woven coir fiber netting on top and 100% woven jute netting on the bottom, sewn together with biodegradable cloth thread. The Blanket shall be 100% biodegradable, and have a typical functional longevity of 24 months after installation. Plastic netting will not be permitted.

D. Fasteners: Fasteners shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer’s spacing and installation instructions.

2.6 EQUIPMENT

A. Tiller:

1. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 2:1 (H:V): A minimum D-7 size tractor with a mounted ripper consisting of 3 to 5 tines spaced a maximum 24 inches apart. Tines shall be equipped with 12 inch wide winged ripper points and shall be capable of penetrating subsoils up to 24 inches deep in one pass.

2. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 4:1 (H:V): A tractor mounted disk harrow consisting of 6 – 12 offset disks weighing a minimum 1,800 pounds each. The harrow shall be capable of penetrating subsoils up to 18 inches deep in one pass.

B. Fine Grading: Hand rake, tractor mounted york rake or other similar equipment.

C. Hydroseeder: Hydroseeding will not be permitted.

D. Hydroseeder: A truck-mounted, hydraulically driven variable speed agitation seeder that effectively shoots an aqueous mixture of seed, fertilizer, and mulch over broad areas through a discharge boom and hydraulic hose. Minimum tank capacity shall be 1,000 gallons.

E. Drop Spreader with Cultipacker, as manufactured by Brillion or John Deere or equivalent.

F. Broadcast Seeding: A spinning-disc type broadcaster with a calibration gauge (hand held and tractor mounted) shall be used to broadcast the seed over the designated areas.
G. Seed Imprinting Equipment: Used with spinning-disc type broadcaster to lightly cover or press seed into the soil. A tractor or all-terrain vehicle mounted dragging devise consisting of anchor chains, disk chains, cables, chain harrow or other similar equipment.

H. Straw Mulcher: A power mulcher that thrashes and separates, then evenly distributes the straw at a capacity between 2 and 20 tons per hour, with a discharge distance between 35 and 100 feet in still air.

I. Crimping Device: A mulch disc or other mechanical anchoring/crimping device for use in anchoring straw mulch into place, such as a Reinco Model MD-96 or equivalent, having flat discs with notched edges spaced 8” apart to impress mulch 1-3” down into soil.

2.7 WATER

A. Water for lawns shall be available from on-site sources.

B. Water shall be free of wastewater effluent or other hazardous chemicals

2.8 TOPSOIL

A. Refer to Section 329100

2.9 SOIL AMENDMENTS

A. Peat shall be a product having at least 95% organic content consisting of sphagnum peat moss with a pH range of 3.0 – 4.0 and Von Post decomposition value of H1 – H3, or low-lime reed-sedge peat with a pH range of 4.0 to 5.0 and Von Post decomposition value of H4 – H6. Product shall be free of sticks, wood or other debris.

B. Compost shall be a heavily decomposed mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings or other compostable materials. Manure is not suitable for use. The compost shall have a dark brown or black color, be capable of supporting plant growth without ongoing addition of fertilizers or other soil amendments and shall not have an objectionable odor. The compost shall be free of plastic, glass, metal and other physical contaminants, as well as viable weed seeds and other plant parts capable of reproducing (except airborne weed species). Composting facility shall be tested in accordance with the United States Composting Council, Seal of Testing Assurance (STA) following procedures as outlined in the Test Methods for the Examination of Composting and Compost protocols (TMECC).

1. pH: 5.5 to 8.
2. Moisture content: 35 to 55 percent by weight. No visible free water or dust is produced when handling it.
3. Sieve analysis: 100 percent passing ¾ inch screen.
4. Soluble salt content: Less than 5 percent.
5. Organic matter content: Minimum 60 percent.

C. Sand shall be clean, coarse, ungraded, meeting the requirements of ASTM C33 for fine aggregates.

D. pH Adjusters:

1. Lime shall be finely ground agricultural grade dolomitic limestone containing not less than 85% calcium and magnesium carbonates conforming to ASTM C602, Class T or O.
2. Elemental sulfur shall be granular, biodegradable, horticultural grade material containing at least 90% sulfur, with a minimum of 99% passing through No. 6 sieve and a maximum of 10% passing
through No. 40 sieve.

E. Mycorrhizal Inoculum:

1. Mycorrhizal fungi in the inoculant shall be available as propagules, i.e., spores, root fragments and hyphae. The inoculant shall contain highly selected strains of low host specificity endo- and ectomycorrhizal fungi combined with other beneficial fungi (Trichoderma), humic acids, biostimulants, beneficial bacteria, soluble sea kelp, and yucca plant extracts, as manufactured by Horticultural Alliance or approved equal. The selection of inoculants shall be based upon fungal partners that are compatible with the specified turf grasses.

2.10 FERTILIZER

A. Fertilizer shall be a complete fertilizer of neutral character, consisting of fast and slow-release nitrogen and shall be applied at the rates and formulations that release nutrients when new plants can effectively draw them from the soil.

1. The percentages of slow release and fast release nitrogen shall be adjusted based on the time of year fertilizers are being applied.
2. For fall seeding, the percentage of slow-release nitrogen shall be higher that spring seeding since a high percentage of fast-release nitrogen will be mostly lost by runoff or infiltration before plant uptake.

B. Composition: The percentages by weight shall be determined per recommendations of the soil testing reports for lawns.

2.11 PESTICIDES

A. General: Pesticide and herbicides shall be registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides and herbicides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within seeded areas at the soil level.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General:

1. The Contractor shall establish a quantifiable system to be employed in the field for measuring areas, weighing products and calibrating equipment on a daily basis to ensure all products are installed at the specified rates of application.
2. Prior to beginning work, examine and verify the acceptability of the project site and notify the Owner’s Representative of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
3. Identify areas of subsoil compaction prior to placement of topsoil.
4. Verify that no foreign or deleterious material has been deposited in soil within a planting area.
5. Where lawn installation occurs in close proximity to other site improvements, provide adequate protection to all features prior to commencing work. Promptly repair any items damaged during installation operations to their original condition.

6. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

7. Suspend spoil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

8. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

9. If lawn areas die or are rejected due to non-conformity to contract requirements, they must be removed from the site immediately and replaced before Substantial Completion.

B. Utilities: Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand-excavate to minimize possibility of damage.

C. Coordination with Other Work:

1. The Contractor shall coordinate work with other contractors or trades to determine the appropriate sequence of landscape installation with respect to other work on the site.

2. Completed work installed out of construction sequence which is subsequently disturbed by the completion of work by other trades shall be repaired by the landscape installer at no cost to the Owner.

3. Maintain grade stakes and layout controls set by others until removal is mutually agreed upon by all parties concerned.

3.2 SUBGRADE PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by lawn installation operations.

B. Install erosion control measures, if necessary, to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties, natural resources and walkways.

C. Vegetation Removal: Strip and dispose of organic debris and root mat.

D. Topsoil stripping, stockpiling: Refer to Section 311000 - Site Clearing.

E. Maintain subgrade in areas to be topsoiled in a uniform condition so as to prevent future depressions. Prior to placing topsoil;

1. Till all subsoils to a minimum depth of 18-inches with approved equipment to remove all compacted subsoils. Tilling shall be complete breaking thoroughly fracturing. Perform tilling in two directions, one perpendicular to the other.

2. Upon completion of tilling, the subsoils will require light compaction and leveling to prevent ponding of water and settlement after topsoil placement. As a final operation, a light-weight tracked dozer shall be employed that will remove surface irregularities and prevent excessive settlement. During this procedure, the surface of the subsoil on slopes greater that 4:1 (H:\V) shall be imprinted with tracks from the dozer. Imprinting shall be perpendicular to the slope and shall be approximately one-inch deep.

3. Do not proceed with topsoil placement until subgrade tilling and imprinting is completed to the satisfaction of the Landscape Architect.

4. Repair disturbances to previously graded areas and remove surplus subgrade material associated with any landscape construction.

F. If the prepared subgrade is eroded or compacted by rainfall prior to topsoil placement, rework the surface as specified.

G. In locations where existing topsoil has not been removed, till entire area in accordance with paragraph E above. Do not till within dripline of existing trees.
3.3 PLACING TOPSOIL, SOIL AMENDMENTS AND FERTILIZER

A. Provide, fertilize and amend topsoil in accordance with testing laboratory recommendations specified under Section 329113 "Soil Preparation (Topsoil)".

B. Uniformly distribute topsoil on lawn areas so that after light compaction and finish grading, a uniform depth of 4-inches is achieved. Reduce elevation of planting soil to allow for thickness of sod. Placement shall include spreading, cultivating, lightly compacting, dragging and grading to the conditions specified below.

C. Topsoil, when placed, shall be dry enough so as not to puddle or bond. Do not place topsoil when the subgrade is frozen, excessively wet, extremely dry or in a condition otherwise detrimental to proper grading or lawn operation.

D. Following topsoil placement but prior to finish grading, broadcast all soil amendments and fertilizer and rototill into the topsoil. The coverage areas for soil amendments and fertilizer shall be carefully calculated by the installer and fully blended into the entire topsoil profile. Do not incorporate soil amendments and fertilizer more than 5 days in advance of seeding.

E. Mycorrhizal Inoculum:
   1. Rototill two granular pounds per 1,000 square feet of seed bed into the top four to six inches of topsoil or as recommended by supplier.

3.4 PRE-INSTALLATION PREPARATION

A. Finish Grading:
   1. Immediately before lawn installation scarify, loosen, float, and drag topsoil as necessary to bring it to the proper condition. Remove all foreign matter larger than 1" in diameter. There shall be no visible plants, roots, debris or any foreign material present prior to installation.
   2. Finished grades shall slope to drain, be free of depressions or other irregularities, lightly compacted to prevent settlement, and shall be uniform in slope between grading controls and the elevations indicated.
   3. Finished grade for seeded lawn areas shall meet existing grades at contract limits and be ½" below top of curbs, walk paving, and metal edging if used.
   4. Finished grade for sodded areas shall meet existing grades at contract limits and be 1" below top of curbs, walk paving, and metal edging if used.

B. Before lawn installation obtain Landscape Architect's acceptance of finish grading. Restore seedbed areas if eroded or otherwise disturbed after finish grading.

3.5 SEEDING AND MULCHING

A. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.

B. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean seeding, dragging, mulching, crimping and tackifier.

C. Seeding Procedures:
   1. Do not sow seed when weather conditions are unfavorable, such as during drought or high winds.
   2. Perform seeding with only approved equipment. Do not broadcast or drop seed when wind velocity exceeds 10 mph.
3. Sow the seed uniformly at a rate specified under 2.1 of this section. For dormant seeding, increase seeding rates by 25% (if accepted by Owner's Representative).

4. Do not use wet seed or seed that is moldy or otherwise damaged.

5. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucers, plant beds and other seed beds.

6. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

7. Immediately following seeding, rake, drag or float all seed beds to provide a light covering of topsoil approximately 1/8 inch deep. When using equipment that lightly injects the seed into the soil, include equipment that lightly rolls the seed bed to provide good moisture contact between the seed and soil.

8. Maintain soil moisture in accordance with 3.11 below.

D. Mulching Procedures:

1. Do not use any straw that contains weeds and other plants that will contaminate the seed beds with unspecified plants. Carefully inspect each bale of straw prior to spreading and any bales observed to be contaminated with weeds shall be removed from the site on a daily basis.

2. Do not mechanically blow straw when wind speeds exceed 10 mph.

3. Remove all straw that has been deposited outside the limits of seeding and on adjacent pavement, plant beds and tree saucers.

4. Spread straw mulch evenly at the rate of approximately 2 tons dry straw per acre. Place all mulch over all seeded areas within 24 hours after seeding. A mechanical blower or hand spreading shall be used to apply mulch material, provided the machine has been specifically designed and approved for this purpose. Mulch shall be uniform in thickness and cover resulting in a blanket of straw approximately 1 ½ inches loose thickness with little to no visible soil.

5. Slopes 4:1 or steeper and drainage swales shall be stabilized with erosion control blanket in accordance with 3.12 below.

6. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with 3.12 below at no additional cost to the Owner.

E. Anchoring Mulch Procedures:

1. Anchor the mulch by using both an approved crimping device and applying tackifier on the mulched surface immediately following mulching operation.

2. Mulch shall be crimped in all seed beds where slopes are less than 4:1 (H:V) and of sufficient width to allow equipment to perform crimping without damaging the finish seed bed. Crimp all locations in two directions. When finished, straw shall be anchored one to two inches into the seed bed in rows no more than eight inches apart.

3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.

4. Any seed and mulch displaced due to improper crimping and bonding with tackifier shall be immediately replaced to the specified condition at no additional cost to the Owner.

3.6 HYDROSEEDING AND HYDROMULCHING

A. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.

B. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.

C. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean, seeding, mulching, crimping and tackifier.

D. Hydroseeding and mulching shall be installed as a two-step process.
1. **Step One:** Apply the seed and water slurry at the specified seed-sowing rate, with a light application of an approved hydraulic fiber mulch tracer.

2. **Step Two:** Apply the specified straw mulch and tackifier at specified rate, see 3.5 D and E above. Combining both steps into one will not be permitted.

**E. Hydroseeding – Step One Procedures:**

1. Fertilizer and soil amendments shall be applied as specified under 3.3 above and shall not be included within the step one slurry.

2. Apply seed on the previously prepared bed at the rates specified under 2.1 of this section. For dormant seeding, increase seeding rates by 25%.

3. Water used shall be obtained from fresh water source, and shall be free from injurious chemicals and other toxic substances at all times. Identify to the Owner all sources of water at least two weeks prior to use. The Owner, at his/her discretion, may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content.

4. Mixtures shall be constantly agitated from the time they are combined until they are finally applied to the seed bed. Once combined, mixtures shall be used within 8 hours.

5. Apply slurry uniformly and at the prescribed rate, avoiding misses and overlapping areas, gauging quantities of mixtures to measured application areas. Checks on the rate and uniformity of application may be made by the Landscape Architect observing the degree of wetting, or by distributing test sheets and observing the quantity of seed deposited thereon.

6. Direct application nozzle sufficiently upward so that the mixture falls to the ground in a uniform shower. Never direct spray toward the ground in a manner that produces erosion or runoff. Discontinue application during periods of high wind that affect the ability to properly apply the seed at a uniform cover.

7. Maintain soil moisture in accordance with 3.11 below.

**F. Mulching – Step Two Procedures:**

1. Hydromulching is not permitted. Apply straw mulch and erosion control blanket and anchor to soil as specified under 3.5 above.

2. Mulch all seeded areas with specified hydraulic mulch following the same requirements outlined under 3.6 E above.

3. Hydraulic mulch shall be applied at the following rates:
   a. 100% cellulose fibers: 2,000 lb/acre on slopes flatter than 4:1 (H:V).
   b. 70% wood fiber / 30% cellulose fiber: 2,500 lb/acre of slopes flatter than 4:1. (H:V).

4. Slopes 4:1 or steeper shall be stabilized with erosion control blanket in accordance with 3.12 below.

5. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with 3.12 below at no additional cost to the Owner.

**G. Anchoring Mulch Procedures:**

1. Spray hydraulic mulch tackifier concurrent with or immediately after mulching following the same requirements outlined under 3.6 E above.

2. Use only an approved tackifier applied at the rate recommended by the manufacturer.

3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.

4. Any seed and mulch displaced due to improper installation of tackifier shall be immediately replaced to the specified condition at no addition cost to the Owner.
3.7 TURF RENOVATION

A. All preparation work shall be conducted in accordance with 3.1 through 3.4 above. Following surface preparation, lawn installation shall be completed in accordance with the applicable lawn installation methods specified above. Blend newly seeded areas into adjacent existing lawns.

B. Renovate existing lawns where indicated. In areas where diseased or contaminated lawns are identified, remove existing topsoil and dispose off site.

C. Renovate lawns damaged by Contractor's operations, such as storage of materials, haul roads or other areas outside the limits of work.

D. Renovate lawns where topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations has occurred. Remove existing topsoil and dispose off-site.

E. Mow, dethatch, core aerate, and rake existing turf where identified.

F. Maintain soil moisture in accordance with 3.11 below.

3.8 WATERING

A. Watering Procedures:

1. Immediately following lawn installation water all bed areas thoroughly and immediately with a fine mist until soil is soaked to a depth of at least 2-inches or as indicated above. Puddling of water or allowing the seedbed to dry is unacceptable.

2. For seeded areas, maintain soil in a moist condition (in hot dry weather irrigation may be required 2-4 times per day) until seeds have sprouted and reached a height of 1-inch. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering. Provide irrigation to moisten soil to a depth of 4" to encourage deeper rooting.

3. For sodded areas, begin watering the entire area within 24 hours of installation and water daily for the first two weeks; twice a day in hot dry weather. Keep soil in all areas moist but not soaked to 2-inches below the bottoms of the plants. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering until Final Acceptance. During this period, moisten soil to a minimum depth of 4" to encourage deeper rooting.

4. Watering at accelerated rates that dislodge seed and mulch materials or cause erosion shall be immediately repaired at no cost to the Owner.

3.9 EROSION CONTROL BLANKET

A. Erosion Control Blanket Procedures:

1. Install erosion control blanket as indicated in on the Plans and all seed beds with slopes 4:1 (H:V) or steeper.

2. Immediately following seeding, erosion control blanket shall be rolled out in place in the direction of the slope fall line. The material shall be applied without stretching and shall lie smoothly but loosely on the soil surface. Installers shall minimize walking directly on the seed or topsoil bed either before or after the blanket is applied.

3. All ends shall be buried a minimum of 4 inches deep and the trench shall be firmly tamped after closing.

4. In cases where roll ends join, the up-slope piece shall overlap the down-slope piece by at least 18 inches.

5. Anchor edges prior to backfilling trench, all overlaps at 12-inch intervals, and the center of each panel on 3-foot intervals.

6. The upslope ends of the blanket shall be buried a minimum of 6 inches deep and anchored at 12-inch intervals prior to backfilling trench.
7. Reseed all disturbed edges immediately following straw blanket installation and work seed into blanket.

3.10 MAINTENANCE

A. General: Maintain and establish lawn areas by watering, fertilizing, pest and weed control, litter removal, mowing, trimming, repairs, and performing other operations as required to establish healthy, viable lawn. Maintenance shall also include grade repair, seeding, sodding all associated soil amendments and fertilizers.

B. Provide all maintenance under the supervision of a skilled employee of the lawn installer. The skilled maintenance supervisor shall be: capable of operating the automatic irrigation system controller, conducting turf diagnostics to identify the presence of disease, insect and fertility problems, and directing a maintenance crew in the performance of horticultural maintenance practices identified below. Maintenance requirements identified below shall be the basis for information to be included in the Maintenance Schedule and Irrigation Plan identified under 1.5.C of this section and thoroughly documented under the required Maintenance Report Forms to verify the work has been properly performed.

1. Failure to perform and submit factual Maintenance Report Forms could result in non-payment for said services and require the extension of the warranty and maintenance period an additional year at the Contractor’s expense.

C. Provide all equipment, materials, labor and services to maintain the landscape beginning immediately after each area is installed and continuing until Final Acceptance and the end of the warranty period. During this period, perform the following:

1. Inspect the entire landscape at least once per week during the growing season and perform needed maintenance promptly.
2. Prior to each mowing, collect all debris, litter and miscellaneous materials accumulating on the site and remove from the site.
3. Irrigation: Irrigate all turf areas to maintain optimum moisture within the root zone as specified under 3.11 above. When using an automatic sprinkler system, the lawn installer responsible for maintenance shall bear full responsibility to set each zone to the correct frequency and duration.
4. Mow all lawns weekly during the growing season and as described below. Mowing frequencies shall be adjusted based on cutting requirements and may require more frequent visits during high growth periods. Use mulching mower only with sharpened blades and alternate direction of each mowing session to prevent rutting.
5. Fertilize as described below.
6. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Apply herbicides and pesticides as described below.
7. Remove leaves bi-weekly during the fall as they accumulate on the lawns. Bag and dispose off-site. Do not mow in advance of leaf removal.
8. Repair bare, eroded or settled areas and restore to provide a uniformly smooth lawn with the specified grasses. Provide same materials and installation procedures as those used in the original installation.
9. Reclaim/replace soil materials and turf damaged or lost in areas of subsidence. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth lawn.
10. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

D. Mowings: Mow turf as soon as top growth is tall enough to cut. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. At the time of each mowing, adjust mowing equipment to meet this requirement. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass, fescue to a height of 2-1/2 to 3-inches.
2. For sodded lawns wait at least 2 weeks after installation for first mowing.
3. Mowing heights may increase during the hot summer months based on regional conditions.
4. Collect all grass clippings if mowings are not sufficiently timed to allow for composting into the existing lawn and accumulations of clippings can be observed on the surface of the grass. Collection and off-site disposal shall be performed at no additional cost to the Owner.

3.11 POST-INSTALLATION FERTILIZATION

A. Apply fertilizers at the time of season, rate of application and grade of N-P-K that maximizes the health of the lawn and minimizes the potential run-off of fertilizers to adjacent waterways and groundwater. Avoid the use of phosphorus unless site soils are deficient of this nutrient.

B. During the warranty and maintenance period, fertilize warm season grasses three times and cool season grasses two times during the growing season.

C. Test site topsoil in early-spring and base actual rates on testing recommendations.

D. Apply fertilizer during the following dates;

1. Spring (April / May): Cool season grasses: After the second spring mowing apply fertilizer at a rate of 1 lb. actual nitrogen per 1,000 square feet of lawn. Nitrogen shall be 70% slow-release. Avoid the use of phosphorous and apply at 4-0-1 ratio of N-P-K.

2. Fall (September/October): Warm and cool season grasses: 8 weeks following application of spring apply fertilizer at a rate of 1.5 lbs. actual nitrogen per 1,000 square feet of lawn. Nitrogen shall be water soluble, quick release. Avoid the use of phosphorous and apply at 3-0-1 ratio of N-P-K.

3.12 PESTICIDE APPLICATION

A. Apply pesticides, and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Protect newly seeded areas from stormwater flows discharging from paved surfaces until grass establishment. Additional water diversion and erosion control measures such as wattles and check dams may be utilized at Contractor's discretion and expense.

E. Remove nondegradable erosion-control measures after grass establishment period.
END OF SECTION
WAYNE STATE UNIVERSITY
BASEBALL BATTING CAGES
WSU PROJECT NUMBER: 097-344215
DETROIT, MICHIGAN
FEBRUARY 16, 2022
BID DOCUMENTS
SMITHGROUP PROJECT NO. 13614.000

Prepared for:
WAYNE STATE UNIVERSITY
5454 CASA AVE
DETROIT, MI 48202

Prepared by:
SMITHGROUP
201 DEPOT STREET
SECOND FLOOR
ANN ARBOR, MI 48104
734.662.4457
www.smithgroup.com

SCOPE OF WORK
SITE CLEARING, CONCRETE FLATWORK 4" THICKNESS PER MDOT STANDARD, SYNTHETIC TURF, BATTING CAGE NET POST FOUNDATIONS, PLACEMENT OF NET POSTS, LABOR TO INSTALL CABLE WIRE AND NET POST SYSTEM, EARTHWORK AND RESTORATION.

WAYNE STATE UNIVERSITY HAS PURCHASED THE BATTING CAGE NET AND CABLE WIRE. THESE ITEMS ARE CURRENTLY STORED ON CAMPUS. WAYNE STATE ATHLETICS CAN TRANSPORT THESE MATERIALS TO THE PROJECT SITE ONCE THE CONTRACTOR IS READY FOR INSTALLATION.

THE NET POSTS ARE DONATED AND WILL BE DELIVERED TO WAYNE STATE UNIVERSITY; THEY ARE CURRENTLY OFF-SITE. CONTRACTOR TO COORDINATE WITH WAYNE STATE UNIVERSITY FOR DELIVERY OF THE NET POSTS.

ADD ALTERNATE 1
WALL AND WALL FOUNDATION SPREAD FOOTING, REBAR, TIES AND GRouting. CAP STONE/STONE ASSOCIATED WITH THE WALL. PART OF ADD ALTERNATE 2 IS THE CONCRETE FLATWORK 4" THICKNESS PER MDOT STANDARD, AND THICKENED EDGE ASSOCIATED WITH THIS CONCRETE AND ADJACENT RIPRAP AT CATCH BASIN.

ADD ALTERNATE 2
CONCRETE FLATWORK 3" THICKNESS PER MDOT STANDARD, AND THICKENED EDGE TO AREA WEST OF BATTING CAGES (BASE BID), AND WEST OF ADD ALTERNATE 1.

ADD ALTERNATE 3
UPGRADE THE BATTING CAGE CONCRETE FROM 4" THICKNESS (BASE BID) TO 6" THICKNESS WITH WWM 2.9.

ADD ALTERNATE 4
SHOCK PAD TO BE ADDED UNDER THE SYNTHETIC TURF AT THE BATTING CAGE.

ADD ALTERNATE 5
IN LIEU OF A CMU BLOCK WALL ASSOCIATED WITH ADD ALTERNATE 1, PROVIDE PRICING FOR CONCRETE WALL. SEE SECTION FOR 12" THICK CAST-IN-PLACE CONCRETE WALL.

ADD ALTERNATE 6
IN LIEU OF A CMU BLOCK WALL ASSOCIATED WITH ADD ALTERNATE 1, PROVIDE PRICING FOR CONCRETE WALL, SEE SECTION FOR 8" THICK CAST-IN-PLACE CONCRETE WALL.

SHEET LIST TABLE

<table>
<thead>
<tr>
<th>Sheet Number</th>
<th>Sheet Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS - 100</td>
<td>COVER SHEET</td>
</tr>
<tr>
<td>CS - 701</td>
<td>EXISTING CONDITIONS AND REMOVALS</td>
</tr>
<tr>
<td>CS - 200</td>
<td>SITE PLAN, UTILITIES &amp; GRADING</td>
</tr>
<tr>
<td>CS - 500</td>
<td>DETAILS</td>
</tr>
<tr>
<td>CS - 601</td>
<td>DETAILS</td>
</tr>
<tr>
<td>CS - 602</td>
<td>DETAILS</td>
</tr>
<tr>
<td>CS - 603</td>
<td>DETAILS</td>
</tr>
</tbody>
</table>
7'-6'' MIN. DEPTH
4'-0'' POLE EMBEDMENT
3'-6'' MIN.
1'-0'' (3 TIES)
1'-0'' (3 TIES)
3'' CLR
OPTIONAL COLD JOINT
#4 TIES @ 12'' oc, U.N.O.
(12)
CONTINUOUS VERTICAL #6 BARS
TYPICAL DRILLED CONCRETE PIER
HSS 8.625x0.322 (8'' Sch 40)
PROVIDE 1'' WASH, TYPICAL FINISH GRADE
3'-0'' MIN.
DIAMETER
HSS 8.625x0.322 (8'' Sch 40)
#4 TIES @ 12'' oc, NOTE: PROVIDE (3)- #4 TIES WITHIN TOP 12'' OF CONCRETE PIER & BOTTOM 12'' OF EMBEDDED SLEEVE, EQUALLY SPACED
(12) #6 BARS EQUALLY SPACED, AS SHOWN
SYSTEM NOTES:
1. SYSTEM FOR USE WITH #36 1 3/4 x 1 3/4 NETTING
2. CABLE SAG BETWEEN POLES = 1'0'' (MIN)
NOTES:
1. DESIGN PER ASCE 7-10 w/105mph WIND
2. CONCRETE SHALL ET THE FOLLOWING:
2.1. 28 DAY STRENGTH = 4500psi (MIN.)
2.2. W/C RATIO = 0.45
2.3. AIR ENTRAINMENT = 6.0%
3. REINFORCING BAR SHALL MEET ASTM A615, GRADE 60.
4. UNIT WEIGHT OF SOIL = 115pcf
5. SOIL INTERNAL ANGLE OF FRICTION USED FOR DESIGN = 28 DEGREES
6. MAX. POLE HEIGHT = 14'
7. WATER TABLE ASSUMED TO BE 4'-6'' BELOW GRADE FOR FOOTING DESIGN.
8. COMPACT SOIL SURROUNDING FOOTING TO 95% MODIFIED PROCTOR

NOTES: TUNNELS
1. CROSSBAR TAB, FACES OUTSIDE OF TUNNEL
2. CABLE TAB, FACES INSIDE OF TUNNEL

FINISH GRADE
4'0''
GROUND SLEEVE OR DIRECT EMBEDMENT

CONCRETE PAVEMENT
AGGREGATE BASE COURSE
SUBGRADE

CONCRETE PAVEMENT
AGGREGATE BASE COURSE
SUBGRADE
EXPANSION JOINT

CONCRETE PAVEMENT
TOOLED OR SAWCUT JOINT TO T DEPTH OF PAVEMENT. (T= CONCRETE PAVEMENT THICKNESS).

CONCRETE PAVEMENT
CONCRETE EDGE, 1 8" RADIUS

JOINT SEALANT
BACKER ROD
EXPANSION JOINT MATERIAL TO FULL DEPTH

4" OR 6" CONCRETE PAVEMENT, 4" OR 6" (SEE ADD ALTERNATES)
BATTING CAGE FOUNDATION
BATTING CAGE POLE
EXPANSION JOINT
AGGREGATE BASE COURSE
SUBGRADE

WAYNE STATE UNIVERSITY HAS PURCHASED THE NET, NET CABLE SYSTEM AND THE NET POSTS TO BE DELIVERED TO THE SITE. THESE ITEMS SHALL NOT BE INCLUDED IN THE BID. NET POST FOUNDATIONS WILL BE INCLUDED IN THE BID.
WAYNE STATE UNIVERSITY BASEBALL BATTING CAGES

Harwell Baseball Field - WSU
5401 John C. Lodge Service Drive
Detroit, MI

Owner:
WSU FP&M, Design & Construction Services

HSS 8.626" x 0.322" STEEL POLE

NET PIER WSU

FINISHED GRADE

BATTING CAGE ELEVATION

WAYNE STATE UNIVERSITY HAS PURCHASED THE NET, NET CABLE SYSTEM AND THE NET POSTS TO BE DELIVERED TO THE SITE. THESE ITEMS SHALL NOT BE INCLUDED IN THE BID. NET POST FOUNDATIONS WILL BE INCLUDED IN THE BID.
PLAN VIEW

ELEVATION (NORTH SIDE LOOKING SOUTH)

NOTE:
1) NORTH SIDE OF WALL TO BE PAINTED GREEN 
HITTER'S BACKDROP (WSU PANTONE COLOR).  COORDINATE WITH WSU ON SPECIFIC PANTONE COLOR. 

2) CONTRACTOR TO PROVIDE CMU FOR REMAINING WALL THAT IS NOT PAINTED. SUBMIT SAMPLE OF CMU SEALANT.

CAST-IN-PLACE CONCRETE FOUNDATION LIMITS

WALL RETURN, PROVIDE (1) ONE VERTICAL REBAR #4, 36" ABOVE TOP OF FOUNDATION, TYP.

CAST-IN-PLACE CONCRETE FOUNDATION

#4 REBAR, VERT. AND HORIZ. TYP.

VERTICAL REBAR #4: SPACED EVERY 16", ONE PER EVERY CMU UNIT

VERTICAL REBAR #4: EXPOSED TO ACCOMMODATE CMU UNITS. FILL BLOCKS WITH MORTAR UP TO THE TOP OF REBAR (REBAR FULL HEIGHT OF WALL)

8" X 12" X 16" CMU BLOCK, TYP.

9 GA TIES, 16" O.C.

3" CAP, 24" LENGTH, 12" WIDE

21AA

ADJACENT SIDEWALK, PITCH AT 1.5%

EXPANSION JOINT

#4 @ 12"

(5) #4 CONTINUOUS

3" CLEAR, TYP.

CAST-IN-PLACE CONCRETE, SEE SPECS FOR REQUIREMENTS

VERTICAL DOWELS #4, SPACED EVERY 12"

HORIZONTAL REBAR #4, SPACED EVERY 12"

SLOPE TOP OF WALL AT 1% TO DRAIN TOWARDS THE SOUTH

NOTE, CAST IN PLACE WALL DOES NOT REQUIRE RETURN IN THE WALL. 30.56' LENGTH ONLY

CAST-IN-PLACE CONCRETE, SEE SPECS FOR REQUIREMENTS

VERTICAL REBAR #4: SPACED EVERY 16", ONE PER EVERY CMU UNIT

VERTICAL REBAR #4: EXPOSED TO ACCOMMODATE CMU UNITS. FILL BLOCKS WITH MORTAR UP TO THE TOP OF REBAR (REBAR FULL HEIGHT OF WALL)

8" X 12" X 16" CMU BLOCK, TYP.

9 GA TIES, 16" O.C.

3" CAP, 24" LENGTH, 12" WIDE

21AA

ADJACENT SIDEWALK, PITCH AT 1.5%

EXPANSION JOINT

#4 @ 12"

(5) #4 CONTINUOUS

3" CLEAR, TYP.

CAST-IN-PLACE CONCRETE, SEE SPECS FOR REQUIREMENTS

VERTICAL DOWELS #4, SPACED EVERY 12"

HORIZONTAL REBAR #4, SPACED EVERY 12"

SLOPE TOP OF WALL AT 1% TO DRAIN TOWARDS THE SOUTH

NOTE, CAST IN PLACE WALL DOES NOT REQUIRE RETURN IN THE WALL. 30.56' LENGTH ONLY

8" X 12" X 16" CMU BLOCK

CAST-IN-PLACE CONCRETE FOUNDATION LIMITS

WALL RETURN, PROVIDE (1) ONE VERTICAL REBAR #4, 36" ABOVE TOP OF FOUNDATION, TYP.
WAYNE STATE UNIVERSITY

HARWELL FIELD - BASEBALL INFIELD TURF
5401 JOHN C. LODGE SERVICE DR, DETROIT, MI 48202

ISSUED FOR: OWNER REVIEW
5/2/2022

WSU PROJECT #097-345346
NOTES:
1. ALL BASEBALL FIELD MARKINGS SHALL BE PAINTED ACCORDING TO MANUFACTURER SPECIFICATIONS.
2. CONTRACTOR TO PROTECT EXISTING OUTFIELD GRASS AND TO REPAIR ANY AREA WITH SOD AFTERloth WITH MANUFACTURER SPECIFICATIONS. ALL AREAS IMPACTED BY CONSTRUCTION ACTIVITIES.
3. SEE DETAILS C-801 FOR CIVIL DETAILS.
NOTES:
1. OVERALL SYNTHETIC TURF AREA = 34,423 SF
2. SEE SHEET C-802 FOR FIELD DETAILS.
3. REFER TO C-100 FOR ALL FIELD LINES & MARKINGS.
1. DWG SHEET C'D FOR FIELD DRAINAGE DETAILS

2. PLAT PANELS SHALL BE INSTALLED AT A MINIMUM 0.50% SLOPE TOWARD THE PROPOSED 12" COLLECTOR PIPES.

3. CONTRACTOR TO FIELD VERIFY HUB ELEVATION OF PROPOSED CONNECTION TO EXISTING 6" PVC PIPE. ADJUST ELEVATION AS REQUIRED TO ACHIEVE 0.26% SLOPE TOWARD THE PROPOSED 12" COLLECTOR PIPES. LOCATION SHOWN IS APPROXIMATE.

4. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING UNDERDRAIN SYSTEM LOCATION SHOWN IS APPROXIMATE.

5. CONTRACTOR TO SUBMIT PROPOSED IRRIGATION LINES FOR OWNER TO REVIEW AND APPROVAL. ALL PROPOSED LINES SHALL RESIDE OUTSIDE SYNTHETIC TURF LIMITS.

6. OUTFIELD IRRIGATION SYSTEM (TYP.) CONTRACTOR TO RESTORE ALL OUTFIELD AREA EXISTING IRRIGATION SYSTEM. LOCATION SHOWN IS APPROXIMATE.

7. CONTRACTOR TO FIELD VERIFY INVERT ELEVATION OF PROPOSED CONNECTION TO EXISTING COMBINED SEWER. ADJUST ELEVATION AS REQUIRED TO ACHIEVE 0.50% TOWARDS THE PROPOSED 12" COLLECTOR PIPES. LOCATION SHOWN IS APPROXIMATE.

8. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING UNDERDRAIN SYSTEM LOCATION SHOWN IS APPROXIMATE.

9. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING UNDERDRAIN SYSTEM LOCATION SHOWN IS APPROXIMATE.
PROPOSED SYNTHETIC TURF BASEBALL FIELD
THROUGH THIRD BASE LINE

PROPOSED SYNTHETIC TURF BASEBALL FIELD
THROUGH HOME PLATE TO SECOND BASE LINE

PROPOSED SYNTHETIC TURF BASEBALL FIELD
THROUGH FIRST BASE LINE

LEGEND
1. SYNTHETIC TURF SYSTEM
2. 2" CAPSTONE - #8 CRUSHED AGGREGATE
3. 4.5" (MIN) TO 12" (MAX) - #57 CRUSHED AGGREGATE BASE
4. 6" CONCRETE CURB (SEE DETAIL)
5. MIRAFI 500X LINER OR APPROVED EQUAL.

WARNING TRACK 15'
INFIELD/OUTFIELD INTERFACE 11'-6"
HOME PLATE 9'-0"
PITCHING MOUND 9'-0" DIA.
FRONT OF PITCHING RUBBER 1'-6"
12" COLLECTOR PIPE SEE UTILITY PLAN
FIELD DRAINAGE NOTE
FLAT PANEL DRAINS SHALL BE INSTALLED AT A MINIMUM 0.50% SLOPE TOWARD THE PROPOSED 12" COLLECTOR PIPE. SUBGRADE WILL DIFFER FROM FINISH SURFACE GRADES. #57 CRUSHED AGGREGATE BASE DEPTH WILL VARY.

SUBGRADE AND FLAT PANEL DRAINS @ 0.50% SLOPE (TYP.)
EX BACKSTOP INSTALL 2"x4" NAILER BOARD TO EXISTING BACKSTOP

MATCH EXISTING SLOPE
SLOPE VARIES SEE PLANS

INFIELD/OUTFIELD INTERFACE
MEET EX GRADE
MATCH EXISTING SLOPE

FIELD SECTIONS
DRAWING NO.
C-104

The Osborn Engineering Company
505 South High Street, Suite 700
Cleveland, Ohio 44113
(216) 861-2020
www.osborn-eng.com

HARWELL BASEBALL FIELD INFELD REPLACEMENT
WAYNE STATE UNIVERSITY
62 WEST WARREN AVENUE
DETROIT, MICHIGAN 48202
(313) 577-2424
SWPPP LEGEND

- Silt Fence/Filter Sock
- Inlet Protection
- Concrete Washout Basin and Stormwater Areas
- Construction Driveway
- Limits of Construction (LT = LOT)

NOTES:
1. PROPOSED STAGING LIMITS FOR USE AS REFERENCE ONLY
2. CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF FENCE THAT IS DISTURBED FOR CONSTRUCTION ACTIVITIES

SWPPP NOTES:
- PROJECT AREA SOIL TYPE AND CLASSIFIED AS HYDROLOGIC GROUP B. SOIL DATA OBTAINED FROM NRCS WEBSOIL DATABASE.

CONSTRUCTION IMPLEMENTATION SCHEDULE:
1. MOBILIZATION
2. OWNER AND CONTRACTOR TO DOCUMENT EXISTING CONDITIONS WITH PHOTOGRAPHIC AND INSTRUMENTATIONS AS A BASIS FOR RESTORATION
3. INSTALLATION FILTER SOCK, SILT FENCE, AND INLET PROTECTION
4. DEMOLITION OF EXISTING GRASS FIELD
5. INSTALL COLLECTOR AND UNDER DRAIN SYSTEM
6. INSTALL STONE BASE
7. INSTALL SYNTHETIC TURF AND FIELD MARKINGS
8. INFILL APPLICATION
9. DECOMPOSITION OF ANY SITE SOILS DISTURBED BY CONSTRUCTION ACTIVITIES
10. RESTORE/REPAIR ACCESSION ROAD, LAYDOWN AREAS, PAVEMENT, ETC., TO ORIGINAL CONDITION
11. RESEED NATURAL GRASS AREA
12. DECOMPOSITION OF ANY SITE SOILS DISTURBED BY CONSTRUCTION ACTIVITIES
13. REMOVER FILTER Sock, Silt Fence and Inlet Protection
14. PROJECT COMPLETION

NOTES:
1. PROPOSED STAGING LIMITS FOR USE AS REFERENCE ONLY
2. CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF FENCE THAT IS DISTURBED FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION IMPLEMENTATION SCHEDULE:
1. MOBILIZATION
2. OWNER AND CONTRACTOR TO DOCUMENT EXISTING CONDITIONS WITH PHOTOGRAPHIC AND INSTRUMENTATIONS AS A BASIS FOR RESTORATION
3. INSTALLATION FILTER SOCK, SILT FENCE, AND INLET PROTECTION
4. DEMOLITION OF EXISTING GRASS FIELD
5. INSTALL COLLECTOR AND UNDER DRAIN SYSTEM
6. INSTALL STONE BASE
7. INSTALL SYNTHETIC TURF AND FIELD MARKINGS
8. INFILL APPLICATION
9. DECOMPOSITION OF ANY SITE SOILS DISTURBED BY CONSTRUCTION ACTIVITIES
10. RESTORE/REPAIR ACCESSION ROAD, LAYDOWN AREAS, PAVEMENT, ETC., TO ORIGINAL CONDITION
11. RESEED NATURAL GRASS AREA
12. DECOMPOSITION OF ANY SITE SOILS DISTURBED BY CONSTRUCTION ACTIVITIES
13. REMOVER FILTER Sock, Silt Fence and Inlet Protection
14. PROJECT COMPLETION

NOTES:
1. PROPOSED STAGING LIMITS FOR USE AS REFERENCE ONLY
2. CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF FENCE THAT IS DISTURBED FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION IMPLEMENTATION SCHEDULE:
1. MOBILIZATION
2. OWNER AND CONTRACTOR TO DOCUMENT EXISTING CONDITIONS WITH PHOTOGRAPHIC AND INSTRUMENTATIONS AS A BASIS FOR RESTORATION
3. INSTALLATION FILTER SOCK, SILT FENCE, AND INLET PROTECTION
4. DEMOLITION OF EXISTING GRASS FIELD
5. INSTALL COLLECTOR AND UNDER DRAIN SYSTEM
6. INSTALL STONE BASE
7. INSTALL SYNTHETIC TURF AND FIELD MARKINGS
8. INFILL APPLICATION
9. DECOMPOSITION OF ANY SITE SOILS DISTURBED BY CONSTRUCTION ACTIVITIES
10. RESTORE/REPAIR ACCESSION ROAD, LAYDOWN AREAS, PAVEMENT, ETC., TO ORIGINAL CONDITION
11. RESEED NATURAL GRASS AREA
12. DECOMPOSITION OF ANY SITE SOILS DISTURBED BY CONSTRUCTION ACTIVITIES
13. REMOVER FILTER Sock, Silt Fence and Inlet Protection
14. PROJECT COMPLETION
1. A CONCRETE WASHOUT AREA SHALL BE DESIGNATED TO CLEAN CONCRETE TRUCKS AND TOOLS. AT NO TIME SHALL CONCRETE PRODUCTS BE ALLOWED TO ENTER STREAMS OR DRAINS.

2. TEMPORARY CONCRETE WASHOUT FACILITIES (TYPE BELOW GRADE) SHOULD BE CONSTRUCTED AS SHOWN ON THE DETAIL, WITH A RECOMMENDED MINIMUM LENGTH AND MINIMUM WIDTH OF 10 FT. THE QUANTITY AND VOLUME SHOULD BE SUFFICIENT TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS.

3. LATH AND FLAGGING SHOULD BE COMMERCIAL TYPE.

4. PLASTIC LINING MATERIAL SHOULD BE A MINIMUM 10 MIL POLYETHYLENE SHEETING AND SHOULD BE FREE OF HOLES, TEARS, OR OTHER DEFECTS THAT COMPROMISE THE IMPERMEABILITY OF THE MATERIAL BELOW GRADE.

ALTERNATE: APPROVED FABRIC WASHOUT BAGS.

CONCRETE WASHOUT FACILITY

5. FILTER SOCKS ARE NOT TO BE USED IN CONCENTRATED FLOW SITUATIONS OR IN RUNOFF CHANNELS.

6. ROUTINELY INSPECT FILTER SOCKS AFTER EACH SIGNIFICANT RAIN, MAINTAINING FILTER SOCKS IN A FUNCTIONAL CONDITION AT ALL TIMES.

7. REMOVE SEDIMENTS COLLECTED AT THE BASE OF THE FILTER SOCKS WHEN THEY REACH 1/3 OF THE EXPOSED HEIGHT OFF THE PRACTICE.

8. WHERE THE FILTER SOCK DETERIORATES OR FAILS, IT WILL BE REPAIRED OR REPLACED WITH A MORE EFFECTIVE ALTERNATIVE.

9. REMOVAL - FILTER SOCKS WILL BE DISPERSED ON SITE WHEN NO LONGER REQUIRED IN SUCH A WAY AS TO FACILITATE AND NOT OBSTRUCT SEEDINGS.

FILTER SOCK DETAIL

1. MATERIALS - COMPOST USED FOR FILTER SOCKS SHALL BE WEEED, PATHOGEN AND INSECT FREE AND FREE OF ANY REFUSE, CONTAMINANTS OR OTHER MATERIALS TOXIC TO PLANT GROWTH. THEY SHALL BE DERIVED FROM A WELL-COMPOSED SOURCE OF ORGANIC MATTER AND CONSIST OF A PARTICLE RANGING FROM 3/8" TO 2".

2. FILTER SOCKS SHALL BE 3 OR 5 MIL CONTINUOUS, TUBULAR, HDPE 3/8" KNITTED MESH FILTERING MATERIAL, FILLED WITH COMPOST PASSING THE ABOVE SPECIFICATIONS FOR COMPOST PRODUCTS.

INSTALLATION:

3. FILTER SOCKS WILL BE PLACED ON A LEVEL LINE ACROSS SLOPES, GENERALLY PARALLEL TO THE BASE OF THE SLOPE OR OTHER AFFECTED AREA. ON SLOPES APPROACHING 2:1, ADDITIONAL SOCKS SHALL BE PROVIDED AT THE TOP AND AS NEEDED MID-SLOPE.

4. FILTER SOCKS INTENDED TO BE LEFT AS A PERMANENT FILTER OR PART OF THE NATURAL LANDSCAPE, SHALL BE SEeded AT THE TIME OF INSTALLATION FOR ESTABLISHMENT OF PERMANENT VEGETATION.

5. FILTER SOCKS ARE NOT TO BE USED IN CONCENTRATED FLOW SITUATIONS OR IN RUNOFF CHANNELS.

MAINTENANCE:

6. ROUTINELY INSPECT FILTER SOCKS AFTER EACH SIGNIFICANT RAIN, MAINTAINING FILTER SOCKS IN A FUNCTIONAL CONDITION AT ALL TIMES.

7. REMOVE SEDIMENTS COLLECTED AT THE BASE OF THE FILTER SOCKS WHEN THEY REACH 1/3 OF THE EXPOSED HEIGHT OFF THE PRACTICE.

8. WHERE THE FILTER SOCK DETERIORATES OR FAILS, IT WILL BE REPAIRED OR REPLACED WITH A MORE EFFECTIVE ALTERNATIVE.

9. REMOVAL - FILTER SOCKS WILL BE DISPERSED ON SITE WHEN NO LONGER REQUIRED IN SUCH A WAY AS TO FACILITATE AND NOT OBSTRUCT SEEDINGS.
COMPACTED SUBGRADE
SEE SPECIFICATION 31 20 01 FIELD

GRADING
12" O.D.
PIPE COVER
BEDDING
1/4 PIPE DIAMETER
6" MIN - 12" MAX
24" MAX. 72" DIA. & OVER
15" MAX. 27" TO 66" DIA.
12" MAX. 24" DIA. & LESS

PREMIUM FILL
MATERIAL
9" MIN
9" MIN

THE BACKFILL MATERIAL SHALL BE CRUSHED STONE OR OTHER GRANULAR MATERIAL MEETING THE REQUIREMENTS OF CLASS II MATERIAL AS DEFINED IN ASTM D2321, OR AS DETERMINED BY LOCAL STANDARDS & SITE ENGINEER. BEDDING & BACKFILL FOR SURFACE DRAINAGE INLETS SHALL BE PLACED & COMPACTED UNIFORMLY IN ACCORDANCE WITH ASTM D2321.

FINISHED GRADE
FURNISH AND INSTALL OPEN GRATE FLUSH WITH SURROUNDING GRADE

MIN PIPE BURIAL DEPTH PER MANUFACTURER RECOMMENDATION

SEE PLANS

NOTES:
1. ALL BENDS AND FITTINGS AND ALL VERTICAL PIPE SHALL BE SOLID WALL HDPE.
2. 8" CLEAN OUT SHALL BE USED FOR 8" SEWER AND LARGER.
3. SMALLER SIZE SEWERS AND LAMP SHALL HAVE SAME SIZE PIPE.

8" X 8" Y BRANCH

NOT TO SCALE
SYNTHETIC TURF SYSTEM DETAIL
1

FLAT PANEL DRAIN SECTION
2

FLAT PANEL DRAIN OUTLET TO COLLECTOR SEWER DETAIL
3

TYPICAL CLEANOUT DETAIL
4

TYPICAL UTILITY TRENCH DETAIL
5

NYLOPLAST CATCH BASIN DETAIL
6
Unless otherwise stated in Contract, The Osborn Engineering Company retains copyright ownership. Instruments of Service may only be used for the purpose described in the Contract. The Osborn Engineering Company may grant specific usage rights under license, and/or may transfer copyright ownership/assignment in writing. Reproduction, re-use or re-distribution of Instruments of Service is prohibited.
TABLE OF CONTENTS

DIVISION 1
01 10 00 Summary
01 25 00 Substitution Procedures
01 33 00 Submittal Procedure
01 60 00 Product Requirements

DIVISION 11 – EQUIPMENT
11 68 33 Baseball Field Equipment

DIVISION 31 – EARTHWORK
31 10 00 Site Clearing
31 22 01 Field Grading
31 23 33 Trenching and Backfilling

DIVISION 32 – SITE IMPROVEMENTS
32 92 00 Turf Grasses
32 92 05 Synthetic Turf – Project Requirements and Conditions
32 92 10 Synthetic Turf Subsurface Drainage & Aggregate Base
32 92 13 Synthetic Turf Playing Surface – Alternate #1
   AstroTurf – Diamond OPS/RBI
32 92 15 Synthetic Turf Playing Surface – Alternate #2
   Field Turf – DoublePlay Fast Clay/Fast Grass
32 92 17 Synthetic Turf Playing Surface Alternate #3
   Shaw Sports Turf – B1K Six4Three/TagUp 1.75
32 92 25 Natural Turf – Grass Turf System

DIVISION 33 – SITE UTILITIES
33 40 00 Storm Drainage Utilities
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Work restrictions.
5. Specification and drawing conventions.

1.3 PROJECT INFORMATION

A. Project Identification: Harwell Field – Baseball Infield Turf Installation

1. Project Location: 5401 John C. Lodge Service Drive, Detroit MI, 48208

B. Owner: Wayne State University

1. Owner's Representatives:

   Aly sca Valentine, Construction - Project Manager
   Wayne State University, Design and Construction Services

   Jason Clark, Executive Associate Athletics Director
   Wayne State University
C. Architect/Engineer: OSPORTS

1. Points of Contact

   Dan Kelbach, PE - Project Manager
   OSPORTS

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Contractor mobilization.

2. Perform preconstruction video prior to construction of all areas occupied by the contractor and trucking areas.

3. Install erosion and sediment control as per plans.

4. Demolition of existing natural grass field and infield skinned surface as per plans.

5. Installation of field collector and underdrain systems.


7. Installation of synthetic turf systems and inlay of all field markings.

8. Installation of infill systems.

9. Decompaction of any site soils disturbed by construction activities.

10. Restoration and repair of any areas disturbed by construction activities and laydown areas.

11. Reseed and resod of natural grass areas.

12. Contractor demobilization.


14. Project completion.

B. Type of Contract:

1. Project will be constructed under a single prime contract.
1.5 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner,Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
   a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing field to normal business working hours of 8:00 a.m. to 6:00 p.m., Monday through Saturday, unless otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.

2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Nonsmoking Site: Smoking is not permitted on the site.
E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.7 PROJECT SCHEDULE

A. Anticipated Construction Start: June 20th, 2021

B. Punchlist/Substantial Completion: September 15th, 2022

C. Project Closeout: October 1st, 2022

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.  Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

2.  Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1.  Substitution Request Form: Use CSI Form 13.1A.

2.  Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

   b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.

g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

j. Cost information, including a proposal of change, if any, in the Contract Sum.

k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.


b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

   b. Substitution request is fully documented and properly submitted.

   c. Requested substitution will not adversely affect Contractor's construction schedule.

   d. Requested substitution has received necessary approvals of authorities having jurisdiction.

   e. Requested substitution is compatible with other portions of the Work.

   f. Requested substitution has been coordinated with other portions of the Work.

   g. Requested substitution provides specified warranty.

   h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.
PART 3 - EXECUTION (Not Used)

END OF SECTION 012500
SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
   a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Architect's final release or approval.
   g. Scheduled date of fabrication.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

   a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect’s receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

   1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

   3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

   1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

   2. Name file with submittal number or other unique identifier, including revision identifier.

      a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., RECF-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., RECF-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Names of subcontractor, manufacturer, and supplier.
   h. Category and type of submittal.
   i. Submittal purpose and description.
   j. Specification Section number and title.
   k. Specification paragraph number or drawing designation and generic name for each of multiple items.
   l. Drawing number and detail references, as appropriate.
   m. Location(s) where product is to be installed, as appropriate.
   n. Related physical samples submitted directly.
   o. Indication of full or partial submittal.
   p. Transmittal number, numbered consecutively.
   q. Submittal and transmittal distribution record.
   r. Other necessary identification.
   s. Remarks.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
   1. Submit electronic submittals via email as PDF electronic files.
   2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
      a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
   h. Availability and delivery time information.

4. Submit Product Data before or concurrent with Samples.

5. Submit Product Data in the following format:
   a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 22 by 34 inches.

3. Submit Shop Drawings in the following format:
   a. PDF electronic file.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
   e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

G. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

H. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
K. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT’S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300
SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
   1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

   3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

   a. Form of Approval: As specified in Section 013300 "Submittal Procedures."

   b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.


1.5 QUALITY ASSURANCE

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

   1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   3. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   4. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents.
Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:
   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are
based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000
SECTION 11 68 33
BASEBALL FIELD EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes baseball field equipment as follows:
   1. Ground Anchored Bases.
   2. Ground Anchored Home Plate
   3. Ground Anchored Pitching Rubber

1.03 REFERENCES

A. Comply with applicable requirements of the following standards:
   1. National Federation of State High School Associations (NFHS).
   4. Manufacturers Data and Recommended Installation Requirements.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of baseball field equipment.
   1. Include plans, elevations, sections, and attachment details.
   2. Provide drawings of the manufacturer’s recommended installation requirements.

C. Samples for Verification: For each type of exposed finish on the following products:
   1. Include Samples of accessories to verify color and finish selection.
   2. Molded Plastic/Rubber/Turf Options: Minimum 3 inches (76 mm) square.
1.05 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of baseball field equipment.

B. Field quality-control reports.

C. Sample Warranty: For manufacturer's special warranties.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm whose baseball field equipment components have been certified by third-party product certification service.

1.08 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of baseball field equipment that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures.
   b. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Five years from date of Substantial Completion.

3. Bleachers: One year from defect in materials and workmanship on total structure. Five years on planks due to exposure to weather conditions or UV rays.

PART 2 - PRODUCTS

2.01 BASEBALL FIELD EQUIPMENT

A. Ground Anchored Bases:

1. Basis-of-Design Product: Subject to compliance with requirements, provide “Hollywood Slider Base-set of three, BB Bases, SB Bases” as manufactured by Schutt or comparable product/system as approved by Architect.

2. Construction: Solid, one-piece style with beveled corners and tapered base, allowing runners to slide over the base with reduced risk of injury.


B. Ground Anchored Homeplate:
   1. Basis-of-Design Product: Subject to compliance with requirements, provide “Hollywood Bury-All Home Plate” as manufactured by Schutt or comparable product/system as approved by Architect.
   2. Material: All rubber construction, non-skid surface.

C. Ground Anchored Pitching Rubber:
   1. Basis-of-Design Product: Subject to compliance with requirements, provide “Hollywood MLB Official Size Four Sided Pitching Rubber” as manufactured by Schutt or comparable product/system as approved by Architect.
   2. Material: All rubber construction, non-skid surface.

PART 3 - EXECUTION

3.01 EXAMINATION

   A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for earthwork, subgrade elevations, surface and subgrade drainage, and other conditions affecting performance of the Work.

   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

   A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor baseball field equipment securely, positioned at locations and elevations indicated.
SECTION 31 10 00
SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section, including but not limited to - the following.

1. Document 31 22 01 FIELD GRADING: Requirements for earth moving and filling operations


1.02 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities and/or abandoning site utilities in place.

1.03 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.04 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.05 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.

2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.06 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Utility Locator Service: Notify MissDIG at 1-800-482-7171 or 8-1-1 for area where Project is located before site clearing.
D. Do not commence site clearing operations until temporary erosion and sedimentation-control measures are in place.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section 31 22 01 "FIELD GRADING."
   
   1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect existing site improvements to remain from damage during construction.
   
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.02 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
   
   1. Arrange with utility companies to shut off indicated utilities.

B. Locate, identify, and disconnect utilities indicated to be abandoned in place.

C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   
   1. Revise subparagraphs below to suit Project. Change "Architect" to "Owner" or other responsible party if required.

   2. Notify Owner not less than three days in advance of proposed utility interruptions.

   3. Do not proceed with utility interruptions without Owner’s written permission.
D. Excavate for and remove underground utilities indicated to be removed.

3.03 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.

3. Use only hand methods for grubbing within protection zones.

4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

3.04 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

2. Refer to section 32.92.00 TURF GRASSES for topsoil processing requirements, if applicable.

3.05 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated on drawings and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.06 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 311000
SECTION 31 22 01
FIELD GRADING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
1. Removal of topsoil and stockpiling for later reuse and removal of excess from the Site.
2. Removal of subsoil and stockpiling for later reuse and removal of excess from the Site.
3. Grading and fill operations for the Site.
4. Finish grading with topsoil to proposed contours.

B. Related Sections:
1. SECTION 312333 – TRENCHING AND BACKFILLING: Excavation and backfilling for utilities.
2. SECTION 329210 – SYNTHETIC TURF PLAYING DRAINAGE AND BASE: Finish grading, compaction, and testing of subgrade for aggregate base course.

1.03 REFERENCES

A. ASTM International:
2. Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN·m/m³)) (ASTM D-698-00a).
4. Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb-lbf/ft³ (2,700 kN·m/m³)) (ASTM D-1557-00).
5. Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) (ASTM D-2487-00).
7. Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth) (ASTM D-3017-96(c)).

1.04 SUBMITTALS

A. Quality Control Submittals (Test Reports): Submit the following in accordance with the GENERAL REQUIREMENTS:
   1. Field density test reports.
   2. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

B. Contract Closeout Submittals (Project Record Documents): Accurately record horizontal dimensions, elevations or inverts, and slope gradients of the following:
   1. Utilities to remain in place.
   2. Rerouted utilities.
   3. New utilities.

1.05 PROJECT CONDITIONS

A. Existing Conditions: For reference only, a topographic survey of the Site has been included on the Drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Existing Topsoil: Natural, fertile agricultural soil capable of sustaining vigorous plant growth, not in frozen or muddy condition, containing not less than six percent organic matter, and corrected to pH value of 5.5 to 7.5. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, couchgrass, noxious weeds, and foreign matter.

B. Subsoil: Excavated material, graded free of lumps larger than 4 inches, rocks larger than 2 inches.

C. Structural Fill: Fill materials required to achieve design grades underneath field areas shall be composed of the following characteristics.
   1. USCS Classification: SP, SP-SM, or SP-SC
   2. Fines Content: < 12 %
   3. Maximum Particle Size: 2 inches diameter
   4. Organic Content: < 5 %
2.02 SOURCE QUALITY CONTROL

A. Perform test and analysis of fill materials per ASTM D-698 for cohesive materials and ASTM D-4254 for cohesionless soils and in accordance with DIVISION 1 – GENERAL REQUIREMENTS.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Inspect the Site and verify as to actual grades and levels, and the true conditions under which the work is to be performed.

3.02 PREPARATION

A. Locate and verify all underground utilities.

B. Contact MissDig (811 or 1-800-482-7171 at least 72 hours before digging.
   1. Notify owners of underground utilities who are not current members of Sunshine811 three (3) working days in advance.

C. Protection:
   1. Protect trees, shrubs, lawns and other features remaining as portion of final landscaping.
   2. Protect benchmarks, existing structures, fences, roads, sidewalks, paving and curbs from equipment and vehicular traffic.
   3. Maintain and protect utilities that pass through work area and are indicated to remain:
      a. Identify and flag aerial and surface utilities.
      b. Identify known underground utilities. Stake and flag locations.
      c. Where unmarked utilities are uncovered within the work area, notify the Engineer and the authorities having jurisdiction (AHJ), and take precautions to prevent interruption of service. Should such lines or services be damaged, broken, or interrupted through negligence, repair and restore immediately without additional cost to utility owner.
   4. Repair damage caused by the Work of this Section.
   5. Identify required lines, levels, contours, and datum.
   6. Notify utility company when removing and/or relocating existing utilities.
   7. If conditions are encountered that are different than those indicated on the Drawings, notify the Engineer and discontinue affected work in area until notified to resume work.
A. Topsoil Stripping:
   1. Prior to mass earthwork excavation, strip all topsoil from areas which will receive paving, walks, synthetic turf systems or other impervious surfacing. Remove topsoil, vegetation, roots, soft, organic, frozen, or unsuitable soils in the construction area.
   2. Stockpile topsoil in storage piles where directed by the Owner/Site Civil Engineer. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust.
   3. Dispose of topsoil in excess of that needed for finish grading off the Site.

B. Subgrade Compaction and Proof Rolling
   1. Prior to fill and grading operations, the contractor shall scarify and compact the subgrade in field areas to at least 98% of the materials’ standard proctor maximum dry density, in general accordance with ASTM procedures, to a depth of at least twelve inches below the surface and then proof-rolled with a loaded tandem axle dump truck or similar heavy rubber tired vehicle.
   2. Subgrade compaction should be compacted and/or stabilized before proof rolling operations.
   3. Proof-rolling operations shall be performed under a period of dry-weather and be witnessed by a representative of the geotechnical engineer of record.
      a. Soils that are observed to rut or deflect excessively (>1”) under the moving load should be undercut and replaced with properly compacted low plasticity fill material.

C. Rough Grading:
   1. Set all required grading stakes. Check and verify correctness.
   2. Perform all exterior cut, fill, backfill and grading as required to conform to existing contours and elevations on the Drawings. Hold rough grades below finish grades as follows:
      a. Areas to receive Natural and Synthetic Turf Playing Systems:
         To bottom of proposed base layer.
   3. Dispose excavated material in excess of that needed for fill off the Site or as directed by the Owner/Site Civil Engineer. Provide additional fill equivalent to that obtained on the Site and which meets specified material. Install in layers not exceeding 6 inches or of a thickness determined by the testing service as required to achieve proper compaction and moisten only to obtain the specified degree of compaction.
D. Pavement Subbase Course:
1. General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade to support a pavement base course.
2. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.
3. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneously with compacting and rolling of each layer of subbase course.
4. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
5. When a compacted subbase course is indicated to be 6 inches thick or less, place material in a single layer. When shown to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

E. Fill Operations and Compaction:
1. Structural fill materials to be placed in maximum loose lifts of 4 to 6 inches when hand-guided compacted equipment, and maximum loose lifts and compacted to the requirements listed below.
2. Compact soil to not less than the following percentages of maximum density for soils that exhibit a well-defined moisture density relationship (cohesive soils) determined per ASTM D-698; and not less than the following percentages of relative density, determined per ASTM D-4254 for soils that will not exhibit a well-defined moisture-density relationship (cohesionless soils):
   a. Dugout Structures and Synthetic Turf Playing Field Systems: Compact top 6 inches and layer of backfill or fill materials to at least 98 percent of the materials’ standard Proctor maximum dry density.
   b. Outfield and Warning Track Areas: Compact top 6 inches and layer of backfill or fill materials to at least 90 percent of the materials’ standard Proctor maximum dry density.

F. Shaping:
1. After grading is completed, drag and float surface to remove ridges, depressions, and other irregularities.
2. Rake out and remove all roots, debris and stones larger than 1 1/2 inches.
G. Site Tolerances:
1. Perform earthwork operations to establish required elevations and dimensions within the following tolerances at points taken on a grid of the specified dimensions. Results that rely on average values will be grounds for rejection of the installation.
   a. Exception: No tolerance will be permitted that would allow:
      1) A lesser size than indicated for footings and foundations.
      2) A lesser thickness than indicated for:
         a. Paving
         b. Paving base course.
         c. Concrete floor slabs-on-grade.

2. Under Synthetic Turf Playing Field System Areas: Plus 0 inch or minus 1/2 inch at points taken on a 25-foot grid.

H. Dewatering:
1. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding the Site and the surrounding areas.
2. Do not allow water to accumulate in excavations. Remove water to prevent soil changes detrimental to stability of subgrades. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
3. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

3.04 FIELD QUALITY CONTROL

A. The Contractor shall employ and pay for soil testing and inspection service for quality control testing during earthwork operations in accordance with DIVISION 1 – GENERAL REQUIREMENTS. Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.
1. Testing frequency of Standard Proctor, Minimum % Dry Density, and Placement Moisture Content Range shall be performed in the following intervals.
   a. Structural Fill (Granular): 1 per 5,000 sqft of fill placed/lift
   b. Utility Trench Backfilling: 1 per 150 linear foot/lift

B. If tests indicate work does not meet specified requirements, remove work, replace and re-test at no additional cost to the Owner.
3.05 ADJUSTING

A. Repair and re-establish grades in settled, eroded, or rutted areas:
   1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, remove and replace or scarify soil materials, reshape, and re-compact to specified density prior to further construction.
   2. Where settling is measurable or observable at excavated areas during general warranty period for the Project, remove surface (lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.06 PROTECTION

A. Protect graded areas from traffic and erosion.

END OF SECTION 312201
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section, including but not limited to - the following.

1. Document 31 22 01 – FIELD GRADING
2. Document 33 40 00 – STORM UTILITY DRAINAGE PIPING
3. Trench excavation width and safety.
4. Backfill materials and placement for underground utilities.
5. Utility identification using marking tape and trace wire.

1.02 SUMMARY

A. Section Includes:

1. Trench excavation width and safety.
2. Backfill materials and placement for underground utilities.
3. Utility identification using marking tape and trace wire.

1.03 REFERENCES

A. American Public Works Association (APWA):


B. ASTM International (ASTM):

5. D421: Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants.


7. D698: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3)).

8. D1556: Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

9. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft3 (600 kN-m/m3)).

10. D2167: Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.


C. Occupational Safety and Health Administration (OSHA) Standards and Regulations:

1.04 CLASSIFICATION OF EXCAVATION

A. As specified in Section 31 20 01 – FIELD GRADING

1.05 DEFINITIONS

A. Percent Compaction or Compaction Density: The field dry density of compacted material, expressed as a percentage of the maximum dry density.

B. Field Dry Density or Field Density: In-place density as determined by ASTM D1556 (Sand Cone Method), ASTM D2167 (Rubber Balloon Method), or ASTM D6938 (Nuclear Method).

C. Maximum Dry Density: Laboratory density as determined by ASTM D698 (Standard Proctor) and occurring at the optimum moisture content of the soil being tested.

D. Pipe Embedment: Comprised of the following or combination thereof:

1. Foundation: Required only when the native trench bottom does not provide a firm working platform or the necessary uniform and stable support for the installed pipe.

2. Bedding: Placed directly underneath the pipe and brings the trench bottom to grade. Provides a firm, stable, and uniform support of the pipe.

3. Haunching: From bottom of pipe to springline.

4. Initial Backfill: From top of bedding or foundation to six inches above top of pipe, unless noted otherwise.

5. Final Backfill: Above the initial backfill to the original or finish grade.


1.06 SUBMITTALS

A. Submit in accordance with Section 01 33 00, Submittals.

B. Materials Sources: Name of source, location, date of sample, sieve analysis, and laboratory compaction characteristics.
1.07 QUALITY ASSURANCE

A. Comply with the requirements specified in Section 01 43 00, Quality Requirements, an

B. Responsibilities by CONTRACTOR:

1. The CONTRACTOR shall compact backfill material in accordance with the specifications.

C. Responsibilities of Owner:

1. The Owner shall provide quality control acceptance field testing services of compacted backfill material, unless noted otherwise.

2. The Owner’s representative will take tests along backfilled area if compaction tests indicate a failure to meet the specified compaction requirements.

1.08 DELIVERY STORAGE AND HANDLING

A. Comply with the requirements specified in Section 01 66 13, Product Storage, Maintenance, and Protection.

B. Provide geotextile fabric meeting the following requirements, 3.5oz/y nonwoven, needlepunched PP fabric; 90lbs tensile strength, 185psi Mullen burst, 60lb puncture, 40lb trapezoidal tear.

C. Protect geotextile fabric from sunlight during transportation and storage. Do not leave geotextile fabric exposed to sunlight for more than five days during installation operations.

1.09 SITE CONDITIONS

A. A Geotechnical Data Report was prepared for this Project and is provided with the Contract Documents.

PART 2 - PRODUCTS

2.01 BACKFILL MATERIALS

A. Sanitary Sewer Pipe Bedding Classification as noted below, unless otherwise indicated on the Contract Drawings:

1. Rigid pipe and non-rigid pipe as defined in Section 33 30 00, Sanitary Sewerage Utilities.
2. Rigid Pipe – ASTM C12, Class B.


B. Materials as specified in Section 31 20 00 - GRADING, and indicated on Contract Drawings.

2.02 EQUIPMENT

A. Compaction equipment shall be capable of consistently achieving the specified compaction requirements without damaging pipes.

2.03 UTILITY IDENTIFICATION

A. Trace Wire: Continuous, single-strand copper wire, insulated, maximum 10 AWG. Clear plastic covering, imprinted with inscription describing specific utility in large letters.

B. Marking Tape: Use type specifically manufactured for marking and locating underground utilities. Acid- and alkali-resistant polyethylene film, six inches wide with minimum thickness of 0.004 inch, minimum strength of 1,750 psi lengthwise and 1,500 psi crosswise. Provide tape manufactured with foil core at least 0.35-mil thick to enable detection by metal detection when tape is buried up to three feet deep. Tape shall bear continuous printed inscription describing specific utility. Tape shall be installed 12 inches below finished grade. Tape color shall be as follows:

1. Electric conduits, duct banks, and cable: Red.

2. Potable water systems: Blue.


5. Telephone, Fiber Optic, CCTW, fire communications: Orange.


PART 3 - EXECUTION

3.01 EXAMINATION

A. As specified in Section 31 20 01 - FIELD GRADING.
3.02 PREPARATION
   A. As specified in Section 31 20 01 – FIELD GRADING

3.03 PROTECTION OF IN-PLACE CONDITIONS
   A. As specified in Section 31 20 01 – FIELD GRADING.

3.04 RESTORATION
   A. As specified in Section 31 20 01 – FIELD GRADING.

3.05 TRENCH EXCAVATION
   A. Preserve material below and beyond the lines of excavations.
   B. Locate stockpiled excavated material at least three feet from edge of excavations and prevent cave-ins or bank slides.
   C. Remove rock to the greater of six inches seal if required, and backfill with bedding material.
   D. Refer to Section 31 20 00 - GRADING, for additional requirements.

3.06 UNAUTHORIZED EXCAVATION
   A. CONTRACTOR is responsible for backfilling unauthorized excavations.
   B. Unauthorized excavations which extend to and expose rock will be sealed with at least six inches of CLSM, concrete, or sprayed with bitumen within eight hours of exposure. If sealing is delayed more than eight hours, over excavate at least six inches below the excavation bottom to expose fresh rock and seal within eight hours.
   C. Remaining extent of unauthorized excavation will be filled with bedding material.

3.07 BACKFILL
   A. Contractor responsible for obtaining all inspections and approvals.
   B. All trenches and excavations shall be backfilled as soon as practicable after the pipe has been installed unless other protection of the pipe is directed or shown on the plans.
C. The backfill around the pipe up to the top of the pipe shall be placed in loose layers not exceeding six inches per layer and thoroughly compacted by hand or power tampers approved by the OWNER. Great care shall be used to obtain thorough compaction under the haunches and along the sides of the pipe. Over the top of the pipe, backfill layers of approximately eight inch depth shall be added with each layer compacted separately and thoroughly until the trench is completely and uniformly filled to a depth of two feet above the top of the pipe. Backfilling operations shall be done in such a manner as to avoid movement or damage to the pipe.

D. Backfill material shall be brought up evenly by depositing the material in layers approximately nine inches in loose depth and without injuring the pipe by shock, jar or excessive free fall. Each layer shall be thoroughly compacted by power tampers operated with care so as not to injure the underlying pipe or appurtenances. Hand tampers may be used in corners or narrow places inaccessible to power tampers. If compaction is done using hydraulically-operated backhoe-mounted compactors with minimum rated impulse force of 6,400 pounds with a minimum of 2,000 cycles per minute, the backfill material may be deposited in layers not more than two feet in loose depth. Layers in excess of two feet may be deposited only if tests, conducted at the CONTRACTOR's expense, show, to the satisfaction of the OWNER, that the specified degree of compaction is being achieved. There shall be at least three feet of compacted backfill over the pipe before this method of compaction may be employed.

E. Backfilling shall be kept completed up to a point within 100 feet of the end of the newly laid pipe unless otherwise directed by the OWNER. During backfilling operations, no sheeting or bracing shall be removed without permission of the OWNER.

F. Fill to lines and grades necessary to provide finish grades.

G. Use a placement method that does not disturb or damage other work or existing features.

H. Maintain fill materials within two percent of optimum moisture, to attain required compaction density.

I. Place and compact material in equal continuous layers.

J. Maximum compacted depth is six inches for aggregate materials and eight inches for soil materials, unless noted otherwise.
3.08  COMPACTATION

A. As specified in Section 31 20 01 – FIELD GRADING.

3.09  UTILITY IDENTIFICATION

A. Install marking tape over all site utilities, 12 inches below finish grade or as indicated on Contract Drawings.

B. Install trace wire at top center of marking tape; pull wire taut to remove slack.

C. Extend trace wire to utility boxes, manholes and junctions to allow for connection to subsurface location equipment.

3.10  FIELD QUALITY CONTROL AND QUALITY ASSURANCE

A. General

1. The OWNER shall perform field quality control tests separate from acceptance testing. CONTRACTOR test results will not be used by the OWNER for acceptance.

2. The Owner will perform field density testing for quality assurance testing in accordance with ASTM D1556, ASTM D2167, or ASTM D6938. Acceptance of compaction will be in accordance with City’s test only.

3. Compaction shall be deemed to comply with the specifications when no more than one test of any three consecutive tests performed by the City falls below the specified relative compaction. The one test shall be no more than three percentage points below the specified compaction. The CONTRACTOR shall pay the costs for any retesting or additional testing of work not conforming to these Specifications.

4. Where compaction tests indicate a failure to meet the specified compaction, the City will take additional tests in each direction until the extent of the failing area is identified. Rework the entire failed area until the specified compaction has been achieved.

B. Compaction:

1. Material shall be placed and compacted in layers until the density is not less than the percentage of maximum dry density indicated in Table 31 23 33-1 determined by ASTM D698 or other approved method.
Table 31 23 33-1

<table>
<thead>
<tr>
<th>Max Lab Dry Wt. (lbs/ft³)</th>
<th>Min Compaction Requirements (% Lab. Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 104.9</td>
<td>100</td>
</tr>
<tr>
<td>105 to 119.9</td>
<td>98</td>
</tr>
<tr>
<td>120 and more</td>
<td>95</td>
</tr>
</tbody>
</table>

2. The Engineer will evaluate field density test results in relation to maximum dry density as determined by testing material in accordance with ASTM D698 (Standard Proctor).

3. Location of field density tests shall be determined by the OWNER.

4. Minimum frequency of City field density tests as specified in Table 31 23 33-2.

<table>
<thead>
<tr>
<th>Area</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench (Structural Areas)</td>
<td>1 per lift for every 1,000 linear feet (300 m) of trench</td>
</tr>
<tr>
<td>Trench (Non-Structural Areas)</td>
<td>1 per alternate lift for every 1,000 linear feet (300 m) of trench</td>
</tr>
</tbody>
</table>

5. Regardless of the minimum testing frequency specified, field density tests shall be performed by the CONTRACTOR in sufficient number for the CONTRACTOR's quality control purposes to ensure that specified density is obtained.

3.11 ADJUSTING

A. Shrinkage:

1. Backfill to a height above finished grade which will allow for the shrinkage or consolidation of material. Initially, provide at all points, an excess of at least one percent of total height of backfill measured from stripped surface to top of finished surface.

2. Supply specified materials and build up low places, without additional cost if embankment or backfilling settles to be below the indicated level for proposed finished surface at any time before final acceptance of the work.
3.12 PROTECTION

A. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.

END OF SECTION 312333
SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Seeding.
2. Lawn renovation.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity,
germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass seed, identifying source, including name and telephone number of supplier.

C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.

D. Qualification Data: For landscape Installer.

E. Material Test Reports: For existing surface soil and imported topsoil.

F. Planting Schedule: Indicating anticipated planting dates for each type of planting.

G. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn and meadow establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil
amendments to be added to produce a satisfactory topsoil.

D. Preinstallation Conference: Conduct conference at Project site upon request by the CM.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.7 SCHEDULING

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Contract Completion.

2. Fall Planting: August 15 until October 15.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 LAWN MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods (confirm schedule and coordinate with CM):

1. Seeded Lawns: 60 days from date of Contract Completion.

   a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering
equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water lawn at a minimum rate of 1 inch per week.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow grass 3 to 4 inches high.

E. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq.ft. to lawn area.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. General Seed Mix: State-certified seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed, proportioned by weight, as follows:
   a. 70 percent turf-type tall fescue.
   b. 20 percent perennial ryegrass (Lolium perenne).
   c. 10 percent Kentucky bluegrass (Poa pratensis).
2.2 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

   a. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.3 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

   1. Class: Class T, with a minimum 99 percent passing through No. 8 sieve and a minimum 75 percent passing through No. 60 sieve.
   2. Provide lime in form of dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 sieve and a maximum 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

G. Sand: Clean, washed, natural or manufactured, free of toxic materials.
H. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

A. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 FERTILIZER

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.
2.6 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.7 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with soil amendments and fertilizers as recommended in the soils report.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
   1. Protect adjacent and adjoining areas from hydroseeding overspray.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Apply superphosphate fertilizer directly to subgrade before loosening.
   2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
      a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
      b. Mix lime with dry soil before mixing fertilizer.
   3. Spread planting soil mix to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
      a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil mix.
      b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
   a. Apply superphosphate fertilizer directly to surface soil before loosening.
3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
   1. Do not use wet seed or seed that is moldy or otherwise damaged.

B. Sow lawn seed at the rate of 6 to 8 lb/1000 sq. ft..

C. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.
E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into topsoil with suitable mechanical equipment.
2. Bond straw mulch by spraying with asphalt emulsion at the rate of 10 to 13 gal./1000 sq. ft.. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

F. Protect seeded areas from hot, dry weather or drying winds by applying straw mulch within 24 hours after completing seeding operations. Soak and scatter uniformly to a depth of 3/16 inch and roll to a smooth surface.

3.5 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate.
3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry application at a minimum rate of 500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb/acre.

3.6 TURF RENOVATION

A. Renovate existing lawn.

B. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish lawn where settlement or washouts occur or where minor
regrading is required.

C. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.

D. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

E. Mow, dethatch, core aerate, and rake existing lawn.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch as required for new lawns.

K. Water newly planted areas and keep moist until new lawn is established.

3.7 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify CM before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.8 SATISFACTORY LAWNS
A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches.

B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.9 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established. Confirm schedule and coordinate with CM.

C. Remove erosion-control measures after grass establishment period.

END OF SECTION 329200
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Pre-approved synthetic turf manufacturers/suppliers and selected turf systems for alternate(s).
   2. Synthetic turf playing field system requirements and sports field accessories.
   3. Synthetic turf fabric and infill Manufacturer/Contractor’s required qualifications for performing the work.

B. Related Sections
   1. See Section 32 92 11 SYNTHETIC TURF PLAYING SURFACE – Alternate #1 – AstroTurf – Diamond OPS/ RBI
   2. See Section 32 92 12 SYNTHETIC TURF PLAYING SURFACE – Alternate #2 – Fieldturf – Double Play Fast Clay/Fast Grass
   3. See Section 32 92 13 SYNTHETIC TURF PLAYING SURFACE – Alternate #3 – Shaw Sports Turf – B1K Six4Three / TagUp 2.0

1.03 REFERENCES

A. FM Factory Mutual
   1. P7825 - Approval Guide; Factory Mutual Research Corporation; current edition

   1. D1577 - Standard Test Method for Linear Density of Textile Fiber
   2. D1907 – Yarn Denier Skein Method
   3. D2256 – Yarn Tensile & Elongation
   4. D3218 – Yarn Thickness, Microns
5. D5823 – Pile Height
6. D5848 - Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering
7. D5793 – Stitch Gauge
9. D5034 - Standard Test Method of Breaking Strength and Elongation of Textile Fabrics (Grab Test)
11. DIN 18-035 – Water Permeability
13. D7138 – Melting Point
16. F1951 – ADA Compliance
17. F2117-01 – Ball Rebound
18. D792 – Specific Gravity
19. EN 14808 – Force Reduction
20. EN 14809 – Vertical Deformation
21. EN 15301-1 – Rotational Resistance

1.04 SUBMITTALS

A. General: Make Submittals in accordance with the General Requirements.

B. Shop Drawings:
   1. Indicate field layout; field marking plan and details for the specified sports; i.e., baseball, softball, etc.; roll/seaming layout; methods of attachment, field openings and perimeter conditions.
   2. Show installation methods and construction indicating field verified conditions, clearances, measurements, terminations, drainage and goals/goal posts.
   3. Provide joint submission with related trades when requested by Architect/Engineer.

C. Product Data:
   1. Submit manufacturer's catalog cuts, material safety data sheets (MSDS), brochures, specifications; preparation and installation instructions and recommendations; storage, handling requirements and
recommendations.

2. Submit fiber manufacturer's name, type of fiber and composition of fiber.

3. Submit data in sufficient detail to indicate compliance with the contract documents.

4. Submit manufacturer's instructions for installation.

5. Submit manufacturer's instructions for maintenance for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.

D. Samples for Verification: For the following products, in manufacturer's standard sizes.

1. A 12-inch x 12-inch, minimum sample of the exact synthetic turf and infill system that is specified for this project.

2. Sand / Rubber infill mix with proper mix ratio.

E. Product Certification:

1. Submit manufacturer’s certification that products and materials comply with requirements of the specifications.

2. Submit test results indicating compliance with Reference Standards.

F. Project Record Documents: Record actual locations of seams, drains and other pertinent information in accordance with Division 1 Specifications Series, General Requirements.

G. List of existing installations: Submit list including respective Owner’s representative and telephone number.

H. Warranties: Submit warranty and ensure that forms have been completed in Owner's name and registered with approved manufacturer.

I. Testing Certification: Submit certified copies of independent (third-party) laboratory reports on ASTM testing:

1. D1577 - Linear Density of Textile Fiber
2. D1907 – Yarn Denier Skein Method
3. D2256 – Yarn Tensile & Elongation
4. D3218 – Yarn Thickness, Microns
5. D5823 – Pile Height
6. D5848 - Mass Per Unit Area of Pile Yarn Floor Covering
7. D5793 – Stitch Gauge
8. D1335 - Tuft Bind of Pile Yarn Floor Covering
9. D5034 - Breaking Strength and Elongation of Textile Fabrics (Grab Test)
10. F1015 - Relative Abrasiveness of Synthetic Turf Playing Surfaces
11. DIN 18-035 – Water Permeability
12. D2859 - Ignition Characteristics of Finished Textile Floor Covering Materials
13. D7138 – Melting Point
16. F1951 – ADA Compliance
17. F2117-01 – Ball Rebound
18. D792 – Specific Gravity
19. EN 14808 – Force Reduction
20. EN 14809 – Vertical Deformation
21. EN 15301-1 – Rotational Resistance

1.05 QUALITY ASSURANCE

A. Comply with the General Requirements.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section. The turf manufacturer/supplier:
   1. Shall be experienced in the manufacture and installation of specified type of synthetic infill monofilament and/or slit-film grass system for a minimum of three years with the same manufacturer, product and company they are proposing for this field. This includes use of a monofilament fiber and/or a slit-film fiber in addition to the backing, the backing coating, and the installation method.
   2. Shall have manufactured a minimum of two million (2,000,000) square feet of tufted turf for sports field use in the past five (5) years
   3. Shall have installations in place that are a minimum of six (6) years old, of the specific type (or substantially equal type) of turf to be used on this project. This includes the tufting, backing, backing coating, and installation method.

C. Installer: Company shall specialize in performing the work of this section. The Contractor shall provide competent workmen skilled in this specific type of synthetic grass installation.
   1. The designated Supervisory Personnel on the project shall be certified, in writing by the turf manufacturer, as competent in the installation of specified monofilament and/or slit-film material, including sewing seams and proper installation of the infill mixture.
   2. Installer shall be certified by the manufacturer and licensed.
   3. The installer supervisor shall have a minimum of 5 years experience as
either a construction manager or a supervisor of synthetic turf installations.

4. The contracting company shall have installed a minimum of twenty-five (25) full sized synthetic turf fields with similar characteristics, within the past four (4) years.

D. Pre-Installation Conference: Conduct conference at project site at time to be determined by Owner/Engineer. Review methods and procedures related to installation including, but not limited to, the following:
   1. Inspect and discuss existing conditions and preparatory work performed under other contracts.
   2. In addition to the Contractor and the installer, arrange for the attendance of installers affected by the Work, The University’s representative, and the Architect/Engineer.

E. The Contractor shall verify special conditions required for the installation of the system.

F. The Contractor shall notify the Architect/Engineer of any discrepancies.

G.

1.06 DELIVERY, STORAGE AND HANDLING

A. Prevent contact with materials that may cause dysfunction.

B. Deliver and store components with labels intact and legible.

C. Store materials/components in a safe place, under cover, and elevated above grade.

D. Protect from damage during delivery, storage, handling and installation. Protect from damage by other trades.

E. Inspect all delivered materials and products to ensure they are undamaged and in good condition.

F. Comply with manufacturer’s recommendations.

1.07 SEQUENCING AND SCHEDULING

A. Coordinate the Work with installation of work of related trades as the Work proceeds.
B. Sequence the Work in order to prevent deterioration of installed system.

1.08 WARRANTY

A. Warranty: The Synthetic Turf Contractor shall submit it Manufacturer’s Warranty, which guarantees the usability and playability of the synthetic turf system for its intended uses for an eight (8) year period commencing with the date of Substantial Completion.

B. The warranty submitted must have the following characteristics:
   1. Must provide full-synthetic field coverage for eight (8) years from date of Substantial Completion.
   2. Must warrant materials and workmanship.
   3. Must warrant that the materials installed meet or exceed the product specifications within manufacturing tolerances.
   4. Must have a provision to either repair or replace such portion of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.
   5. Must be a Manufacturer’s warranty from a single source covering workmanship and all self-manufactured or procured materials.
   6. Warranties for the synthetic turf field systems shall address the following:
      1) Acceptable uses for the field
      2) Fading
      3) Color match within specifications
      4) Excessive fiber wear
         a) Synthetic turf installer to provide attic stock and provisions for replacement of lacrosse goal areas.
      5) Wrinkling and panel movement
      6) Shock absorbency (G-max)
      7) Seam Integrity
      8) Drainage - Turf
      9) Flammability
     10) Response time for required repairs/replacement

1.09 MAINTENANCE SERVICE

A. Contractor shall train the Owner's facility maintenance staff in the use of the turf manufacturer's recommended maintenance equipment.

B. Manufacturer must provide maintenance guidelines and a maintenance video to the facility maintenance staff.
PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS/SUPPLIERS – BASE BID & ALTERNATES

A. Approved Providers – Baseball Field Complex
   1. Astroturf; astroturf.com
   2. FieldTurf; fieldturf.com
   3. Shaw Sports Turf; shawsportsturf.com

B. Synthetic Turf System Alternates
   1. See Section 32 92 11 SYNTHETIC TURF PLAYING SURFACE – Alternate #1 – AstroTurf – Diamond OPS/ RBI
   2. See Section 32 92 12 SYNTHETIC TURF PLAYING SURFACE – Alternate #2 – Fieldturf – Double Play Fast Clay/Fast Grass
   3. See Section 32 92 13 SYNTHETIC TURF PLAYING SURFACE – Alternate #3 – Shaw Sports Turf – B1K Six4Three / TagUp 2.0

2.02 MATERIALS & EQUIPMENT

A. The synthetic turf playing field system is to include a turf sweeper and grooming brush, which consists of a 46” wide field sweeper and 72” wide grooming brush designed to groom the exposed grass fibers to keep them from matting down excessively. This equipment shall be approved by the turf manufacturer and the County to be used as directed by the Manufacturer. No additional payment will be made for providing the equipment, but the costs for providing the equipment shall be included in the price bid for the synthetic turf. The equipment shall include the manufacturer’s standard warranty and County training.

PART 3 - EXECUTION

3.01 EXECUTION

A. See Section 32 92 11 to 13 – SYNTHETIC TURF PLAYING SURFACE … for the approved and alternate turf fabric and infill system(s) installation requirements/procedures.

END OF SECTION 329205
SECTION 32 92 10
SYNTHETIC TURF - SUBSURFACE DRAINAGE & AGGREGATE BASE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
A. This Section includes the following:
   1. Furnishing all labor, materials, tools and equipment necessary to install, in place, all subsurface drainage and aggregate base materials as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the Selected Turf Manufacturer’s written installation instructions, and in accordance with all approved shop drawings. Any variance from these requirements must be accepted in writing, by the Selected Turf Manufacturer’s on-site representative, and submitted to the University, verifying that the changes do not in any way affect the warranty.

B. Related Sections
   1. SECTION 312201 – FIELD GRADING: Subgrade preparation and compaction.
   2. Section 329205 – Synthetic Turf Project Requirements And Conditions: Project Requirements and Conditions
   4. SECTION 334000 – STORM DRAINAGE UTILITIES: Collector piping materials and installation requirements.

1.03 REFERENCES
A. ASTM International:
   2. Standard Classification for Sizes of Aggregate for Road and Bridge Construction (ASTM D-448-03a).
   3. Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)) (ASTM D-698-00a).
   4. Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method (ASTM D-1556-00).
   5. Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb-lbf/ft³ (2,700 kN-m/m³))

1.04 SUBMITTALS
A. Quality Control Submittals (Test Reports): Submit the following in accordance with the GENERAL REQUIREMENTS:
1. Perforated panel drains.
2. Sieve analyses on crushed stone
3. Geotextile filter fabric

PART 2 - PRODUCTS

2.01 MATERIALS
A. Perforated (Flat) Panel Drains:
1. Pipe shall be a 12” standard perforated “panel-type” design, installed in a 45° herringbone orientation, with a geotextile wrap. Panel shall have a minimum compressive strength of 3000lbs/ft² tested normal to the plane and 1500lb/ft² tested at 50° from normal at 20% deflection (ASTM D2412).
B. Aggregate Base: Type 2 Base Stone: Crushed #57 limestone meeting the following gradation specifications:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 1/2”</td>
<td>100</td>
</tr>
<tr>
<td>1”</td>
<td>95 to 100</td>
</tr>
<tr>
<td>1/2”</td>
<td>25 to 60</td>
</tr>
<tr>
<td>#4</td>
<td>0 to 10</td>
</tr>
<tr>
<td>#8</td>
<td>0 to 5</td>
</tr>
</tbody>
</table>

C. Finishing/Leveling Stone: Crushed “#8” limestone screenings:
1. The upper 2” thickness of gravel below the carpet shall meet the following gradations or as required and approved by the turf contractor.

D.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2”</td>
<td>100</td>
</tr>
</tbody>
</table>

Project #: 097-345346
Harwell Field – Baseball Infield Turf

32 92 10 - 2 SYNTETIC TURF - SUBSURFACE
DRAINAGE & BASE
<table>
<thead>
<tr>
<th>Gradation</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8”</td>
<td>85 to 100</td>
</tr>
<tr>
<td>#4</td>
<td>10 to 30</td>
</tr>
<tr>
<td>#8</td>
<td>0 to 10</td>
</tr>
<tr>
<td>#16</td>
<td>0 to 5</td>
</tr>
</tbody>
</table>

E. These gradation specifications are provided for guidance only. It is the sole responsibility of the turf contractor to select and install a finishing gravel that will provide sufficient surface stability and vertical drainage capacity to meet the performance criteria and warranty requirements of these specifications.

F. Perimeter Edge: A perimeter concrete curb with a composite wood-polymer nailer board, 2x4 nominal dimension.

G. Geotextile fabric: Mirafi 500x, or equal, with the following characteristics:

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>200 lbs.</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>15 %</td>
</tr>
<tr>
<td>Mullen Burst</td>
<td>400 psi</td>
</tr>
<tr>
<td>Puncture Strength</td>
<td>90 lbs.</td>
</tr>
<tr>
<td>Trapezoidal Tear</td>
<td>75 lbs.</td>
</tr>
<tr>
<td>Apparent Opening</td>
<td>50 US Sieve</td>
</tr>
<tr>
<td>Permittivity</td>
<td>0.05 Sec⁻¹</td>
</tr>
<tr>
<td>UV Resistance Retained</td>
<td>70%</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>5 g/m/sf</td>
</tr>
</tbody>
</table>

H. Collector Pipes: Perforated, corrugated High Density Polyethylene (HDPE) Pipe and Fittings at the diameter shown on the Drawings, meeting the material requirements specified in Section 334000 – Storm Drainage Utilities.

PART 3 - EXECUTION

3.01 GENERAL

A. Sub-Grade Preparation:
   1. The soil bed or subgrade is to be sloped to match the proposed finished surface grades as indicated in the Drawings.
   2. The soil bed or sub-grade must be compacted in both directions to attain the compaction rate specified in Section 312201 – FIELD GRADING.
   3. The soil bed or subgrade must be prepared to tolerances of not more than 1/4” from design grade to allow for even drainage.
   4. Cover the prepared subgrade with the Geotextile fabric, overlapping the seams a minimum of 12” in the direction the runoff flows.
B. Installation of Collector Pipes:
1. Excavate drainage collector trenches minimum 20" wide to the invert depth and longitudinal slope shown on the Drawings. Collection trenches should be void of all debris.
2. Place geotextile fabric in the trenches first, overlapping the seams a minimum of 12" in the direction the runoff flows. The fabric in the trenches is to be separate from the fabric on the field. Overlap field and trench liners at least 18" in the direction of runoff flow.
3. Place a minimum of 2" clean, Aggregate Base material in the bottom of the collector trenches, on top of the geotextile and compacted to a minimum 98% of the maximum dry density.
4. Place the collector pipes in the trenches. The centerline of the pipe shall coincide with the centerline of the trench. Pre-manufactured fittings shall be used for all connections into the collector drainage network.
5. Backfill trench with Aggregate Base material specified above and compact to a minimum 98% of the maximum density, placing a minimum of 4" clean, crushed aggregate on the sides of the underdrain pipes and collectors, and 6" minimum of the aggregate on top of the pipe network.

C. Installation of the perforated (flat) panel drains:
1. Install perforated (flat) panel underdrain system in a 45° herringbone pattern at 25' on center as shown on the Drawings.
2. Tape the underdrain pipes every 15 feet to the fabric with waterproof tape.
3. Use due care when applying aggregate not to crush or otherwise damage the panel drains.

D. Installation of Type 2 Aggregate Base Stone Course:
1. Place base stone without damaging or disturbing the prepared subgrade soil bed, geotextile fabric liner or flat panel drains. Do not create any depressions in the subgrade. Stone shall be damp when transported to site and shall be kept damp during installation, to minimize segregation of the materials.
2. Compact base course to a minimum depth of 4" in all areas of the field. Slope top of stone layer to match the proposed finished surface grades as indicated in the Drawings. Where the compacted depth of the base course exceeds 6", install in two layers of approximate equal thickness. Each layer must be compacted in both directions to a minimum 98% of the maximum density.
3. The grade of the base course shall not vary from the specified grade by more than 1/4" from design grade.

E. Finishing Stone
1. The final grade aggregate layer should not be more than 2" deep.
2. The final grade material must be sloped 0.5% from the center longitudinal axis towards the field perimeter unless otherwise specified.
3. The final grade must be compacted in both directions to attain the specified compaction rate of 98% standard Proctor.
4. The final grade of the finishing stone shall not vary from the specified grade by more than 1/4" from design grade, nor by more than ¼" in 10ft. Laser guided grading is highly recommended.

F. Synthetic Turf and Infill Material: Install in conformance with Section 32 92 [11,12,or13] – SYNTHETIC TURF – PLAYING SURFACE

END OF SECTION 329210
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Furnishing all labor, materials, tools and equipment necessary to install, in place, all synthetic turf and infill materials as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the manufacturer’s written installation instructions, and in accordance with all approved shop drawings.

B. Related Sections
   1. Section 312201 – Field Grading
   2. Section 321800 – Infield Surfacing
   3. Section 329205 – Synthetic Turf – Project Requirements And Conditions
   4. Section 329210 – Synthetic Turf – Drainage And Base

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Synthetic turf system materials shall consist of the following:
   1. Carpet made of a combination of monofilament polyethylene fiber, slit-film polyethylene fibers and manufacturer’s standard thatch layer per manufacturer’s baseball specific installation specifications into a free draining backing with minimum pile heights as noted within the Drawings and specifications herein.
   2. Infill component of the synthetic turf system shall consist of the following:
a. Controlled mixture of graded sand and crumb rubber installed per manufacturer’s baseball specific installation specifications.

3. Glue, thread, paint, seaming fabric and other materials used to install and mark the playing surface.

B. The installed artificial playing surface shall have the following physical characteristics (+/-5%) as tested according to ASTM F1551 Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value (Infield/ Warning Track) Diamond Series OPS</th>
<th>Value (Grass Areas) Diamond Series RBI</th>
<th>Units</th>
<th>ASTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pile Yarn Type</td>
<td>UV-resistant polyethylene</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yarn Structure</td>
<td>Monofilament, Slit Film and Thatch Blend</td>
<td>Monofilament/ Slit Film Blend</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Yarn Denier</td>
<td>15,800</td>
<td>15,800</td>
<td>Denier</td>
<td>D1577</td>
</tr>
<tr>
<td>Yarn Breaking Strength</td>
<td>&gt;20 nominal</td>
<td>lbs</td>
<td>D2256</td>
<td></td>
</tr>
<tr>
<td>Yarn Maximum Elongation</td>
<td>&gt;50 nominal</td>
<td>%</td>
<td>D2256</td>
<td></td>
</tr>
<tr>
<td>Pile Height</td>
<td>1.50”</td>
<td>2.00”</td>
<td>inches</td>
<td>D5823</td>
</tr>
<tr>
<td>Pile Weight</td>
<td>52</td>
<td>60</td>
<td>Oz/yd2</td>
<td>D5848</td>
</tr>
<tr>
<td>Primary Backing Weight</td>
<td>8</td>
<td>8</td>
<td>Oz/yd2</td>
<td>D5848</td>
</tr>
<tr>
<td>Secondary Backing Weight</td>
<td>20</td>
<td>20</td>
<td>Oz/yd2</td>
<td>D5848</td>
</tr>
<tr>
<td>Total Weight</td>
<td>80</td>
<td>88</td>
<td>Oz/yd2</td>
<td>D5848</td>
</tr>
<tr>
<td>Stitch Gauge</td>
<td>3/8”</td>
<td>3/8”</td>
<td></td>
<td>D5793</td>
</tr>
<tr>
<td>Tuft Bind</td>
<td>≥12</td>
<td>lbs/force</td>
<td>D1335</td>
<td></td>
</tr>
<tr>
<td>Grab Tear Length</td>
<td>≥200</td>
<td>lbs/force</td>
<td>D5034</td>
<td></td>
</tr>
<tr>
<td>Grab Tear Width</td>
<td>≥200</td>
<td>lbs/force</td>
<td>D5034</td>
<td></td>
</tr>
<tr>
<td>Pill Burn Test</td>
<td>Pass</td>
<td>D2859</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>------</td>
<td>-------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yarn Melting Point</td>
<td>&gt;245</td>
<td>Degrees F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact Attenuation (Gmax)</td>
<td>&lt;175</td>
<td>GMax</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Permeability (w/ infill)</td>
<td>≥15</td>
<td>inch/hr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(w/o infill)</td>
<td>≥30</td>
<td>inch/hr</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DIN 18-035

C. Carpet Rolls shall be 15’ wide rolls.
   1. Rolls shall be long enough to go from field sideline to sideline.
   2. The perimeter white line shall be tufted into the individual sideline rolls, where applicable.

D. Backing:
   1. Primary backing shall be a double-layered polypropylene fabric treated with UV inhibitors.
   2. Secondary backing shall consist of an application of a heat-activated urethane to permanently lock the fiber tufts in place.

E. Fibers shall be low friction, and UV-resistant fiber measuring not less than 1.5 inches high for the warning track and infield areas and not less than 2.0 inches for the outfield and foul territory areas.

F. Infill materials shall be installed to a depth as approved by the respective manufacturer.
   1. Infill shall consist of a resilient layered granular system, comprising of a selected and graded dust-free silica sand and ambient rubber crumb installed at the following percentages of total infill by weight, to optimize baseball specific performance characteristics:
      a. Infield areas: 50% sand, 50% rubber
      b. Grass areas: 50% sand, 50% rubber
      c. Warning Track: 75% sand, 25% rubber

G. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.
H. Thread for sewing seams of turf shall be compatible by the synthetic turf manufacturer.

I. Glue and seaming fabric for inlaying lines and markings shall be compatible by the synthetic turf manufacturer.

2.02 QUALITY CONTROL IN MANUFACTURING

A. The manufacturer shall own and operate its own manufacturing plant in North America. Both tufting of the field fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer. Outsourcing of either is unacceptable.

B. The manufacturer shall have full-time certified in-house inspectors at their manufacturing plant that are experts with industry standards.

C. The manufacturer’s full-time in-house certified inspectors shall perform pre-tufting fiber testing on tensile strength, elongation, tenacity, denier, shrinkage, and twist i.e., turns per inch, upon receipt of fiber spools from fiber manufacturer.

D. Primary backing shall be inspected by the manufacturer’s full-time certified in-house inspectors before tufting begins.

E. The manufacturer’s full-time in-house certified inspectors shall verify “pick count”, yarn density in relation to the backing, to ensure the accurate amount of face yarn per square inch.

F. The manufacturer’s full-time, in-house, certified inspectors shall perform turf inspections at all levels of production including during the tufting process and at the final stages before the turf is loaded onto the truck for delivery.

G. The manufacturer shall have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that all sub-base leveling is complete prior to installation.
B. Installer shall examine the surface to receive the synthetic turf and accept the sub-base planarity in writing prior to the beginning of installation.
   1. Acceptance is dependent upon the Contractors test results indicating compaction and planarity are in compliance with manufacturer’s specifications.
   2. The surface shall be accepted by Installer as “clean” as installation commences and shall be maintained in that condition throughout the process.

C. The surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-½" from design grade.

D. Correct conditions detrimental to timely and proper completion of Work.

E. Do not proceed until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of existing conditions

3.02 PREPARATION

A. Prior to the beginning of installation, inspect the sub-base for tolerance to grade.

B. Sub-base acceptance shall be subject to receipt of test results (by others) for compaction and planarity that sub-base is in compliance with manufacturer’s specifications and recommendations.

C. Dimensions of the field and locations for markings shall be measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made.

D. When requested by Architect/Engineer, installed sub-base shall be tested for porosity prior to the installation of the synthetic turf. A sub base that drains poorly is an unacceptable substrate.

3.03 INSTALLATION – GENERAL

A. The installation shall be performed in full compliance with approved Shop Drawings.

B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing, or brushing operations.
C. The designated Supervisory personnel on the project must be certified, in writing by the turf manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.

D. Designs, markings and layouts shall first be approved by the Architect or Owner in the form of final shop drawings. All markings will be in full compliance with final shop drawings.

3.04 INSTALLATION

A. Install at location(s) indicated, to comply with final shop drawings, manufacturers’/installer’s instructions.

B. The Contractor shall strictly adhere to specified procedures. Any variance from these requirements shall be provided in writing, by the manufacturer’s on-site representative, and submitted to the Architect and/or Owner, verifying that the changes do not in any way affect the Warranty. Infill materials shall be approved by the manufacturer and installed in accordance with the manufacturer’s standard procedures.

C. Full width rolls shall be laid out across the field.
   1. Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline.
   2. No cross seams will be allowed in the main playing area between the sidelines.
   3. Each roll shall be attached to the next roll utilizing standard state-of-the-art sewing procedures.
   4. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing surface.

D. Artificial turf panel seams shall be sewn or glued per manufacturer’s turf system specifications along the selvedge edging flap of the turf roll.
   1. Seams shall be flat, tight, and permanent with no separation or fraying.
   2. In the case of all lines and logos, turf carpet must be sheared to the backing (do not cut the backing) and adhered using hot melt adhesives.

E. Infill Materials:
   1. Infill materials shall be applied in lifts as necessary to allow for even distribution of infill throughout the pile height. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined by the manufacturer.
2. Layered infill shall be installed in a systematic order as per manufacturer’s standard installation procedures.

3. Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. Install sand and rubber infill in such a manner to minimize fiber entrapment wherever possible. Install infill in uniform layers to ensure a consistent, predictable playing surface. A final application of specifically sized non-marking rubber completes the system. The Infill shall be installed to the depth as specified by manufacturer’s baseball specific playing system.

F. Non-tufted or inlaid lines and markings shall be painted in accordance with turf and paint manufacturers’ recommendations. Number of applications will be dependent upon installation and field conditions.

G. Synthetic turf shall be attached to the perimeter edge detail in accordance with the manufacturer’s standard procedures.

H. Upon completion of installation, the finished field shall be inspected by the installation crew and an installation supervisor.

3.05 FIELD MARKINGS

A. Field markings shall be installed in accordance with approved shop drawings

B. Field markings will be inlaid or painted in accordance with the Drawings.

3.06 ADJUSTMENT AND CLEANING

A. Do not permit traffic over unprotected surface.

B. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.

C. All usable remnants of new material shall become the property of the Owner.

D. The Contractor shall keep the area clean throughout the project and clear of debris.

E. Surfaces, recesses, enclosures, and related spaces shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.
3.07 PROTECTION

A. Protect installation throughout construction process until date of final completion.

END OF SECTION 329211
SECTION 32 92 12
SYNTHETIC TURF PLAYING SURFACE
ALTERNATE #2
FieldTurf – DoublePlay Fast Clay / DoublePlay Fast Grass

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Furnishing all labor, materials, tools and equipment necessary to install, in place, all synthetic turf and infill materials as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the manufacturer’s written installation instructions, and in accordance with all approved shop drawings.

B. Related Sections
   1. Section 312201 – Field Grading
   2. Section 321800 – Infield Surfacing
   3. Section 329205 – Synthetic Turf – Project Requirements And Conditions
   4. Section 329210 – Synthetic Turf – Drainage And Base

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Synthetic turf system materials shall consist of the following:
   1. Carpet made of a combination of monofilament polyethylene fiber, slit-film polyethylene fibers and manufacturer’s standard thatch layer per manufacturer’s baseball specific installation specifications into a free draining backing with minimum pile heights as noted within the Drawings and specifications herein.
   2. Infill component of the synthetic turf system shall consist of the following:
a. Controlled mixture of graded sand and crumb rubber installed per manufacturer’s baseball specific installation specifications.

3. Glue, thread, paint, seaming fabric and other materials used to install and mark the playing surface.

B. The installed artificial playing surface shall have the following physical characteristics (+/-5%) as tested according to ASTM F1551 Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value (Infield/Warning Track) Double Play Fast Clay</th>
<th>Value (Outfield) Double Play Fast Grass</th>
<th>Units</th>
<th>ASTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pile Yarn Type</td>
<td>UV-resistant polyethylene</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yarn Structure</td>
<td>Slit Film and Thatch Blend</td>
<td>Monofilament/Slit Film Blend</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Yarn Denier</td>
<td>Slit Film: 10,000</td>
<td>Mono: 14,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thatch: 5,000</td>
<td>Slit Film: 5,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yarn Breaking Strength</td>
<td>&gt;20 nominal</td>
<td>lbs</td>
<td>D2256</td>
<td></td>
</tr>
<tr>
<td>Yarn Maximum Elongation</td>
<td>&gt;50 nominal</td>
<td>%</td>
<td>D2256</td>
<td></td>
</tr>
<tr>
<td>Pile Height</td>
<td>1.60”</td>
<td>2.00”</td>
<td>inches</td>
<td>D5823</td>
</tr>
<tr>
<td>Pile Weight</td>
<td>50</td>
<td>39</td>
<td>Oz/yd2</td>
<td>D5848</td>
</tr>
<tr>
<td>Primary Backing Weight</td>
<td>8</td>
<td>7</td>
<td>Oz/yd2</td>
<td>D5848</td>
</tr>
<tr>
<td>Secondary Backing Weight</td>
<td>20</td>
<td>20</td>
<td>Oz/yd2</td>
<td>D5848</td>
</tr>
<tr>
<td>Total Weight</td>
<td>78</td>
<td>60</td>
<td>Oz/yd2</td>
<td>D5848</td>
</tr>
<tr>
<td>Stitch Gauge</td>
<td>3/8”</td>
<td>3/4”</td>
<td></td>
<td>D5793</td>
</tr>
<tr>
<td>Tuft Bind</td>
<td>≥8</td>
<td>lbs/force</td>
<td>D1335</td>
<td></td>
</tr>
<tr>
<td>Grab Tear Length</td>
<td>≥200</td>
<td>lbs/force</td>
<td>D5034</td>
<td></td>
</tr>
<tr>
<td>Grab Tear Width</td>
<td>≥200</td>
<td>lbs/force</td>
<td>D5034</td>
<td></td>
</tr>
<tr>
<td>Pill Burn Test</td>
<td>Pass</td>
<td></td>
<td>D2859</td>
<td></td>
</tr>
<tr>
<td>Yarn Melting Point</td>
<td>&gt;245</td>
<td>Degrees F</td>
<td>D7138</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>------</td>
<td>-----------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Impact Attenuation (Gmax)</td>
<td>&lt;175</td>
<td>GMax</td>
<td>F355</td>
<td></td>
</tr>
<tr>
<td>Water Permeability (w/ infill) (w/o infill)</td>
<td>≥15</td>
<td>inch/hr</td>
<td>DIN 18-035</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥30</td>
<td>inch/hr</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Carpet Rolls shall be 15’ wide rolls.
   1. Rolls shall be long enough to go from field sideline to sideline.
   2. The perimeter white line shall be tufted into the individual sideline rolls, where applicable.

D. Backing:
   1. Primary backing shall be a double-layered polypropylene fabric treated with UV inhibitors.
   2. Secondary backing shall consist of an application of a heat-activated urethane to permanently lock the fiber tufts in place.

E. Fibers shall be low friction, and UV-resistant fiber measuring not less than 1.5 inches high for the warning track and infield areas and not less than 2.0 inches for the outfield and foul territory areas.

F. Infill materials shall be installed to a depth as approved by the respective manufacturer.
   1. Infill shall consist of a resilient layered granular system, comprising of a selected and graded dust-free silica sand and ambient rubber crumb installed at the following unit weights, to optimize baseball specific performance characteristics:
      a. Infield and Warning Track areas: 3.50 lbs./square foot sand, 1.0 lbs./square foot rubber
      b. Grass areas: 5.4 lbs./square foot sand, 1.5 lbs./square foot rubber

G. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.

H. Thread for sewing seams of turf shall be compatible by the synthetic turf manufacturer.
I. Glue and seaming fabric for inlaying lines and markings shall be compatible by the synthetic turf manufacturer.

2.02 QUALITY CONTROL IN MANUFACTURING

A. The manufacturer shall own and operate its own manufacturing plant in North America. Both tufting of the field fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer. Outsourcing of either is unacceptable.

B. The manufacturer shall have full-time certified in-house inspectors at their manufacturing plant that are experts with industry standards.

C. The manufacturer’s full-time in-house certified inspectors shall perform pre-tufting fiber testing on tensile strength, elongation, tenacity, denier, shrinkage, and twist i.e., turns per inch, upon receipt of fiber spools from fiber manufacturer.

D. Primary backing shall be inspected by the manufacturer’s full-time certified in-house inspectors before tufting begins.

E. The manufacturer’s full-time in-house certified inspectors shall verify “pick count”, yarn density in relation to the backing, to ensure the accurate amount of face yarn per square inch.

F. The manufacturer’s full-time, in-house, certified inspectors shall perform turf inspections at all levels of production including during the tufting process and at the final stages before the turf is loaded onto the truck for delivery.

G. The manufacturer shall have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that all sub-base leveling is complete prior to installation.

B. Installer shall examine the surface to receive the synthetic turf and accept the sub-base planarity in writing prior to the beginning of installation.
1. Acceptance is dependent upon the Contractors test results indicating compaction and planarity are in compliance with manufacturer’s specifications.

2. The surface shall be accepted by Installer as “clean” as installation commences and shall be maintained in that condition throughout the process.

C. The surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-½" from design grade.

D. Correct conditions detrimental to timely and proper completion of Work.

E. Do not proceed until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of existing conditions

3.02 PREPARATION

A. Prior to the beginning of installation, inspect the sub-base for tolerance to grade.

B. Sub-base acceptance shall be subject to receipt of test results (by others) for compaction and planarity that sub-base is in compliance with manufacturer’s specifications and recommendations.

C. Dimensions of the field and locations for markings shall be measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made.

D. When requested by Architect/Engineer, installed sub-base shall be tested for porosity prior to the installation of the synthetic turf. A sub base that drains poorly is an unacceptable substrate.

3.03 INSTALLATION – GENERAL

A. The installation shall be performed in full compliance with approved Shop Drawings.

B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing, or brushing operations.
C. The designated Supervisory personnel on the project must be certified, in writing by the turf manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.

D. Designs, markings and layouts shall first be approved by the Architect or Owner in the form of final shop drawings. All markings will be in full compliance with final shop drawings.

3.04 INSTALLATION

A. Install at location(s) indicated, to comply with final shop drawings, manufacturers’/installer’s instructions.

B. The Contractor shall strictly adhere to specified procedures. Any variance from these requirements shall be provided in writing, by the manufacturer’s on-site representative, and submitted to the Architect and/or Owner, verifying that the changes do not in any way affect the Warranty. Infill materials shall be approved by the manufacturer and installed in accordance with the manufacturer’s standard procedures.

C. Full width rolls shall be laid out across the field.
   1. Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline.
   2. No cross seams will be allowed in the main playing area between the sidelines.
   3. Each roll shall be attached to the next roll utilizing standard state-of-the-art sewing procedures.
   4. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing surface.

D. Artificial turf panel seams shall be sewn or glued per manufacturer’s turf system specifications along the selvedge edging flap of the turf roll.
   1. Seams shall be flat, tight, and permanent with no separation or fraying.
   2. In the case of all lines and logos, turf carpet must be sheared to the backing (do not cut the backing) and adhered using hot melt adhesives.

E. Infill Materials:
   1. Infill materials shall be applied in lifts as necessary to allow for even distribution of infill throughout the pile height. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined by the manufacturer.
   2. Layered infill shall be installed in a systematic order as per manufacturer’s standard installation procedures.
3. Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. Install sand and rubber infill in such a manner to minimize fiber entrapment wherever possible. Install infill in uniform layers to ensure a consistent, predictable playing surface. A final application of specifically sized non-marking rubber completes the system. The Infill shall be installed to the depth as specified by manufacturer’s baseball specific playing system.

F. Non-tufted or inlaid lines and markings shall be painted in accordance with turf and paint manufacturers’ recommendations. Number of applications will be dependent upon installation and field conditions.

G. Synthetic turf shall be attached to the perimeter edge detail in accordance with the manufacturer’s standard procedures.

H. Upon completion of installation, the finished field shall be inspected by the installation crew and an installation supervisor.

3.05 FIELD MARKINGS

A. Field markings shall be installed in accordance with approved shop drawings

B. Field markings will be inlaid or painted in accordance with the Drawings.

3.06 ADJUSTMENT AND CLEANING

A. Do not permit traffic over unprotected surface.

B. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.

C. All usable remnants of new material shall become the property of the Owner.

D. The Contractor shall keep the area clean throughout the project and clear of debris.

E. Surfaces, recesses, enclosures, and related spaces shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

3.07 PROTECTION
A. Protect installation throughout construction process until date of final completion.

END OF SECTION 329212
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Furnishing all labor, materials, tools and equipment necessary to install, in place, all synthetic turf and infill materials as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the manufacturer’s written installation instructions, and in accordance with all approved shop drawings.

B. Related Sections
   1. Section 312201 – Field Grading
   2. Section 321800 – Infield Surfacing
   3. Section 329205 – Synthetic Turf – Project Requirements And Conditions
   4. Section 329210 – Synthetic Turf – Drainage And Base

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Synthetic turf system materials shall consist of the following:
   1. Carpet made of a combination of monofilament polyethylene fiber, slit-film polyethylene fibers and manufacturer’s standard thatch layer per manufacturer’s baseball specific installation specifications into a free draining backing with minimum pile heights as noted within the Drawings and specifications herein.
   2. Infill component of the synthetic turf system shall consist of the following:
a. Controlled mixture of graded sand and crumb rubber installed per manufacturer’s baseball specific installation specifications.

3. Glue, thread, paint, seaming fabric and other materials used to install and mark the playing surface.

B. The installed artificial playing surface shall have the following physical characteristics (+/-5%) as tested according to ASTM F1551 Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value (Infield/Warning Track) B1K Six4Three</th>
<th>Value (Grass Areas) B1K TagUp 1.75</th>
<th>Units</th>
<th>ASTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pile Yarn Type</td>
<td>UV-resistant polyethylene</td>
<td>n/a</td>
<td></td>
<td>D1577</td>
</tr>
<tr>
<td>Yarn Structure</td>
<td>Slit Film w/Thatch</td>
<td>Monofilament/Slit Film Blend</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Yarn Denier</td>
<td>Slit Film: 8,000 Thatch: 4,400</td>
<td>Mono: 10,800 Slit Film: 5,000</td>
<td>Denier</td>
<td>D2256</td>
</tr>
<tr>
<td>Yarn Breaking Strength</td>
<td>Slit Film &gt; 20</td>
<td>Mono &gt; 20 Slit Film &gt; 12</td>
<td>lbs</td>
<td>D2256</td>
</tr>
<tr>
<td>Yarn Maximum Elongation</td>
<td>&gt;30 nominal</td>
<td>%</td>
<td>D2256</td>
<td></td>
</tr>
<tr>
<td>Pile Height</td>
<td>1.625”</td>
<td>1.75” inches</td>
<td>D5823</td>
<td></td>
</tr>
<tr>
<td>Pile Weight</td>
<td>55</td>
<td>40 Oz/yd2</td>
<td>D5848</td>
<td></td>
</tr>
<tr>
<td>Primary Backing Weight</td>
<td>8</td>
<td>8 Oz/yd2</td>
<td>D5848</td>
<td></td>
</tr>
<tr>
<td>Secondary Backing Weight</td>
<td>20</td>
<td>20 Oz/yd2</td>
<td>D5848</td>
<td></td>
</tr>
<tr>
<td>Total Weight</td>
<td>83</td>
<td>68 Oz/yd2</td>
<td>D5848</td>
<td></td>
</tr>
<tr>
<td>Stitch Gauge</td>
<td>3/8”</td>
<td>1/2”</td>
<td>D5793</td>
<td></td>
</tr>
<tr>
<td>Tuft Bind</td>
<td>&gt;10</td>
<td>lbs/force</td>
<td>D1335</td>
<td></td>
</tr>
<tr>
<td>Grab Tear Length</td>
<td>≥200</td>
<td>lbs/force</td>
<td>D5034</td>
<td></td>
</tr>
<tr>
<td>Grab Tear Width</td>
<td>≥200</td>
<td>lbs/force</td>
<td>D5034</td>
<td></td>
</tr>
<tr>
<td>Pill Burn Test</td>
<td>Pass</td>
<td></td>
<td>D2859</td>
<td></td>
</tr>
<tr>
<td>Yarn Melting</td>
<td>&gt;245</td>
<td>Degrees F</td>
<td>D7138</td>
<td></td>
</tr>
</tbody>
</table>
C. Carpet Rolls shall be 15’ wide rolls.
   1. Rolls shall be long enough to go from field sideline to sideline.
   2. The perimeter white line shall be tufted into the individual sideline rolls, where applicable.

D. Backing:
   1. Primary backing shall be a double-layered polypropylene fabric treated with UV inhibitors.
   2. Secondary backing shall consist of an application of a heat-activated urethane to permanently lock the fiber tufts in place.

E. Fibers shall be low friction, and UV-resistant fiber measuring not less than 1.5 inches high for the warning track and infield areas and not less than 2.0 inches for the outfield and foul territory areas.

F. Infill materials shall be installed to a depth as approved by the respective manufacturer.
   1. Infill shall consist of a resilient layered granular system, comprising of a selected and graded dust-free silica sand and ambient rubber crumb installed at the following percentages of total infill by weight, to optimize baseball specific performance characteristics:
      a. Infield areas: 50% sand, 50% rubber
      b. Grass areas: 50% sand, 50% rubber
      c. Warning Track: 75% sand, 25% rubber

G. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.

H. Thread for sewing seams of turf shall be compatible by the synthetic turf manufacturer.
I. Glue and seaming fabric for inlaying lines and markings shall be compatible by the synthetic turf manufacturer.

2.02 QUALITY CONTROL IN MANUFACTURING

A. The manufacturer shall own and operate its own manufacturing plant in North America. Both tufting of the field fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer. Outsourcing of either is unacceptable.

B. The manufacturer shall have full-time certified in-house inspectors at their manufacturing plant that are experts with industry standards.

C. The manufacturer’s full-time in-house certified inspectors shall perform pre-tufting fiber testing on tensile strength, elongation, tenacity, denier, shrinkage, and twist i.e., turns per inch, upon receipt of fiber spools from fiber manufacturer.

D. Primary backing shall be inspected by the manufacturer’s full-time certified in-house inspectors before tufting begins.

E. The manufacturer’s full-time in-house certified inspectors shall verify “pick count”, yarn density in relation to the backing, to ensure the accurate amount of face yarn per square inch.

F. The manufacturer’s full-time, in-house, certified inspectors shall perform turf inspections at all levels of production including during the tufting process and at the final stages before the turf is loaded onto the truck for delivery.

G. The manufacturer shall have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

EXECUTION

2.03 EXAMINATION

A. Verify that all sub-base leveling is complete prior to installation.

B. Installer shall examine the surface to receive the synthetic turf and accept the sub-base planarity in writing prior to the beginning of installation.

   I. Acceptance is dependent upon the Contractors test results indicating compaction and planarity are in compliance with manufacturer’s specifications.
2. The surface shall be accepted by Installer as “clean” as installation commences and shall be maintained in that condition throughout the process.

C. The surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-½" from design grade.

D. Correct conditions detrimental to timely and proper completion of Work.

E. Do not proceed until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of existing conditions

2.04 PREPARATION

A. Prior to the beginning of installation, inspect the sub-base for tolerance to grade.

B. Sub-base acceptance shall be subject to receipt of test results (by others) for compaction and planarity that sub-base is in compliance with manufacturer’s specifications and recommendations.

C. Dimensions of the field and locations for markings shall be measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made.

D. When requested by Architect/Engineer, installed sub-base shall be tested for porosity prior to the installation of the synthetic turf. A sub base that drains poorly is an unacceptable substrate.

2.05 INSTALLATION – GENERAL

A. The installation shall be performed in full compliance with approved Shop Drawings.

B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing, or brushing operations.

C. The designated Supervisory personnel on the project must be certified, in writing by the turf manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.
D. Designs, markings and layouts shall first be approved by the Architect or Owner in the form of final shop drawings. All markings will be in full compliance with final shop drawings.

2.06 INSTALLATION

A. Install at location(s) indicated, to comply with final shop drawings, manufacturers’/installer’s instructions.

B. The Contractor shall strictly adhere to specified procedures. Any variance from these requirements shall be provided in writing, by the manufacturer’s on-site representative, and submitted to the Architect and/or Owner, verifying that the changes do not in any way affect the Warranty. Infill materials shall be approved by the manufacturer and installed in accordance with the manufacturer’s standard procedures.

C. Full width rolls shall be laid out across the field.
   1. Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline.
   2. No cross seams will be allowed in the main playing area between the sidelines.
   3. Each roll shall be attached to the next roll utilizing standard state-of-the-art sewing procedures.
   4. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing surface.

D. Artificial turf panel seams shall be sewn or glued per manufacturer’s turf system specifications along the selvedge edging flap of the turf roll.
   1. Seams shall be flat, tight, and permanent with no separation or fraying.
   2. In the case of all lines and logos, turf carpet must be sheared to the backing (do not cut the backing) and adhered using hot melt adhesives.

E. Infill Materials:
   1. Infill materials shall be applied in lifts as necessary to allow for even distribution of infill throughout the pile height. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined by the manufacturer.
   2. Layered infill shall be installed in a systematic order as per manufacturer’s standard installation procedures.
   3. Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. Install sand and rubber infill in such a manner to minimize fiber entrapment wherever possible. Install infill in uniform layers to ensure a consistent, predictable playing
surface. A final application of specifically sized non-marking rubber completes the system. The Infill shall be installed to the depth as specified by manufacturer’s baseball specific playing system.

F. Non-tufted or inlaid lines and markings shall be painted in accordance with turf and paint manufacturers’ recommendations. Number of applications will be dependent upon installation and field conditions.

G. Synthetic turf shall be attached to the perimeter edge detail in accordance with the manufacturer’s standard procedures.

H. Upon completion of installation, the finished field shall be inspected by the installation crew and an installation supervisor.

2.07 FIELD MARKINGS

A. Field markings shall be installed in accordance with approved shop drawings

B. Field markings will be inlaid or painted in accordance with the Drawings.

2.08 ADJUSTMENT AND CLEANING

A. Do not permit traffic over unprotected surface.

B. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.

C. All usable remnants of new material shall become the property of the Owner.

D. The Contractor shall keep the area clean throughout the project and clear of debris.

E. Surfaces, recesses, enclosures, and related spaces shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

2.09 PROTECTION

A. Protect installation throughout construction process until date of final completion.

END OF SECTION 329213
PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Production and installation of a natural grass sod turf system.

1.02 SUBMITTALS

A. Submit the name, location and contact information for the grower who will produce the natural grass sod, in conformance with General Requirements.

B. Submit the natural grass sod seed blend broken down by seed variety and percent, in conformance with General Requirements.

C. Submit the soil mix design and particle size analysis for the sand/silt/clay soil growing media, in conformance with General Requirements.

D. Submit a copy of the natural grass sod grower/supplier warranty and ensure that forms have been completed in the University’s name and registered with approved natural grass sod grower/supplier.

1.03 QUALITY ASSURANCE

A. The turf system consists of a high-quality, fine leaf variety bluegrass natural grass sod blend grown on sandy loam-type soil for irrigated athletic fields in full sun areas that is adaptable to different environmental conditions as well as disease resistant.

B. Prior to installation, the contractor shall be responsible for all recommended pre-plant fertility applications, installation of the turf and one sand top dressing following installation, if requested by the University.

1.04 WARRANTY

A. The warranty submitted must have the following characteristics:

1. Must provide full-field coverage for one (1) full year from date of Substantial Completion.

2. Must warrant natural grass sod materials and workmanship.
3. Must warrant that the natural grass sod materials installed meet or exceed the product specifications within sod growing tolerances.

4. Must have a provision to either repair or replace such portion of the installed natural grass sod materials that are no longer serviceable to maintain a serviceable and playable surface.

5. Must be a grower/supplier’s warranty from a single source covering the natural grass sod material and workmanship.

PART 2 – PRODUCTS

2.01 MATERIALS

A. The natural grass sod Bluegrass seed blend shall be as follows:

   40% P105 Kentucky Bluegrass  
   30% Midnight Star Kentucky Bluegrass  
   30% Brilliant Kentucky Bluegrass

B. The natural grass sod sand/silt/clay soil growing media shall be within the following limits:

   90% - 92%  Sand  
   6% - 7%  Silt  
   2% - 3%  Clay  
   0% - 0.2%  Gravel

C. The natural grass sod shall be a “thick cut” sod with minimum 1” thick soil suitable for installation in the summer months.

D. Approved sod grower/supplier(s) is (are) as follows:

   Hillcrest Grass Sod Farm  
   32609 Pennsylvania Road  
   Romulus, MI 48174  
   734-941-9595

   -OR-
   DeBuck’s Sod Farm  
   12163 Lippincott Blvd  
   Davison, MI 48423  
   810-653-2201

   -OR-

   Owner/Engineer Approved Equal
PART 3 – EXECUTION

3.01 INSTALLATION

A. Prior to installation of the natural grass sod, pre-plant fertility applications are the responsibility of the sod grower/supplier. Applications will likely include, but may not be limited to organic or composted fertilizers, starter fertilizers, dolomitic limestone and granulated micronutrients.

B. Natural grass sod shall be harvested using big roll equipment.

C. Harvested sod shall be laid within 24hrs of stripping from the farm. Sod shall be laid with tightly fitting joints and seams, with butted joints staggered no less than 3’ apart. Laying equipment must have high flotation tires or tracks and not damage the prepared surface. If, in the opinion of the Architect/Engineer, the laying equipment or operation is damaging the surface of the rootzone and resulting in deviations from designated grade requirements, or severely rutting adjacent sod strips, he may require the contractor to work from boards.

D. Patches must fit tightly on all sides and be a minimum of 18” in length and the full width of the roll.

E. After laying, roll the sod with a light drum roller (less than 10 tons). Inspect the sod and hand-fill any seams that are in excess of 1/4”. Areas that deviate more than 1/4” outside of grade specifications must be lifted, filled and compacted below the sod piece.

F. Irrigate the sod as soon as possible after installation and on a consistent basis as needed. The contractor accepts full responsibility for managing the frequency and rate of the irrigation cycles.

G. If the School District concludes that a sand topdressing and deep-core aeration is required following installation of the sod, the contractor shall undertake the operation according to the School District’s guidelines.

END OF SECTION 329225
SECTION 33 40 00
STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
A. Section includes storm sewer removal and installation from building and site to existing storm system.
B. Section 31 23 33 – Trenching and Backfilling:
   1. Bedding and fill materials.
   2. Protection for existing items.
   3. Excavation, fill placement, compaction, backfilling and grading.
   4. Measures to protect the Work of this Section.

1.03 REFERENCES
A. ASTM International:
B. Standard Practice for Installing Vitrified Clay Pipe Lines (ASTM C-12-00).
C. Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe
E. Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (ASTM C-76-00).


M. Ohio Department of Transportation Construction and Material Specifications (ODOT CMS), 2010 edition.

1.04 SUBMITTALS

A. Submit the following in accordance with the GENERAL REQUIREMENTS:

1. Product Data for pipes and fittings.

1.05 PROJECT CONDITIONS

A. Environmental Requirements (Pipe Laying in Cold Weather):

1. Do not lay pipe on frozen ground or frozen bedding material.

B. Heat pipe as recommended by the Pipe Manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Polyvinyl Chloride (PVC) Pipe and Fittings:

1. 4- through 15-inch diameter: Solid wall plastic pipe and fittings per ASTM F-789 or ASTM D-3034, SDR 35.


C. High Density Polyethylene (HDPE) Pipe and Fittings:

1. 12 inch through 36 inch diameter: AASHTO M294 Type S, Type III, Class C, Category 5, Grade P34:
a. Perforated, corrugated pipe under Synthetic and Natural Turf Playing Systems and swales.

b. Solid corrugated pipe with smooth interior under pavement and lawn areas.

D. PLASTIC STORMWATER INLETS

1. General
   a. PVC surface drainage inlets shall be of the inline drain type as indicated on the drawings. The ductile iron grates for each of these fittings are to be considered an integral part of the surface drainage inlet and shall be furnished by the same manufacturer. The surface drainage inlets shall be as manufactured by Nyloplast a division of Advanced Drainage System, Inc., or an approved equal.

2. Materials
   a. The inline drain required for this project shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the furnished configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. This joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals. The flexible elastomeric seals shall conform to ASTM F477. The pipe bell spigot shall be joined to the inline body by use of swage mechanical joint. The raw material used to manufacture the pipe stock that is used to manufacture the inline drain body and pipe stubs of the surface drainage inlets shall conform to ASTM D1784 cell class 12454.

   b. The grates furnished for all surface drainage inlets shall be ductile iron grates for sizes 8”, 10’, 12”, 15”, or 18” (as called for on the plans) shall be specifically for each fitting so as to provide a round bottom flange that closely matches the diameter of the surface inlet.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Pipe Preparation and Handling:

1. Inspect pipe and fittings prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are being used. Clean
ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

B. Use proper implements, tools, and facilities for the safe and proper protection of the work. Lower pipe into the trench in such a manner as to avoid physical damage to the pipe. Remove damaged pipe from the Site. Do not drop or dump pipe into trenches under any circumstances.

C. Excavate bell holes at each joint to permit proper assembly and inspection of entire joint.

D. Laying and Jointing Pipe and Fittings:

1. Start pipe laying proceeding upgrade with spigot ends pointing in direction of flow. After a section of pipe has been lowered into the prepared trench; clean the end of the pipe to be joined, the inside of the joint, and if applicable, the rubber ring, immediately before joining the pipe. Assemble the joint following manufacturer's recommendations for type of joint used. Provide special tools and appliances required for the jointing assembly.

E. Lay pipes uniformly to line and grade so that finished sewer will present a uniform bore. Variations from line and grade in excess of the specified tolerances will be considered sufficient cause for rejection of the Work.

F. When pipes are to be jointed with rubber gaskets, warm the gasket or joint material sufficiently to facilitate making a proper joint.

G. Prevent excavated or other foreign material from getting into the pipe during the laying operation. Close and block the open end of the last laid section of pipe to prevent entry of foreign material or creep of the gasketed joints:

1. When laying operations are not in progress.
2. At the close of the day's work.
3. Whenever the workers are absent.

H. Plug or close off pipes which are stubbed off for manhole construction or for connection by others with temporary plugs.

I. Take necessary precautions to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

J. Make connections of non-reinforced pipe to manholes or concrete structures, so that a standard pipe joint is located not more than one foot from the outside edge of the structure.
K. When field cutting or machining the pipe is necessary, use only tools and methods recommended by the Pipe Manufacturer and approved by the Engineer.

L. Check pipe for alignment and grade after joint has been made. Ensure pipe bedding forms a continuous and uniform bearing and support for the pipe barrel between joints. Apply sufficient pressure in making the joint to assure the joint is "home" as defined in Pipe Manufacturer's standard installation instructions. Place sufficient pipe cover material to secure pipe from movement before next joint is installed to assure proper pipe alignment and joint makeup.

M. Line and Grade: Do not deviate from line and grade, as established by the drawings, more than 1/2 inch for line and 1/4 inch for grade, provided that such variation does not result in a level or reverse sloping invert. Measure for grade at the pipe invert, not at the top of the pipe, because of the permissible variation in pipe wall thickness. Furnish and set the line and grade boards at maximum intervals of 25 feet. If grade boards prove impractical because of trench or other conditions, other methods of controlling line and grade may be submitted to the Engineer for approval.

N. Dewatering: Employ such means as well pointing, ditching, pumping or bailing to prevent water from entering the trench during the laying operation and allow for proper construction of the backfill in the pipe zone. Do not lay pipe in water.

O. Installation of Plastic Stormwater Inlets
   1. The specified PVC drainage inlet shall be installed using conventional flexible pipe backfill materials and procedures. The backfill material shall be crushed stone or granular material meeting the requirements of class 2 material as defined in ASTM D2321. Bedding and backfill for surface drainage inlets shall be placed and compacted uniformly in accordance with ASTM D2321. The drain basin body will be cut at the time of the final grade. No brick, stone or concrete block will be required to set the grate to the final grade height.

3.02 FIELD QUALITY CONTROL

A. Notify the Engineer or local utility owner at least 24 hours prior to tapping existing main to enable inspector to witness all taps. If required, submit portion of pipe removed by boring machine to inspector.

B. Perform cleaning and testing of sewers following the current and applicable standards of the Authority having Jurisdiction.

3.03 CLEANING
A. Prior to final acceptance and final manhole to manhole inspection of the sewer system by the Owner/Engineer, flush and clean all parts of the system. Remove accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system at or near the closest downstream manhole. If necessary, use mechanical rodding or bucketing equipment.

B. Upon the Owner/Engineer's final manhole to manhole inspection of the sewer system, if foreign matter is still present in the system, re-flush and clean the sections and portions of the lines as required.

C. Measure the infiltration using a suitable weir or other acceptable device when the water table is two feet or more above of the top of the pipe line section to be tested.

D. When infiltration cannot be properly tested, test exfiltration by filling the line to be tested with water so that a head of at least two feet is provided above the water table and the top of the pipe at the upper end of the pipe line. Allow to stand until the pipe has reached its maximum absorption, but not less than four hours. After absorption, re-establish the head. Measure the amount of water required to maintain this water level during a two hour test period.

E. When leakage exceeds 250 gallons per inch of diameter per mile of pipeline per day as measured by either the infiltration or exfiltration test, take corrective measures and retest.

END OF SECTION 334400