Project Manual & Specifications

VETERANS MEMORIAL FIELD

for the

City of New London
181 State Street
New London, CT 06320

December 23, 2016

KENT+FROST
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for the
THE CITY OF NEW LONDON
181 STATE STREET
NEW LONDON, CT 06320

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for the
City of New London
181 State Street
New London, CT 06320

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INVITATION TO BID

VETERANS MEMORIAL FIELD
for the
THE CITY OF NEW LONDON
181 STATE STREET
NEW LONDON, CT 06320

General Description of the Work

The work consists of improvements to the existing property known as Veterans Memorial Field at Cedar Grove Avenue and Cape Ann Court and include a 90' Baseball Field with backstop and dugouts, temporary outfield fencing, permanent perimeter fencing, Multi-purpose field, stone dust walking track, stone walls, concrete steps, storage container, scoreboard, water & electric service, ADA cross walk, park signage new granite curbing, site furnishings and planting.

Qualification of Bidders

Eligible Bidders shall be Contractors with prior experience with similar scope of work. Any Contractor, who is in litigation or arbitration with the Town at the time of bid opening, or prior to the execution of the contract, may be considered an unacceptable Bidder and may be disqualified.

Owner

City of New London
181 State Street
New London, CT 06320

Sealed Bids

Received by: Alicia Smith, Purchasing Agent
City of New London
13 Masonic Street
New London, CT 06320

Sealed bids for "Veterans Memorial Field" will be received by the Purchasing Agent until 2:00 PM, Local Time on Friday, January 20, 2017. At that time, all bids will be publicly opened and read aloud. Bids and bid security must be enclosed in a sealed envelope and clearly labeled with "Bid for Veterans Memorial Field" to avoid premature opening of bid. Any bid received after the time and date specified shall not be considered.

Place for Obtaining Bidding Documents

City of New London Website:

www.ci.new-london.ct.us/content/7429/7431/7445/8764.aspx

Bid Documents will be available on or after: **Friday, December 23, 2016, 12:00pm**

Withdraw of Bids

Any bid may be withdrawn prior to the above scheduled time for the opening of bids. No Bid may be withdrawn for a period of sixty (60) days after the opening of bids without written consent of the Owner.

Bid Security

Bid Security shall be issued payable to the "City of New London" in the form of a certified check, cashier's check or bid bond in the amount of 10 percent of the base bid. Those of the lower three (3) bidders will be retained by the City of New London until one (1) of the three (3) bidders signs the contract or until all bids are rejected. All bid Securities, except those of the lower three (3) bidders will be returned within ten (10) days of the opening of bids. In no case will the bid check or bond be retained for more than ninety (90) days unless forfeited as hereinafter stipulated.

Should there be reasons why the Contract cannot be awarded within the specified period, the time period may be extended by mutual agreement between the Bidder and the Owner.

Required Bonds

Performance Bond and Labor and Material Payment Bond for 100% of the Contract price with a surety company satisfactory to the Owner.

Method of Award

It is the owner's intent to award the contract to the lowest responsible bidder. The owner reserves the right, in its sole discretion, to accept or reject any or all bids and waive any formalities in the bidding.

If the lowest bid submitted by a responsible bidder does not exceed the funds allocated for the project, the base bid will be awarded. The Owner reserves the right to add or deduct alternates in any order in which they are listed on the Bid Form which produces a net amount within the available funds.

Applicable Laws

The bidding shall be done in accordance with the Code of the City of New London, and the laws of the State of Connecticut.

This contract is subject to state set-aside and contract compliance requirements.

The contractor who is selected to perform this State project must comply with CONN. GEN. STAT. §§ 4a-60, 4a-60a, 4a-60g, and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session Public Act 15-5. An Affirmative Action Plan must be filed with and approved by the Commission on Human Rights and Opportunities prior to the commencement of construction.

State law requires a minimum of twenty-five (25%) percent of the state-funded portion of the contract for award to subcontractors holding current certification from the Connecticut Department of Administrative Services ("DAS") under the provisions of CONN. GEN. STAT. § 4a-60g, as amended. (25% of the work with DAS certified Small and Minority owned businesses and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.) The contractor must demonstrate good faith effort to meet the 25% set-aside goals.

For municipal public works contracts and quasi-public agency projects, the contractor must file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities. Forms can be found at http://www.ct.gov/opm/cwp/view.asp?a=2982&q=390928&opmNav_GID=1806.

Wage Requirements

Attention of bidders is directed to certain requirements of the contract which require payment of State prevailing wage rates, provisions of 100% Performance and Labor and Materials Payment bonds, and compliance with certain local and state requirements.

Pre-Bid Conference

A pre-bid conference will be held on **Monday, January 9, 2017 at 10:00 a.m.** local time at Veterans Memorial Field, on the corner of Cedar Grove Avenue and Cape Ann Court, New London, CT. Late arrivals, more than fifteen (15) minutes after the scheduled start time, will not be given credit for attendance at the meeting and will not be able to submit a bid for this Project.

An affirmative Action / Equal Opportunity Employer. Minority / Women's Business Enterprises are encouraged to apply.

END OF INVITATION TO BID

BID FORM

VETERANS MEMORIAL FIELD
for the
THE CITY OF NEW LONDON
181 STATE STREET
NEW LONDON, CT 06320

Date_____

To: Alicia Smith, Purchasing Agent
City of New London
13 Masonic Street
New London, Connecticut 06320

Pursuant to and in compliance with your "Invitation to Bid" relating thereto, the undersigned,

_____
(Name of Firm)

having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Kent + Frost Landscape Architecture and the Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Project Manual and Specifications, for the Base Bid Lump Sum of:

_____Dollars ($_____).

Unit Prices

Should the amount of improvements require to be increased or decreased due to special considerations found at the site, or at the request by the Owner, the undersigned agrees that the following supplemental Unit Prices will be the basic price in place for computing the Extra or Credit. Each Unit Price shall include all equipment, tools, labor, permits, fees, etc. incidental to the installation and completion of the work involved:

The amounts shown are net changes to the contract for additional work and include the Contractor's and any Subcontractors amounts for overhead and profit. For deleted work, the net credit to the contract shall be 10% or less.

Abbreviations

C.Y. = Cubic Yard S.Y. = Square Yard S.F. = Square Foot S.F.F = Square Foot of Face
L.F. = Linear Foot EA. = Each

Description

1. Bituminous Concrete Pavement	$ _____	S.F.
2. Granite Curbing	$ _____	L.F.
3. Stone dust Pavement	$ _____	S.F.
4. Concrete Pavement	$ _____	S.F.
5. Roadway Striping	$ _____	L.F.
6. Stone Wall	$ _____	S.F.F
7. Granite Pier	$ _____	EA.
8. 8' Tall Chain link Fence	$ _____	L.F.
9. Approved Top Soil	$ _____	C.Y.
10. Approved Fill	$ _____	C.Y.
11. Contaminated Soil Handling, Disposal On-site	$ _____	C.Y.
12. Contaminated Soil Handling, Disposal Off-site	$ _____	C.Y.
13. Loam and Seed (Loam 4" deep)	$ _____	S.Y.
14. Processed Stone Base	$ _____	C.Y.
15. Shipping Container	$ _____	EA.
16. Saw Cutting	$ _____	L.F.

Add Alternate No. 1

The undersigned Bidder further proposes and agrees that should the following Add Alternates be approved and added to the Contract, the amount of the Lump Sum Bid, as heretofore stated, shall be adjusted by the amount of Add Alternates. All materials and workmanship shall be in strict accordance with the drawings and specifications and shall be installed prices.

Add Alternate No.1: Furnish all labor, equipment, and materials required to furnish and install stone wall extensions, bituminous parking lot and driveway, granite curbing, crosswalk, drainage utilities, trees and grading improvements as detailed and described on the Contract Documents. Add the Base Bid Lump Sum of :

_____Dollars ($_____).

Deduct Alternate No. 2

The undersigned Bidder further proposes and agrees that should the following Deduct Alternates be rejected and removed from the Contract, the amount of the Lump Sum Bid, as heretofore stated, shall be adjusted by the amount of Deduct Alternates. All materials and workmanship shall be in strict accordance with the drawings and specifications and shall be installed prices.

Deduct Alternate No. 2: Furnish all labor, equipment, and materials required to furnish and install the composting restroom as detailed and described on the Contract Documents. Deduct the Base Bid Lump Sum of :

_____Dollars ($_____).

Allowances

Included within the Base Bid Lump Sum amount are included the following allowance as further described within Section 026000, Section 026113 and Section 310513.

Allowance:

Contaminated Soil Handling Disposal on Site: 40 CY

Bid Security

The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting ten percent (10%) of the Base Bid amount above:

_____ Dollars ($_____).

Time of Completion

If awarded the Contact, the undersigned agrees that the work will commence upon formalization of a Contract with the Owner, and shall be Substantially Complete as defined within AIA Document A201 within **eight (8) months** from Owner's Award of Contract.

Addendum

The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

1. Addendum No. 1, dated _____.
2. Addendum No. 2, dated _____.
3. Addendum No. 3, dated _____.
4. Addendum No. 4, dated _____.

Submission of Bid

A. Respectfully submitted this ____ day of _____, 2016.

B. Submitted By_____(Name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

F. Street Address:_____.

G. City, State, Zip_____.

H. Phone:_____.

I. License No.:_____.

J. Federal ID No.:_____(Affix Corporate Seal Here).

END OF BID FORM

State of Connecticut "Prevailing Wage Rates" will be inserted no earlier than 14 days prior to bid.

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Standard Specifications
4. Summary of Work
5. Phased construction.
6. Construction time.
7. Access to site.
8. Coordination with occupants.
9. Work restrictions.
10. Intent.
11. Social Security Taxes.
12. Unemployment insurance.
13. Occupational Safety and Health Act.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

2. Section 026000 “Contaminated Site Material Removal”

3. Section 026113 “Excavation and Handling of Controlled Material

4. Section 310513 “Soils for Earthwork”

1.2 PROJECT DESCRIPTION

A. The work consists of improvements to the existing property known as Veterans Memorial Field at Cedar Grove Avenue and Cape Ann Court and include a 90’ Baseball Field with backstop and dugouts, temporary outfield fencing, permanent perimeter fencing, Multi-purpose field, stone dust walking track, stone walls, concrete steps, storage container, scoreboard, water & electric service, ADA cross walk, park signage new granite curbing, site furnishings and planting as shown and described in the Contract Documents.

1.3 PROJECT INFORMATION

A. Project Identification: Veterans Memorial Field.

1. Project Location: Veterans Memorial Field, Cedar Grove Avenue, New London, CT 06320

B. Owner: City of New London – 181 State Street, New London, CT 06320

C. Landscape Architect: Kent + Frost Landscape Architecture, LLC - 1 High Street, Mystic, CT 06355

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. Type of Contract.

1. Project will be constructed under a single prime contract.

1.5 STANDARD SPECIFICATIONS

A. All work done shall comply with applicable state and federal regulatory agency standards.

B. All work shall be done in a manner compliant with the technical specifications outlined in the sections proceeding this section.

C. If any conflict between provided technical specification and regulatory agency standards, the more stringent of the two applies.

D. All work shall be done within permit limits.

E. Documentation of proper certifications, permitting, and licenses for specified tasks and procedure must be submitted.

F. The Contractor shall conduct all work in a manner that prevents damage to structures, survey points, bench marks, monitoring well not designated for abandonment, and adjacent properties.

G. Contractor shall take at minimum all measures specified to prevent environmental damage and spread of contaminated materials.

1.6 SUMMARY OF WORK

A. Health and Safety Plan

1. All work under this Remedial Action Plan will be performed under a Health and Safety Plan (HASP) as required under OSHA regulations (29 CFR 1910.120). The remediation contractor will be required to prepare a HASP for their personnel and activities. The Engineer will provide a HASP for activities conducted by their field personnel. All contractors and remediation supervisors shall comply with the OSHA general construction standard 29 CFR 1926 and will have appropriate, current OSHA training and medical monitoring required by 29 CFR 1910.120 (HAZWOPER). Remediation contractors will have a “Competent Person” on-site during all excavation and remediation work. The HASP shall have Job Safety Analyses (JSAs) for each specific task related to

remediation activities. The HASP shall be reviewed by and approved in writing by a qualified individual.

B. Preparation
1. Prior to the commencement of any work Contractor shall verify existing conditions and confirm the proposed conditions with engineer.
2. All locations of utilities above and below ground and courses of action if utility is encountered during work shall be clarified with engineer and coordinated with the local utility company.
3. Prior to the commencement of any work, copies of permits, certifications, and licenses shall be made and maintained on-site throughout project.
4. Proper erosion and sedimentation control measures shall be installed prior to any site work being done. (refer to sections 026113 and 312513)
5. Anti-tracking pads shall be installed prior to the commencement of any remedial earthwork.
6. Call Before You Dig 1(800)922-4455, Contractor shall obtain utility markout prior commencing mobilization activities.

C. Earthwork Activities involving contaminated material
1. Redevelopment activities for this project will involve some earthwork, including excavation, addition and compaction of earthen materials, installation of utilities, structures, and equipment, and other activities described elsewhere. These activities may encounter contaminated fill material in the subsurface consisting of ash-impacted soils that contain certain substances at concentrations that exceed Connecticut regulatory criteria, specifically the Residential Direct Exposure Criteria (Res DEC). An orange warning fabric was placed over all remaining soils exceeding the Res DEC following remedial actions conducted. A minimum of 4 feet of clean soil was then placed over the warning fabric, rendering the impacted soils inaccessible as defined in the RSR. An Environmental Land Use Restriction (ELUR) was recorded on December 23, 2010 on land records for the property known as Veterans Field, Cedar Grove Avenue, New London, Connecticut, designated as Map #35, Block #217, and Lot #7 on the City of New London tax map (the “Property”). The ELUR was implemented as part of a remedial action plan to address site-wide contaminated fill materials at the Veterans Field property at depths of up to at least 10 feet in some areas.
2. Excavation of soils below a depth of 4 ft. in areas previously covered by the warning fabric layer could encounter impacted soils that must be handled and managed according to the Soils Management Plan (SMP). Ash-impacted material is present to depths of up to at least 10 ft in some areas of the site. Therefore, excavation of soils below a depth of 4 ft. in areas in any areas regardless of whether a warning fabric layer is present could encounter impacted soils that must be handled and managed according to the Soils Management Plan (SMP).Excavate soil in the manner and to the depth required. If impacted soil is encountered, it should be managed according to the SMP and properly disposing of waste as specified in section 026000.
3. Temporary waste stockpile area(s) should be constructed prior to excavations.
4. Areas will then need to be backfilled and compacted to match existing grade, and in the manner outline in section 310513.

D. Utilities
1. Contractor should notify engineer and applicable utility company if non-indicated utilities are discovered.

1.7 PHASED CONSTRUCTION

A. The Work shall be conducted in a single phase, order of work shall be determined at the time of award with the Owner and Architect.

B. Before commencing Work, submit a copy of Contractor's construction schedule showing the sequence, commencement and completion dates for all phases of the Work.

C. The General Contractor shall provide adequate security barriers and construction fencing between areas of construction and areas of public use and public passage. A construction fencing and security barrier plan shall be formulated by the General Contractor, reviewed with the Architect and Owner, and periodically inspected to insure compliance with necessary security measures. All construction fencing shall be locked if appropriate for the project, at times when the site is not occupied with personnel associated with the General Contractor.

D. The General Contractor shall obtain from the Architect a Certificate of Substantial Completion (AIA Form G704 or equal) at the completion <u>of all contract work and the formation of a punch list by the architect</u>.

1. The General Contractor shall complete all punch list items within thirty (30) working days of issuance. Requests for extensions must be submitted to the Architect and Owner in writing and approved.

1.8 CONSTRUCTION TIME

A. The contractor shall furnish all materials, labor, and equipment to complete the project **<u>within six (6) months</u>** of Owner's Notice to Proceed, there are no provisions for winter conditions.

B. The Contractor shall achieve Substantial Completion (as defined in AIA Document G704) <u>within six (6) months</u> of Owner's Date of Commencement/ Date of Contract Award. Date of Commencement shall be established as the date of Contract Award from the Awarding Authority.

C. All punchlist work for the site work shall be completed **<u>within thirty 30 days</u>** after the date of Substantial completion as indicated above.

D. The term "Substantial Completion" or "Substantially Complete" as used in the contract documents shall be deemed to refer to Substantial Completion of all contracted scope of work.

E. The term "Contract Time" as used in the contract documents shall mean the time period from the date of commencement until the Substantial Completion. Such period may be extended in accordance with the provisions of the Contract Documents.

1.9 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 work in areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated. It is the sole responsibility of the contractor to repair or replace any items damaged during construction at no additional cost to the owner.

1. Limits: Confine construction operations to project limits indicated on the contract documents.

2. Alterations to the Limits Indicated: Should the Contractor find the limits indicated on the contract drawings constrictive. The contractor must submit to the Architect and Owner, a drawing indicating the proposed modifications to the Contract limits for consideration. The Contract Limits shall not be modified without the written consent of the Owner or Architect.

3. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Property Owners, Property Owner's employees, Property Owners patrons 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.

4. Material Stockpile/Vehicle Parking: Material stockpile and vehicle parking locations shall be coordinated with the City of New London prior to the commencement of construction. Under no circumstance shall materials be stored on any property not approved by the City of New London.

1.10 COORDINATION WITH OCCUPANTS

A. Adjacent Property Owners will occupy their properties and existing adjacent building(s) during entire construction period. Cooperate with Property Owners during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Property Owner and approval of authorities having jurisdiction.
2. Notify Property Owner and Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.11 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 building to normal business working hours of 7 AM a.m. to 4 p.m., Monday through Friday, 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 Architect and Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

1.12 INTENT

A. These Specifications with the accompanying Drawings are intended to describe and illustrate all material, labor, and equipment necessary to complete the construction of Veterans Memorial Field.

B. For the convenience of reference, these Specifications are separated into titled Divisions and Sections. Such separations shall not, however, operate to make the Landscape Architect and arbiter to establish limits to Contracts between the General Contractor and Subcontractors. The Divisions of the Specifications do not necessarily define the limits of the Contractor's subcontracts; the work of any one subcontract may include items specified in several Divisions or Sections. The Design Builder may sublet work as he sees fit, but it is his responsibility to see that all work shown on the Drawings and/or specified is completed in accordance with the Contract.

C. Furnish all materials and accomplish all work in strict accordance with the grades or standards of materials, standards of workmanship, and manufacturer's specifications listed or mentioned in these documents.

D. The listing or mention of materials shall be sufficient indication that all such materials shall be furnished by the Subcontractor, in accordance with the grades or standards indicated, free from defects impairing strength, durability or appearance and in sufficient quantity for the proper and complete execution of the work, unless specifically stated otherwise.

E. The listing or mention of any installation, erection, fabrication or workmanship shall not operate to make the Subcontractor an agent, but shall be for the sole purpose of setting a standard of quality for the finished work. The Subcontractor is free to use any alternate method, provided only that, prior to the start of work, such alternate method is approved in writing by the

Architect and General Contractor, as resulting in quality equal to that intended by these documents. Unless an alternate method is approved, all work shall be in strict accordance with all methods of installation, erection, fabrication and workmanship listed or mentioned herein.

1.13 SOCIAL SECURITY TAXES

A. Each Subcontractor shall pay the taxes measured by the wages of all their employees as required by the Federal Social Security Act and all amendments thereto, and accept the exclusive liability for said taxes. The General Contractor shall also indemnify and hold the Owner, and its respective officers, agents and servants and the Architect harmless on account of any tax measured by the wages foresaid of employees of the Subcontractors and his lower tier subcontractors, assessed against the Owner under authority of said law.

1.14 UNEMPLOYMENT INSURANCE

A. General Contractor and each Subcontractor shall pay the unemployment insurance measured by the wages of all their employees as required by law and accept the exclusive liability for said taxes. The General Contractor and each Subcontractor shall also indemnify and hold the Owner, and its respective officers, agents and servants and the Architect harmless on account of any contribution measured by the wages foresaid of employees of the General Contractor and his Subcontractors, assessed against the Owner under authority of said law.

B. Refer to the Insurance Requirements indicated in the Supplemental General Conditions.

1.15 OCCUPAIONAL SAFTEY AND HEALTH ACT

A. General Contractor and all Subcontractors shall comply with the requirements of the Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, including all standards and regulations which have been promulgated by the Governmental Authorities which administer such Acts and said requirements, standards and regulations are incorporated herein by reference.

B. General Contractor and all Subcontractors shall comply with said regulations, requirements and standards and require and be directly responsible for compliance therewith on the part of his agents, employees, material men and Subcontractors; and shall directly receive and be responsible for all citations, assessments, fines or penalties which may be incurred by reason of his agent, employees, material men or Subcontractors failing to so comply.

C. General Contractor and all Subcontractors shall indemnify the Owner and Architect and save them harmless from any and all losses, costs and expenses, including fines and reasonable attorney's fees incurred by the Owner and Architect by reason of the real or alleged violation of such laws, ordinances, regulations and directives, Federal, State and Local, which are currently in effect or which become effective in the future, by the Subcontractor, his lower tier Subcontractors or material men.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Add Alternate No. 1: Parking Lot Improvements

1. Base Bid: The General Contractor and related subcontractors are to provide all labor, equipment, materials, and whatever else necessary to furnish and install stone walls, sidewalks, lawn, planting, and grading improvements as indicated on sheet L-2.0 Site Improvements and sheet L-2.1 Site Improvements Enlargements and as specified in associated specification sections as part of the base bid. Existing building to remain.
2. Add Alternate: Addition of the Parking Lot Improvements, noted within the drawing set, to the General Contractor's scope of work. The General Contractor and related subcontractors are to provide all labor, equipment, materials, and whatever else necessary to furnish and install stone wall extensions, bituminous parking lot and driveway, granite curbing, crosswalk, drainage utilities, trees and grading improvements as indicated on sheet L-8 Parking Lot Alternate and as specified in associated specification sections.

B. Deduct Alternate No. 2: Composting Restroom

1. Base Bid: The General Contractor and related subcontractors are to provide all labor, equipment, materials, and whatever else necessary to furnish and install the composting restroom as indicated on sheet L-2.1 Site Improvements Enlargements and sheet L-7.7 Site Details and as specified in associated specification sections as part of the base bid.
2. Deduct Alternate: Deletion of all improvements related to the furnishing and installation of the composting restroom from the General Contractor's scope of work. Replace improvements with lawn in place.

END OF SECTION 012300

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:
1. AIA Document A701-1997, Instructions to Bidders
2. Supplementary Instructions to Bidders
3. AIA Document A201-2007, General Conditions of the Contract for Construction
4. Supplementary General Conditions
5. Division 1 Specifications

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.
d. List of subcontractors
e. List of products

2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values coordinated with each phase of payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.

d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703. Must include the following:
   a. Generic Name
   b. Relative Specification Section
   c. Name of Subcontractor
   d. Name of manufacturer or fabricator
   e. Name of Supplier
   f. Change orders (numbers) that have affected value
   g. Dollar Value
   h. Percentage of Contract sum to the nearest one hundredth percent, adjusted to total 100%.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Architect by the 1st of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Sustainable design submittal for project materials cost data.
4. Contractor's construction schedule (preliminary if not final).
5. Sustainable design action plans.
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.

9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.
14. Certificates of insurance and insurance policies.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.
10. Removal of surplus materials, rubbish and similar elements.
11. Removal of temporary facilities and services.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination drawings.
2. Requests for Information (RFIs).
3. Project meetings.

1.2 DEFINITIONS

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

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

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

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.

2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Architect's actions on submittals.
    f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.

7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for RFIs.
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Distribution of the Contract Documents.
j. Submittal procedures.
k. Preparation of record documents.
l. Work restrictions.
m. Working hours.
n. Responsibility for temporary facilities and controls.
o. Procedures for disruptions and shutdowns.
p. Construction waste management and recycling.

q. Parking availability.
r. Office, work, and storage areas.
s. Equipment deliveries and priorities.
t. First aid.
u. Security.
v. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Sustainable design requirements.
i. Review of mockups.
j. Possible conflicts.
k. Compatibility problems.
l. Time schedules.
m. Weather limitations.
n. Manufacturer's written instructions.
o. Warranty requirements.
p. Compatibility of materials.
q. Acceptability of substrates.
r. Temporary facilities and controls.
s. Space and access limitations.
t. Regulations of authorities having jurisdiction.
u. Testing and inspecting requirements.
v. Installation procedures.
w. Coordination with other work.
x. Required performance results.
y. Protection of adjacent work.
z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Status of sustainable design documentation.
        5) Deliveries.
        6) Off-site fabrication.
        7) Access.
        8) Site utilization.
        9) Temporary facilities and controls.
        10) Progress cleaning.
        11) Quality and work standards.
        12) Status of correction of deficient items.
        13) Field observations.
        14) Status of RFIs.
        15) Status of proposal requests.
        16) Pending changes.
        17) Status of Change Orders.
        18) Pending claims and disputes.
        19) Documentation of information for payment requests.

3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

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.

1.3 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.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. 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. 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.

B. 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 7 days for review of each resubmittal.

C. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

    j. Number and title of appropriate Specification Section.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.

a. Transmittal Form for Paper Submittals: Use AIA Document G810.
b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

1) Project name.
2) Date.
3) Destination (To:).
4) Source (From:).
5) Name and address of Architect.
6) Name of Construction Manager.
7) Name of Contractor.
8) Name of firm or entity that prepared submittal.
9) Names of subcontractor, manufacturer, and supplier.
10) Category and type of submittal.
11) Submittal purpose and description.
12) Specification Section number and title.
13) Specification paragraph number or drawing designation and generic name for each of multiple items.
14) Drawing number and detail references, as appropriate.
15) Indication of full or partial submittal.
16) Transmittal number, numbered consecutively.
17) Submittal and transmittal distribution record.
18) Remarks.
19) Signature of transmitter.

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., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-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: Identify deviations from the Contract Documents on submittals.

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:

1. Submit electronic submittals via email as PDF electronic files.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit one paper copies of each submittal unless otherwise indicated. Architect will return two copies.
3. Informational Submittals: Submit one paper copies of each submittal unless otherwise indicated. Architect will not return copies.
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be

signed by an officer or other individual authorized to sign documents on behalf of that entity.

a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
b. Provide a notarized statement on original paper copy 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. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. 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, unless submittal based on Architect's digital data drawing files is otherwise permitted.

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, but no larger than 30 by 42 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.

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 that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

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 two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least five sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:

a. PDF electronic file.

F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures.

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. 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.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. 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.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. 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.

S. 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.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

U. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. 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.

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 SUBSTITUTIONS

A. Conditions: The Subcontractor's substitution request will be received and considered by the Architect when one (1) or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.
   1. Extensive revisions to the Contract Documents are not required
   2. Proposed changes are in keeping with the general intent of Contract Documents
   3. The request is timely, fully documented and properly submitted

4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
5. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly
6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
7. A substantial advantage is offered the owner in terms of cost, time energy conservation or considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
8. The specified product or method of construction that is compatible with other materials, and where the Subcontractor certifies that the substitution will overcome the incompatibility.
9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Subcontractor certifies that the proposed substitution provide the required warranty.

B. The Subcontractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the contract documents does not constitute and acceptable or valid request for substitution provide the required warranty.

2.3 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 and three paper copies 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. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. 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, as follows:

1. Approved.

2. Approved as Noted.

3. Revise and Resubmit.

4. Disapproved.

5. Noted.

C. 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.

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 not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.
3. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.

2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

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

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

d. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

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

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

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 applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

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.

PART 3 - EXECUTION

3.1 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.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

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

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. 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.

F. 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.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction

from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

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

1. Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for each facsimile machine in each field office.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Contractor's emergency after-hours telephone number.
e. Architect's office.
f. Engineers' offices.
g. Owner's office.
h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

K. 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.

3.3 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 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, proof rolling, 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.

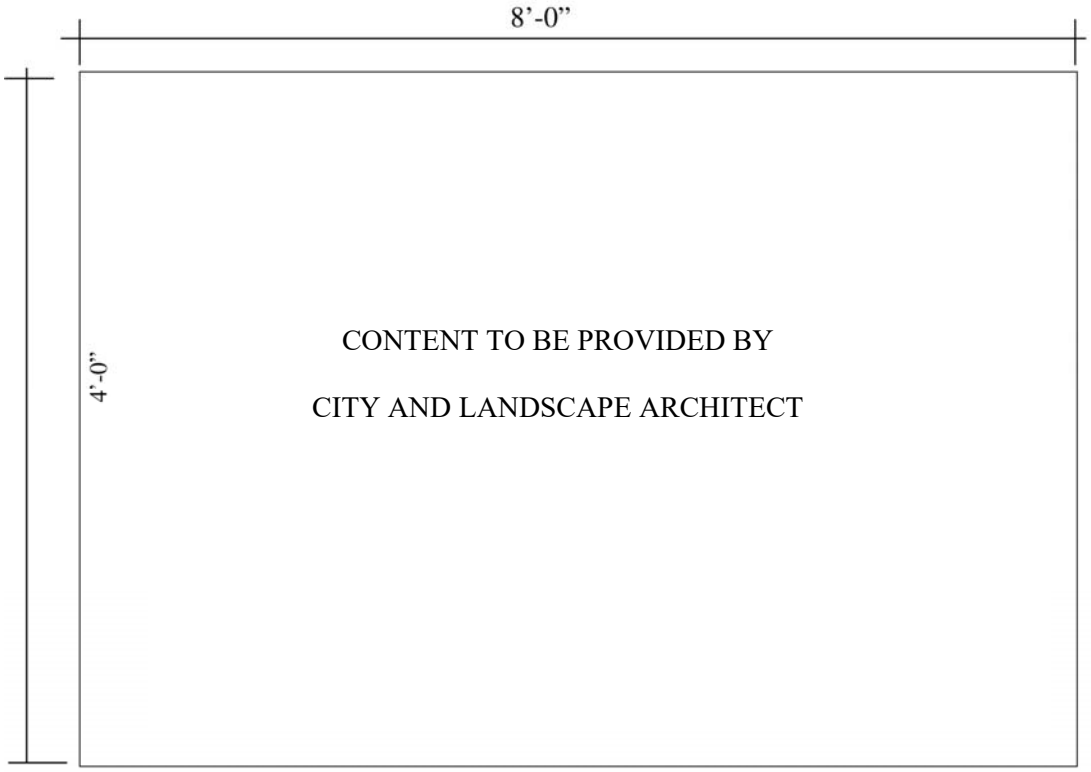
F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

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 sign on 4 feet x 8 feet x 3/4" MDO-EXT-APA plywood. Frame with 2 x 4 inch center cross bracing and two 4 x 4 inch x 12 feet long posts buried 4 feet deep (minimum). Top of sign shall be 8'-0" above grade. Mount sign to framing with four 3/8 inch diameter lag bolts and washers on each side of the sign. Sign locations must be prominent and highly visible to the general public. Graphics shall be provided by the Architect and applied by an experienced sign company using weather resistant finishes. Identification signs must also include the following:

a. Sign template shall be as follows:



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 touchup 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.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 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.

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.

C. 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 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

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

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

F. 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.

G. 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 environmentally safe materials.

H. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence if applicable to the project in a manner that will prevent people and animals 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.

I. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction if applicable to the project. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

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

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

L. 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 not complete, insulate temporary enclosures.

3.5 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. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
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 015000

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

A. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

B. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated. In no instance shall the tree protection be less than the drip line of the tree.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.

C. Samples: For each type of the following:

1. Organic Mulch: Sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples.
3. Protection-Zone Signage: Full-size Samples.

D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1.5 INFORMATIONAL SUBMITTALS

A. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

B. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

C. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1.6 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in jurisdiction where Project is located, current member of ASCA, or registered Consulting Arborist as designated by ASCA. Arborists shall oversee all excavation, trenching, root pruning and crown pruning within tree and shrub protection zones.

1.7 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

1. Planting Soil: Planting soil as specified in Section 329115 "Soil Preparation (Performance Specification)."

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded Hardwood.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:

1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch (50-mm) opening, 0.148-inch- (3.76-mm-) diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- (60-mm-) OD line posts, and 2-7/8-inch- (73-mm-) OD corner and pull posts; with 1-5/8-inch- (42-mm-) OD top rails and 0.177-inch- (4.5-mm-) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.

a. Height: 48 inches (1200 mm).

2. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

3.2 PREPARATION

A. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

B. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.

1. Apply 4-inch (100-mm) uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches (150 mm) of tree trunks.

3.3 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected areas except by entrance gates.

1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
3. Access Gates: Install where indicated.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect.

C. Maintain protection zones free of weeds and trash.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

3.4 EXCAVATION

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

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

C. Do not allow exposed roots to dry out before placing permanent backfill.

3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
3. Cover exposed roots with burlap and water regularly.
4. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1).

B. Cut branches with sharp pruning instruments; do not break or chop.

C. Do not paint or apply sealants to wounds.

D. Chip removed branches and dispose of off-site.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

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

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
2. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch (50-mm) uniform thickness to remain.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 015639

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

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

C. Certified Surveys: Submit two copies signed by land surveyor.

D. Final Property Survey: Submit 5 copies showing the Work performed and record survey data.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching.

PART 2 - PRODUCTS

2.1 MATERIALS

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

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

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

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

3.2 PREPARATION

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

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

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

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

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

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

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

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

3.9 PROTECTION OF INSTALLED CONSTRUCTION

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

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of structures and site improvements, and for disposition of hazardous waste.
2. Section 049000 "Wet Set Stone Masonry" for disposal requirements for masonry waste.
3. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Facilitate recycling and salvage of materials, including the following:

1. Wall Stone
2. Stockpiled rock
3. Stone Curbing
4. Flag Pole
5. Playground Equipment

1.4 INFORMATIONAL SUBMITTALS

A. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Review plan procedures and locations established for salvage, recycling, and disposal.

B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not permitted on Project site.

C. Salvaged Items for Owner's Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. New London Solid Waste Transfer, 63 Lewis Street, New London, CT 06320. (860) 447-5248.

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Grind asphalt to maximum 1-1/2-inch size.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 1-1/2-inch size.

D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 1-inch size.
2. Clean and stack undamaged, whole masonry units on wood pallets.

E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

F. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

G. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

H. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.7 DISPOSAL OF INVASIVE SPECIES

A. General: Remove invasive plant species from Project site and transport to a municipal waste combustor for incineration in compliance with local, state and federal regulations. Under no circumstance shall invasive species be disposed of at local transfer stations.

1. Do not allow invasive plant species to accumulate on-site. Removed plants must immediately be placed in a container for disposal.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas. Smallest portions of the plant roots can regenerate.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Complete startup and testing of systems and equipment.
3. Perform preventive maintenance on equipment used prior to Substantial Completion.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
5. Advise Owner of changeover in heat and other utilities.
6. Participate with Owner in conducting inspection and walkthrough.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate of Final Acceptance after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Submit list of incomplete items in the following format:

a. PDF electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

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

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access.
f. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Remove labels that are not permanent.
i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
j. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
k. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Operation manuals
3. Product maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily

navigated file tree. Configure electronic manual to display bookmark panel on opening file.

2.2 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Wiring diagrams.
6. Control diagrams.
7. Precautions against improper use.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Routine and normal operating instructions.
2. Special operating instructions and procedures.

2.3 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.

2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:
1) Submit record digital data files and one set(s) of plots.
2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:
1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

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

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Record data as soon as possible after obtaining it.
    c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Format: DWG, Version , Microsoft Windows operating system.
3. Format: Annotated PDF electronic file with comment function enabled.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect for resolution.
6. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file and a paper copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file and a paper copy.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file and a paper copy.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

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

END OF SECTION 017839

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected site elements.
   2. Salvage of existing items to be reused or recycled.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Engineering Survey: Submit engineering survey of condition of building.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of selective demolition activities with starting and ending dates for each activity.

D. Predemolition photographs or video.

1.5 CLOSEOUT SUBMITTALS

A. Inventory of items that have been removed and salvaged.

1.6 FIELD CONDITIONS

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

1. Before selective demolition, Owner will remove the following items:

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

C. Hazardous Materials: Hazardous materials are present on site & have been capped 4’ below grade & are protected by a geotextile warning layer.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Storage or sale of removed items or materials on-site is not permitted.

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

F. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Location of existing underground utilities is unknown. The Contractor is responsible for contacting the proper utility companies for a mark-out prior to the start of selective demolition.

B. Verify that utilities have been disconnected and capped before starting selective demolition operations.

C. Inventory and record the condition of items to be removed and salvaged.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

3.3 ABANDONING EXISTING CATCHBASINS AND MANHOLES

A. See Site Demolition Plan (L-1.0) for location of catch basins to be abandoned in place.

B. Remove frame and cover.

C. Existing catch basins and manholes designated to be abandoned shall be removed to a depth of one (1) foot below the subgrade line, unless otherwise indicated on the Plans or directed by the Engineer. Manhole covers shall be set & sealed on all basins & manholes. Drain pipes shall be left clean & clear for possible future use/connection.

3.4 PROTECTION

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

B. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

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

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.

Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch during and for at least 1 hour after flame-cutting operations.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

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

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 CLEANING

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction. and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 026000 - CONTAMINATED SITE MATERIAL REMOVAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. The work included under this item consists of the Contractor's requirements for the loading, transportation, and final off-site disposal of all Controlled Materials.
2. This item shall apply to Controlled Materials generated by the Contractor and all subcontractors.
3. The Contractor must use an approved, permitted treatment/disposal facility for both State and Federal regulated solid and liquid wastes. See section 1.9 below for approved disposal facilities. Identification of the proposed disposal facilities must be coordinated by the Contractor.

B. Related Sections:
1. Section 026113 - Excavation and Handling of Contaminated Materials.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Basis of Payment:

Each "Disposal of Controlled Materials" line item, defined under Section 1.4, price shall include the incidental handling, loading, and transportation of Controlled Materials from the Temporary Waste Stockpile to the treatment/disposal facility, the treatment/disposal of Controlled Materials, the preparation of manifests, bills of lading, and fees paid; and all equipment, materials, tools, and labor incidental to loading, transporting, weighing, treating, and disposal of Controlled Materials. Dust control, equipment decontamination, and time and mileage related to the weighing of trucks for verification purposes are all considered incidental to this work. No additional pay for incidental tasks will be made

B. Method of Measurement:

The work of "Disposal of Controlled Materials" shall be measured for payment as the actual net weight in tons of material delivered to the treatment/disposal facility. Such determinations shall be made by measuring each hauling vehicle on the permanent scales at the treatment/recycling facility and temporary scales on site. Total weight shall be the summation of weigh bills issued by the facility.

Equipment decontamination shall not be measured for payment.

Scrap metal decontamination shall not be measured for payment.

1.3 REFERENCES

A. Occupational Safety & Health Administration:
1. 29 CFR 1910.120, “HAZWOPER” regulations

2. 29 CFR 1910.1200, "HAZCOM" regulations
3. Trenching: 29 CFR 1926-(650-653)

B. Environmental Protection Agency Regulations

1.4 DEFINITIONS

A. Impacted soil disposed of off-site: Shall include all soil materials that are directed to be disposed of off-site by the Engineer, that have been determined by the Engineer to be contaminated with regulated substances at hazardous concentrations. These materials, after proper characterization by the Engineer, shall be transported by a licensed waste transporter approved by the Engineer and disposed of at an approved non-municipal non-hazardous waste landfill, subject to 40 CFR Part 257, as applicable, or solid waste recycling or treatment facility within 90 days from the date of its generation. To be measured by Ton in accordance with Section 1.2B.

1.5 SUBMITTALS

A. Selected Disposal Facility information: The name, address, and contact information for the proposed treatment/disposal facility, which shall include the name and phone number of an authorized representative of the facility. The Contractor shall submit a copy of the facility's:
1. Acceptance criteria
2. Sampling frequency requirements
3. Copy of the facility's operational permit.

B. Disposal Facility Disposal Authorization Documentation: The Contractor shall submit to the Engineer any documentation required to obtain Disposal Facility Authorization at least five (5) working days prior to disposal. The Contractor shall submit to the Owner the Waste Generator Certification at least five (5) working days prior to disposal.

C. The Engineer shall be responsible for providing the following information:
1. Site Sketch
2. Laboratory Analytical Reports
3. Approval letters required by Environmental Professional/Engineer (i.e. Licensed Environmental Professional, Registered Geologist, Professional Geologist, Professional Engineer, etc.)

D. Disposal Records: Submit documentation satisfactory to Engineer, attesting to final and legal disposal of waste materials removed from site. Include records for the following:
1. Bills of Lading
2. Universal Hazardous Waste Manifests
3. Weight tickets/receipts for disposal.
4. A summary of the weight (in tons and/or gallons) of each class of waste material removed from the site for disposal shall be submitted to the Owner and Engineer each month and at the completion of the project, or as directed by the Environmental Professional.
5. Certificates of Destruction for all materials that have been disposed of by methods of incineration, smelting, etc.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
1. United States Environmental Protection Agency.
2. United States Occupational Safety & Health Administration

B. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

A. Workers: All persons working on this project and providing field work must possess an active 40 hour OSHA HAZWOPER 29CFR1910.120 training certificate, adhere specifically to the regulations and have demonstrated at least 3 days of documented work Site specific field experience training from their company, under the guidance of an experienced supervisor.

B. Hauling Company: All haulers removing contaminated material from the site shall be licensed to perform the work. During the entire contract period, the hauling company shall provide and maintain equipment (trucks, etc) to service the Site. The equipment shall be kept in good repair, appearance and in a sanitary condition by the contractor. The contractor will stage the equipment on-Site location and will not stage the equipment in or around the community streets surrounding the Site.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Prevent surface runoff from entering excavation

B. Prevent contaminated soils/runoff from entering storm drain.

C. Prevent erosion of soil stockpile to prevent spreading contamination.

1.9 COORDINATION

A. The Contractor shall notify the Engineer within 24 hours of becoming aware that a material encountered during remediation activities does not meet one of the categories listed in Section 1.4.

1.10 TRANSPORTATION

A. Transported controlled materials are to be covered with minimal thickness 10mil polyethylene sheets at all times prior to leaving the point of generation and are to remain covered until the arrival at the WSA or Disposal Facility

B. Vehicles used to transport Controlled Materials must be free from leaks, equipped with load tarpaulins, and any discharge openings must be securely closed during transportation.

C. All vehicles shall be decontaminated by the Contractor prior to leaving the loadout areas.

D. No materials shall leave the site unless a disposal facility willing to accept all of the material being transported has agreed to accept the type and quantity of waste.

E. All materials haulers/vendors shall be licensed in the State of Connecticut to haul/transport contaminated materials.

PART 2 EXECUTION

2.1 PREPARATION

A. Notify regulating agencies regarding activities.

B. Obtain licenses, permits, and inspections required for activities.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Mark location of utilities.

2.2 WASTE DISPOSAL

A. Collect construction waste, impacted material and waste from construction area, daily or as required.

B. Remove debris, rubbish, and other materials resulting from excavation operations. Transport and legally dispose off-site.
   1. Disposal of contaminated materials encountered during excavation operations, shall comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
   2. Burning of removed materials is not permitted on project site.
   3. Pay for required weighing and measuring fees and charges to legally dispose waste materials off-site.

C. Remove contaminated soil and legally dispose off-site.

D. Remove excess uncontaminated excavated material from site.

END OF SECTION 026000

SECTION 026113 - EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. The Work under this item shall include all materials, equipment, tools and labor required to perform the work, which includes but is not limited to, the following:
      a. Excavate and manage Controlled Materials, as defined in these specifications, as shown on the contract drawings, and/or as directed by the Engineer.
   2. This item shall include construction, maintenance, and dismantling of Temporary Waste Stockpiles.
   3. This item shall apply to all Controlled Materials generated by the Contractor and all subcontractors.
   4. This item will require implementation of the Health and Safety measures outlined in the Soils Management Plan (SMP)

B. The intention of this specification is to enforce all requirements; either specified or implied, which are outlined in the SMP.

C. Related Sections:
   1. Section 026000 - Contaminated Site Material Removal
   2. Section 310513 – Soils for Earthwork

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Excavation and Handling of Contaminated Materials
   1. Basis of Measurement: By Cubic Yard.
   2. The Excavation of Contaminated Materials: This includes the work of excavating, loading, transporting, stockpiling, handling, and maintaining various Contaminated Materials as indicated on the plans and as directed by the Environmental Professional and Engineer. Calculation of volume shall be determined from calculated volumes of material removed as directed by the Engineer as indicated on the Contract drawings. No payment will be made for over excavation.
   3. The following items are considered incidental to the Contract Unit Price items and will not be measured separately for payments:
      a. The work of constructing, maintaining, and dismantling Temporary Waste Stockpiles is considered incidental to the excavation and removal of Contaminated Materials and shall not be measured separately for payment.
      b. Dust control activities shall not be measured for payment.
      c. Equipment decontamination shall not be measured for payment.
      d. Incidental dewatering shall not be measured for payment.
   e. Establishment of survey control points and layout necessary to achieve restoration of existing site grades shall not be measured for payment.

1.3 REGULATORY REQUIREMENTS

A. Comply with 29 CFR 1926 “Safety and Health Regulations for Construction”.
B. Conform to applicable Sections of Connecticut Department of Transportation Standard Specifications.
C. Discrepancies between these technical specifications and state standards, the more stringent of the two should be followed.

1.4 SUBMITTALS

A. Three weeks prior to the start of work, submit to the Engineer for review a written schedule for all activities associated with soil remediation.

PART 2 PRODUCTS

2.1 MATERIALS

A. All polyethylene sheeting used for covering stockpiled Controlled Materials shall have a minimum thickness of 10 mils.
B. All polyethylene sheeting used for underlayment beneath stockpiled Controlled Materials shall have a minimum thickness of 10 mils.
C. Sandbags used to secure polyethylene sheeting covers shall have a minimum weight of 30 lbs.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to Work. Notify the Engineer upon discovery of any unanticipated conditions.
B. At least three working days prior to the start of any excavating activities, the Contractor will notify Engineer of verification of utility locations.
C. Prior to the start of any excavating activities the Contractor must employ a private underground utility locating company to locate any utilities not marked. The Contractor is solely responsible for location and protection of underground utilities.
D. Cooperate with the Engineer’s directions to explore existing conditions to verify location, extent, and depth of contaminated soil that needs to be handled in accordance with the RAP for this site.

3.2 PREPARATION

A. The Contractor shall coordinate with the Engineer to identify location for Temporary Waste Stockpiles.
B. The Contractor shall locate, identify and protect from damage utilities that will remain.
C. Protect benchmarks, monitoring wells, and confirmatory sample location staking from damage by excavating equipment and vehicular traffic, unless otherwise indicated by the Engineer. Benchmarks, staking, and monitoring wells that are damaged or destroyed will be repaired or replaced by the Owner at the Contractor’s expense.

D. Identify limits of remediation that are designated for removal and confirm off-site disposal.
E. All existing utilities to remain and shall be protected during excavation
F. Be advised that utility piping may run through a Remedial Area, coordinate with engineer and/or local utility company on how to proceed.

3.3 EXCAVATION OF CONTROLLED / CONTAMINATED MATERIALS

A. General Requirements
   1. No blasting will be permitted on project site. Rock removal shall be done via mechanical means.
   2. All Controlled Materials excavated under the contract will require Special Handling according to the requirements of these specifications and any applicable federal, state or local regulations.
   3. Contractors that work with, or have the potential to be exposed to Contaminated Materials in the course of construction activities shall meet the requirements of the Environmental Health and Safety Plan. Health and Safety provisions may include the use of personal protective equipment, implementation of engineering controls, air and personnel monitoring, and decontamination procedures.
   4. The Contractor shall take measures to keep areas including, but not limited to, areas adjacent to excavations, roadways leading to and from the project site, parking areas, and public roadways free from dirt, dust, Contaminated Materials, or other materials. If such materials are deposited, spilled, or spread, such material shall be removed promptly, and properly disposed of to the satisfaction of the Environmental Professional no later than the end of each working day or as directed by the Engineer. Wet sweeping shall be used if necessary to reduce dust emissions.
   5. Unless otherwise directed by the Engineer, materials removed from any of the RAC's shall be transported directly to Waste Stockpile Area (WSA). Contractor shall plan excavation activities within the AOC-4 in consideration of the WSA capacity, and the material testing and disposal requirements. *No claims for delay shall be considered based on the Contractor's failure to coordinate excavation activities as specified herein.*
   6. The Contractor is hereby notified that laboratory turnaround time is approximately to be fifteen (10) working days. Turnaround time is the period of time beginning when the Contractor notifies the Engineer which facility it intends to use and that the stockpile is ready for sampling and ending with the Contractor's receipt of the laboratory analytical results. Any change of intended treatment/recycling/disposal facility may prompt the need to resample and will therefore restart the time required for laboratory turnaround. The laboratory will furnish such results to the Engineer. Upon receipt, the Engineer will make available to the Contractor the results of the final waste characterization determinations. *No delay claim will be considered based upon the Contractor's failure to accommodate the laboratory turnaround time as identified above.*

B. Excavation of Controlled Materials
   1. Comply with all site earthwork requirements set forth these Specifications.
   2. Transport all Controlled Materials excavated within the Project Limits off site. The work shall conform to these specifications and the work plans prepared for the project.

3.4 MOISTURE CONTROL

A. Wet or saturated Controlled Materials soils shall be allowed to dry before removal off the site. Dry shall be determined by the ability of materials to be trucked off-site without free-draining liquids.

3.5 OPERATION OF WASTE STOCKPILE AREAS

A. Transported controlled materials are to be covered with minimal thickness 10mil polyethylene sheets at all times prior to leaving the point of generation and are to remain covered until the arrival at the WSA or Disposal Facility

B. The Contractor is responsible for the maintenance and protection of all utilities potentially affected during operations associated with the WSA. The Contractor shall locate and mark all existing utilities potentially affected by such activities prior to use of the WSA. Also, overhead utilities will be located, and any safety issues addressed.

C. Construction of the WSA shall be completed prior to the initiation of construction activities generating Contaminated Materials. The Contractor is responsible for the maintenance and protection of all utilities potentially affected during WSA construction. The Contractor shall locate and mark all existing utilities potentially affected prior to initiating WSA construction.

D. The Contractor shall deposit all excavated Controlled Materials within the WSA following excavation. Controlled Materials shall be deposited at locations within the WSA as directed by the Engineer. The Engineer will also determine the maximum amount of Controlled Materials allowed in an individual stockpile within the WSA. To the extent practicable, placement of Controlled Materials shall be such that available space is fully utilized, while subsequent removal of materials is unhindered. Access to, and egress from, the WSA shall be maintained at all times

E. The Contractor shall keep all stockpiles covered with 10 mil polyethylene sheeting at all times, with the exception of periods when a stockpile is being actively worked. Polyethylene sheeting shall be secured or weighed down with sandbags, roped tires, a combination thereof, or other materials approved by the Engineer, in such a manner as to prevent the plastic from being dislodged by wind.

F. The Contractor shall comply with the terms and conditions specified below. The Engineer will conduct all soil/sediment characterization and perform all record keeping. In particular, the Contractor shall:

1. Construct and repair the WSA in conformance with the requirements of the General Permit.
2. Prevent unauthorized entry onto the stockpiles by the use of fences, gates, or other natural or artificial barriers.
3. Install anti-tracking measures at the WSA to ensure the vehicles do not track soil from the WSA onto a public roadway at any time.
4. Contaminated soil stockpile shall contain a maximum of 1000 cubic yards per pile. RAC-4 excavated soil shall have a separate WSA pile that RAC 1,2 and 3
5. Post and maintain a sign that is visible from a distance of at least 25 feet indicating the contents of each pile per the work plan.

G. Following the removal of all stockpiled material, the Contractor shall use dry decontamination procedures for all surfaces of the WSA as directed by the Engineer. Residual materials shall be disposed of as Contaminated Materials. If the results from

dry methods are unsatisfactory to the Engineer, the Contractor shall modify decontamination procedures as required.

H. The Contractor shall be responsible for the collection and treatment/recycling/disposal of any liquid wastes that may be generated by its decontamination activities in accordance with applicable regulations.

I. Upon completion of the Project and following removal of all residual Controlled Materials, the Contractor shall dismantle the WSA and return the area to original condition. During dismantling, the Contractor shall remove all materials such as polyethylene sheeting and sand bags. Materials shall be disposed of by the Contractor as solid waste in accordance with the Contract and all Federal, State and local regulations.

J. Polyethylene sheeting shall be placed and maintained on stockpiles within the WSA such that no precipitation is allowed to come in contact with the Controlled Materials. When possible, polyethylene sheeting shall be placed on stockpiles to allow precipitation to drain outside of the WSA. Accumulations of rainwater on top of soil stockpile covers shall not be considered a Controlled Material and may be transferred and discharged outside the WSA.

K. The WSA shall be inspected at least once daily by the Contractor to ensure that stockpile covers are in place and secure, no materials are migrating from the WSA, and the area around the WSA is generally clean. If stockpile covers are displaced, the Contractor shall immediately replace and re-secure the sheeting. If soil stockpile covers are damaged, the Contractor shall immediately replace damaged sheeting with new sheeting.

L. It shall be the Contractor's responsibility to maintain all aspects of the WSA, and to prevent the release of contaminants from the WSA to the environment throughout the duration of the project.

M. Because of the nature of the WSA as a storage and marshaling area for Controlled Materials, the facility may not be used as a staging or storage area for tools or equipment unless permission to do so is granted by the Engineer.

N. Throughout, the duration of the project, the Engineer will provide for the sampling and/or testing of materials stockpiled within the WSA. The Engineer or his representative shall have access at all times to the stockpiled materials.

O. All Controlled Materials stockpiled in the WSA shall be sampled by the Engineer in order to characterize soils for final disposition in accordance with Item Number 026000 - Contaminated Site Material Removal

3.6 ANTI-TRACKING MEASURES

A. The Contractor shall employ anti-tracking measures (street sweepers, anti-tracking pads, etc.) at the Staging, Transfer and/or Temporary Storage Area to ensure that vehicles that have entered the Staging, Transfer and/or Temporary Storage Area do not track soils from the Staging, Transfer and/or Temporary Storage Area onto a public roadway at any time.

B. At site entrance/exit Anti-tracking pads shall be constructed using No. 3 Coarse Aggregate. Geotextile shall conform to the requirements of Article M.08.19 (CT-DOT 816). Materials incidental to and necessary for the installation of the geotextile, such as, but not limited to sewing thread, staples, pins, etc., shall conform to the requirements of the manufacturer.

C. Clear area of anti-tracking pad of all vegetation and excavate to a minimum depth of 4”. Place geotextile filter fabric over the full width and length of excavated area and cover with No. 3 crushed stone to a depth of no less than 4”. The anti-tracking pad shall be uniformly graded to produce the entry and exit path to the site for all construction

equipment. The pad shall be maintained of sufficient grading and stone surface to capture all soils and sediment from equipment tires prior to such exiting from the site.

D. Stone shall be replenished or replaced as necessary or as ordered by the Engineer to assure sufficient capture of sediment at the construction site. Any sediment tracked off the site shall be immediately cleaned, swept and removed by the Contractor at no cost to the State

E. Upon completion of work at a site, the anti-tracking pads shall be removed in its entirety and the site restored to its original condition. Excavated material from the installation of the anti-tracking pads shall be stockpiled by the Contractor and shall be used for the restoration of the site when the pad is removed. At locations where the anti-tracking pad is adjacent to a paved surface with curbing, the Contractor shall remove the curbing from the pavement in a manner to minimize any damage to the pavement. The anti-tracking pad shall be installed to match the pavement grade. Upon removal of the pads, the Contractor shall construct replacement curbing matching the material, dimensions and details of the existing curbing at the site.

3.7 EQUIPMENT DECONTAMINATION

A. All equipment shall be provided to the work site free of contamination. The Environmental Professional may prohibit any equipment, which in his/her opinion has not been thoroughly decontaminated prior to arrival. Any decontamination of the Contractor's equipment prior to arrival at the site shall be at the expense of the Contractor. The Contractor is prohibited from decontaminating any equipment on-site which is not thoroughly decontaminated prior to arrival.

B. The Contractor shall furnish labor, materials, tools, and equipment for decontamination of all equipment and supplies, which are used to handle Controlled Materials. Decontamination shall be conducted at an area designated by the Construction Manager for such purpose. Frequency of decontamination shall be determined by the Engineer, and may be required prior to equipment and supplies leaving the project site and/or between stages of the work.

C. **On a routines bases dry decontamination procedures are recommended. Residuals from dry decontamination activities shall be collected and managed as Contaminated Waste.** If dry methods are unsatisfactory as determined by the Engineer, the Contractor shall modify decontamination procedures as required subject to the Engineer approval.

3.8 BACKFILLING AND PROTECTION

A. Backfilling of excavations shall conform to Section 310513 Soils for Earthwork.

B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation. The Contractor shall follow all requirements of Section 310513 Soils for Earthwork during the performance of the work described herein.

C. Provide temporary shoring and/or benching for trenching and excavation per OSHA requirements.

D. Surround excavations with temporary construction fencing or barricades where sloping is not possible and as required by the Engineer.

END OF SECTION 026113

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 321273 "Concrete Paving Joint Sealants" for joint filler and joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M).

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

2.3 STEEL REINFORCEMENT

A. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) , deformed bars, ASTM A 775/A 775M or ASTM A 934/A 934M, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.

B. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, deformed steel.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
2. Fly Ash: ASTM C 618, Class F or C.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IS, portland blast-furnace slag Type IP, portland-pozzolan cement.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement. Shall contain not more than 3% of material finer than a #200 sieve. Fine aggregates shall meet the following gradation requirements indicated in total percent passing by weight:
   a. 3/8": 100
   b. No. 4: 100-95
   c. No. 8: 100-80
   d. No. 16: 85-50
   e. No. 30: 60-25
   f. No. 50: 30-10
   g. No. 100: 10-2

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M and potable.

2.5 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
   a. Sika Greenstreak, 3400 Tree Court Industrial Blvd, St. Louis, MO 63122, 800-325-9504

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
   a. Dayton Superior
   b. W.R. Meadows
   c. Sika Group

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 6.7 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
   a. Dayton Superior
   b. W.R. Meadows
   c. Sika Group

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: Ceramar, closed-cell flexiable foam with recovery qualities exceeding 99% and complying with ASTM D 1751 Sections 5.1-5.4

with compression requirements modified to 10 psi minimum and 25 psi maximum, ASTM D 5249 Type 2, ASTM D 7174-05.

1. Manufacturer: Subject to compliance with requirements, provide products by the following:
   a. W.R. Meadows

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Maximum W/C Ratio: 0.49
3. Slump Limit: 4", plus or minus 1/2 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.0 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect. Provide keyways at all wall to footing junctions.

C. Contraction Joints in Vertical Walls: Use formed contraction joints on both sides of the wall, sectioning concrete into areas indicated and as follows:

1. Attach beveled contraction joint strip to form work prior to construction at an interval three times the wall height for walls under 8 feet and equal to the wall height for walls over 12 feet tall.
2. Contraction joints must extend the entire vertical surface of the wall to a combined depth of 1/4 the thickness of the wall.
3. Inside visible joints shall be no greater than 3/4 inch wide and deep reserving the deeper joint for the earth side of the wall. Freestanding walls which are visible on both sides shall have joints of equal depth.
4. Earth side joints shall be sealed
5. Under no circumstance shall contraction joints be installed at an interval greater than 25 feet on center.
6. Contraction joints shall be within 10 feet to 15 feet of a wall corner.

D. Isolation Joints in Vertical Walls: Provide a space through the full cross section between abutting wall units when concrete is placed and as follows:
1. Install 3/4 inch isolation joints at 100 foot intervals or when a direction change occurs along a wall or when two or more walls come together from different directions.
2. Stop reinforcing 2 inches to 3 inches from the joint
3. Joint dowels shall be used to prevent wall faces from becoming misaligned

3.5 WATERSTOP INSTALLATION

A. Waterstops: Install in contraction joints, construction joints, isolation joints and at other locations indicated, according to manufacturer's written instructions and to the full height of the wall.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

3.7 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 049000 – WET SET STONE MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Granite Block Wall
2. Granite Pier
3. Granite Block Retaining Wall

1.2 Related Sections:

1. Section 312000 "Earth Moving" for Excavation, Compaction, Stone Sub-Base, and Drainage Stone
2. Section 334600 "Subdrainage" for Geo-textile Fabric.

1.3 DEFINITIONS

A. Granite Block Wall: A wet set stone wall with mortar throughout. Mortar shall be visible on the faces. Stones shall be large on average and square in shape. Size and thickness of stones will vary. Faces of these walls are consistent and voids between stones are generous and filled with mortar. This style wall shall be used at both entrances into the park and shall match the existing wall along Cedar Grove Avenue.

B. Granite Pier: A wet set stone wall pier with mortar throughout. Mortar shall be visible on the faces. Stones shall be large on average and square in shape. Size and thickness of stones will vary. Faces of these walls are consistent and voids between stones are generous and filled with mortar. Cap shall be a solid single piece of granite with snapped faces and honed edges. This style wall shall be used to terminate each end of the circular wall at the primary entrance and to terminate the ends of walls at the secondary entrance. The piers shall match the existing piers at the corners of the property along Cedar Grove Avenue.

C. Granite Block Retaining Wall: A wet set stone retaining wall with mortar throughout. Mortar shall be visible on the faces. Stones shall be large on average and square in shape. Size and thickness of stones will vary. Faces of these walls are consistent and voids between stones are generous and filled with mortar. This style wall shall be used at the primary entrance to the park and shall match the existing wall along Cedar Grove Avenue.

D. Granite Block Cheek Wall: A wet set stone retaining wall with mortar throughout. Mortar shall be visible on the faces. Stones shall be large on average and square in shape. Size and thickness of stones will vary. Faces of these walls are consistent and voids between stones are generous and filled with mortar. This style wall shall be used at the steps of the primary entrance to the park and shall match the granite block retaining walls.

1.4 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Samples:

1. For each stone type indicated.
2. For each color of mortar required.

1.5 FIELD CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 WALL GRANITE STONE

A. Material Standard: Comply with ASTM C 615.

B. Wall stone that is to be used to infill and or extend existing walls shall be of equal hardness, color, texture, and size to those used in existing stone walls.

C. Stone reclaimed during the demolition of existing site walls should be considered for used if it meets the requirements above.

2.2 PIER GRANITE STONE

A. Regional Materials: Stone shall be sourced and quarried within 500 miles of Project site.

B. Varieties and Sources: Subject to compliance with requirements, provide the following:
1. Color: Uniform Gray consistent with surrounding stone.
2. Size: Stone shall range in size from .5 square foot minimum to 2.5 square foot maximum.

2.3 RETAINING WALL GRANITE STONE

2.4 SUB-BASE

A. Sub-Base shall conform to Section 312000 "Earth Moving"

2.5 DRAINAGE STONE

A. Drainage stone shall conform to Section 312000 "Earth Moving"

2.6 GEO-TEXTILES

A. Geotextiles shall conform to Section 334600 "Subdrainage"

2.7 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

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

C. Masonry Cement: ASTM C 91.

D. Aggregate: ASTM C 144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
2. White Aggregates: Natural white sand or ground white stone.
3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

E. Water: Potable.

2.8 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

2.9 MORTAR MIXES

A. General: Do not use admixtures unless otherwise indicated.

1. Do not use calcium chloride.
2. Use portland cement-lime masonry or cement mortar unless otherwise indicated.
3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.

1. Mortar for Setting Stone: Type N.
2. Mortar for Pointing Stone: Type N.

PART 3 - EXECUTION

3.1 SETTING STONE MASONRY

A. Perform necessary field trimming as stone is set using a hammer and chisel as needed. Do not over work stone.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones in uncoursed pattern with joint widths within tolerances indicated.

D. Insert small stones into spaces between larger stones as needed to produce joints as uniform in width as practical.

E. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

F. Use larger stones at ends, corners and base of wall.

G. Maintain joint widths except for variations due to different stone sizes. Lay granite stone with joints not less than 1 inch at narrowest points or more than 2 inch at widest points.

3.2 CONSTRUCTION TOLERANCES

A. Variation from plumb: For position shown in plan, do not exceed 1/4 inch in 20 feet for all stone assemblies.

B. Variation from level: For lines of exposed top of walls, as shown in plan, do not exceed ¼” in 20 feet for all stone assemblies.

C. All walls shall have a batter of 1:12 on both faces, except for granite block cheek wall and granite block pier.

3.3 POINTING OF WET SET GRANITE WALLS

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch deep. Compact each layer thoroughly and allow to it become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

1. Wall Cap Joint Profile: Smooth, flat face slightly below edges of stone.

2. Face Stone Joint Profile: Smooth, flat face slightly below edges of stone.

3.4 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Landscape Architect's approval of sample cleaning before cleaning stone masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.
6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.

3.5 EXCESS MATERIALS AND WASTE

A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.

B. Comply with Section 017419 "Construction Waste Management and Disposal"

END OF SECTION 049000

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel tube railings.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Non-shrink/Non-metallic Grout, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2.2 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed).

1. Provide galvanized finish for exterior installations and where indicated.

B. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 FASTENERS

A. General: Provide the following:
1. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

E. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.

F. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.

G. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION

A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Form work true to line and level with accurate angles and surfaces.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Form changes in direction by bending or by inserting prefabricated elbow fittings.

E. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

F. Close exposed ends of railing members with prefabricated end fittings.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

2.6 STEEL FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

3.2 ANCHORING POSTS

A. Form or core-drill holes not less than 8 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

3.3 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055213

SECTION 107516 - GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Scope of Section: Provide aluminum flagpole as shown on drawing and as specified herein, with components as needed for a complete installation.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide flagpoles capable of withstanding the effects of wind loads as determined according to NAAMM FP 1001-07, “Guide Specifications for Design of Metal Flagpoles”, or to specified wind speed, whichever is more stringent.

B. Flagpole Design: Base design on maximum standard size nylon flag suitable for use with pole or flag size indicated, whichever is more stringent.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of flagpole required, submit manufacturer’s technical data and standard installation instructions.

B. Shop Drawings: Show general layout, jointing, anchorage, support systems, and accessories, bases, and anchorage devices.

1.4 QUALITY ASSURANCE

A. Source: Obtain each flagpole as a complete unit from American Flagpole, including fittings, accessories, bases, and anchorage devices.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with a heavy Kraft paper or other lightweight wrapping and enclose in a hard fiber tube or other protective means. Store bare flagpoles in a dry location, protected from the weather and moisture, as recommended by the manufacturer.

B. Shipping: Ship to project site in one piece or as specified. If more than one piece is necessary, provide snug fitting precision joints with self-aligning, internal splicing sleeve arrangements for weather tight, hairline field joints.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturer, subject to compliance with requirements, shall be:
1. **Flagpoles Etc..** 107 Hadley Street, Holly, MI 48442. Phone: (888) 735-5591. Website: http://www.flagpolesetc.com

2.2 FLAGPOLE TYPE AND CONSTRUCTION

A. Aluminum Flagpole Construction: Fabricate from seamless, extruded tubing complying with ASTM B 221, alloy 6063-T6, having a tensile strength not less than 30,000 psi with a yield point of 25,000 psi. Heat treat after fabrication to comply with ASTM B 597, temper T6.
1. Provide cone-tapered flagpoles, per manufacturer's standard rate of taper.

B. Assembly Construction: Internal Revolving – Stainless steel aircraft cable Halyard - Ground Set Foundation. *See Specification Drawing for Mounting Height, Set Depth, Wall Thickness, Butt Diameter, Shaft Pieces, Maximum Wind Speeds, and Maximum Flag Size Specifications.*

2.3 MOUNTING

A. Foundation Tube: Galvanized corrugated steel foundation tube, .0635"-16 Gauge minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16" steel bottom plate and steel centering wedges. Furnish with 3/16" support plate, ¾" diameter x 18" long steel ground lightning spike. Foundation tube will consist of all welded construction.

2.4 FITTINGS

A. Finial (Ornament): Finial sized as indicated. *See Specification Drawing for Type and Size of Finial Specified.*
1. Gold anodized Aluminum Ball.

B. Cast Aluminum revolving truck assembly with aluminum spindle and removable hood.

C. Halyard: Stainless steel Aircraft cable.

D. Halyard Flag Snaps: Provide two (2) snaphooks, swivel, chrome plated bronze with neoprene covers.

E. Beaded roller sling with plastic covered counterweight and winch cable.

F. Flash Collar: Provide Spun Aluminum Collar to match flagpole. *See Specification Drawing for Collar specification.*

G. Corrugated ground sleeve with lightening rod.

2.5 MISCELLANEOUS MATERIALS

A. Concrete: Comply with requirements of Division 3 Section “Cast in Place Concrete”.

2.6 FINISHES

A. Metal Finishes, General: Comply with National Association of Architectural Manufacturers’ (NAAMM) “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Finish: Satin Aluminum. 80 grit.

C. Finish Specifications: Aluminum Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
   a. Natural Satin Finish: Provide directional-sanded satin finish (AA-M33); buff complying with AA-M20.

PART 3 - EXECUTION

3.1 PREPARATION

A. Excavation: For foundations, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.

B. Foundation: Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure forms and galvanized steel ground sleeve foundation tube in position, braced to prevent displacement during concreting. Place concrete immediately after mixing. Compact concrete in place using vibrators. Moist-cure exposed concrete for not less than 7 days or use a non-staining curing compound. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks and uniform in texture and appearance. Provide positive slope for water runoff to base perimeter.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to shop drawings and manufacturer’s written instructions.

B. Foundation Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube to within 2” of the top of tube. Remove hardwood wedges and seal top of foundation tube with a 2-inch (50 mm) layer of elastometric sealant or cement and cover with flashing collar.

END OF SECTION 107516

SECTION 129300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Surface Mounted Bench
2. Players Bench
3. Moveable Bleachers
4. Bicycle rack
5. Removable Bollard
6. Portable Soccer Goal
7. Corner Flag
8. Flex Style Bases
9. Home Plate
10. Pitching Rubber
11. Portable Grand Slam Fence

1.2 ACTION SUBMITTALS

A. Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

B. Product Data: For each type of product.
1. Maintenance Instructions.
2. Storage and handling requirements and recommendations.
3. Installation instructions.

C. Samples: For each exposed product and for each color and texture specified.
1. Submit powdercoat finish samples.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer’s original packaging, with order information and shipping documents.

B. Store products in manufacturer’s original packaging in a clean, dry environment until ready to be installed.

C. Handle products in accordance with manufacturer’s instructions and prevent damage. Protect products during delivery, storage, and handling.

1.4 WARRANTY

A. Surface Mounted Benches: Provide manufacturer’s standard warranty.

1. Products will be free from defects in components, standard finishes or workmanship for a period of five (5) years from date of manufacture

B. Bicycle Racks: Manufacturer's warranty, agreeing to repair, replace, or refund the purchase price of bike parking products found defective, within the following time periods.
   1. Material and workmanship: Five-year metal components warranty.
   2. Coatings: Two-year warranty against peeling, cracking, and significant color change.

C. Removable Bollard: Provide manufacturer’s standard warranty against defects in materials and workmanship. Warranty Period: Five years from date of invoice, except as otherwise indicated.
   1. Coatings: Two years, against peeling, cracking, or significant color change.

D. Score Board: 5-year limited warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Maintenance Instructions for field touch-up of finishes, cleaning, and maintenance.

C. Warranty Documentation: Submit sample of manufacturer’s warranty.

PART 2 - PRODUCTS

2.1 SURFACE MOUNTED BENCH

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

   1. Maglin Site Furniture Inc. 27 Bysham Park Drive, Woodstock, Ontario N4T 1P1 Canada. Toll Free: (800) 716.5506. Phone: (519) 539.6776. Fax: (877) 260.9393. Website: www.maglin.com. E-mail: sales@maglin.com.

B. Model: MLB300-M Bench

C. Dimensions:
   1. Height: 31.19”
   2. Length: 71.25”
   3. Depth: 24.56”

D. Weight:
   1. 130.3lbs

E. Mounting:
   1. Surface Mount

F. Materials:
   1. Bench frame and arms made from solid cast aluminum (95% recycled material)
   2. Seat employs flat bar straps and H.S. steel tube.

3. Finishes:
    a. All steel components are protected with Maglin's automotive-grade electrocoating for superior corrosion protection.
    b. Maglin UV Resistant Powdercoat System provides a durable finish on all metal surfaces.
    c. Maglin standard paint colors: Fine Textured Black FineTex.

G. Installation: MLB300-M benches are delivered pre-assembled. Holes (0.5") are provided in each foot for securing to base. Bolt and anchor benches securely in place.

2.2 PLAYERS BENCH

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

1. Jaypro Sports LLC. 976 Hartford Turnpike, Waterford, CT 06385. Phone: 800-243-0533. Website: www.jayprosports.com.

B. Model: PB10-PRO 21' Pro Series Bench.

C. Dimensions:
1. Total Height: 35"
2. Seat Height: 20"
3. Length: 21'
4. Total Depth: 24"
5. Seat Plank Width: 12"

D. Mounting:
1. Surface Mount

E. Materials:
1. Aluminum contour seat plank and back plank.
2. Galvanized steel tube framing.
3. Finishes:
    a. Custom powder coated color: Grey.

2.3 MOVEABLE BLEACHERS

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

1. Jaypro Sports LLC. 976 Hartford Turnpike, Waterford, CT 06385. Phone: 800-243-0533. Website: www.jayprosports.com.

B. Model: BLCH-427. 27' aluminum seat w/ galvanized steel understructure.

C. Dimensions:
1. Total Height: 29.75"
2. Length: 27'
3. Total Depth: 81"
4. Seat Plank Width: 10"

5. Number of Rows: 4

D. Materials:
1. Non-skid Aluminum seat plank.
2. Galvanized steel understructure 2” x 3/16” steel angle.
3. Dual braces & rear stabilizing bar.
4. Finishes:
   a. Custom powder coated color: Grey.

2.4 BICYCLE RACK

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

1. Reliance Foundry. Unit 207, 6450-148th Street, Surrey, British Columbia, Canada V3S 7G7. Phone: 888-735-5680.Website: http://www.reliance-foundry.com.

B. Model: Reliance Foundry; R-8224-SS

C. Size: 31.5 inches high by 34 inches wide by 5 inches diameter at base.

D. Design: Circle

E. Material:
1. Stainless Steel:
   a. Pipe: ASTM A312.
   b. Sheet, Strip, and Plate: ASTM A959.
   c. Finish: Buffed Satin Finish No. 6.

F. Accessories:
1. Fasteners
   a. [Standard: 1/2 inch UNC Button Head Bolts, c/w SS Washer.] [As specified.]
   b. Drop in place concrete anchors, for 1/2 inch UNC bolts.

G. Installation:
1. Surface/Flange Mount

2.5 REMOVABLE BOLLARD

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

1. Reliance Foundry. Unit 207, 6450-148th Street, Surrey, British Columbia, Canada V3S 7G7. Phone: 888-735-5680.Website: http://www.reliance-foundry.com.

B. Model: Reliance Foundry; R-7539-AL

C. Size: 36 inches high x 10 inches diameter.

D. Design: Tapered and fluted, with round finial and ball top.

E. Material:

1. Aluminum: ASTM B26; 20 percent recycled-material content.

F. Color Coating:
   a. Type: Polyester powder coat over epoxy primer.
   b. Color: Black textured semi gloss.

G. Accessories:
   1. Padlock: Brass, supplied by bollard manufacturer. Key alike.

H. Installation:
   1. Removable, New Concrete, Anchor: Provide anchor and receiver kit.

2.6 PORTABLE SOCCER GOAL

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

   1. Jaypro Sports LLC. 976 Hartford Turnpike, Waterford, CT 06385. Phone: 800-243-0533. Website: www.jayprosports.com.

B. Model: PCG-800. Portable Practice Football / Soccer Goal.

C. Dimensions:
   1. Soccer Shooting area 8’H X 24’W
   2. High School football crossbar 23’-4” W

D. Mounting:
   1. 10” Easy roll wheels.

E. Materials:
   1. 2” O.D. galvanized steel
   2. Finishes:
      a. Uprights and crossbar powder coated white
   3. Use with Jay Pro Official Size Soccer Net – 4 mm braid white.

2.7 CORNER FLAG

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

   1. Jaypro Sports LLC. 976 Hartford Turnpike, Waterford, CT 06385. Phone: 800-243-0533. Website: www.jayprosports.com.

B. Model: Jaypro Deluxe Corner Flags.

C. Dimensions:
   1. Height: 60”

D. Mounting:
   1. Spike Mount

E. Materials:

1. ¾" thick PVC pole with heavy duty base.
2. Square red and white flag

2.8 "FLEX" STYLE BASES

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

1. Jaypro Sports LLC. 976 Hartford Turnpike, Waterford, CT 06385. Phone: 800-243-0533. Website: www.jayprosports.com.

B. Model: BB-200. "Flex Style Bases"

C. Dimensions:
1. Height:3"
2. Width: 15"
3. Length: 15"

D. Mounting:
1. Anchor Mount

2.9 HOME PLATE

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

1. Jaypro Sports LLC. 976 Hartford Turnpike, Waterford, CT 06385. Phone: 800-243-0533. Website: www.jayprosports.com.

B. Model: HP-50. Economy Home Plate

C. Mounting:
1. Spikes

D. Materials:
1. Molded Rubber

2.10 PITCHING RUBBER

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

1. Jaypro Sports LLC. 976 Hartford Turnpike, Waterford, CT 06385. Phone: 800-243-0533. Website: www.jayprosports.com.

B. Model: PR-624

C. Mounting:
1. Fill with Soil

D. Materials:
1. Molded Rubber

2. Interior PVC tube
3. Color: White

2.11 PORTABLE GRAND SLAM FENCE

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

1. www.coversports.com

B. Model: Above Ground Grand Slam Fencing

C. Dimensions:
1. Fence Height: 4’ high
2. Foul Pole Height: 8’ high
3. Length: Custom to fit Home Run Distance. See L-4.0 (Baseball Field Layout Plan) for Lengths.
4. Poles at standard 5’ to 10’ intervals. Number of poles and distance between poles determined by length of fence and manufacturers recommendation.

D. Mounting:
1. Weighted Base

E. Materials:
1. High-performance, furniture grade PVC poles with PVC top cap
2. Durable polypropylene mesh with yellow top
3. Mesh Color: Green
4. Foul Pole Color: Yellow

F. Accessories:
1. 3 Distance banners sewn to fence
2. Cover Sports Grand Slam Fencing Foul Pole Kit

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates are properly prepared.

B. Verify that substrates are stable and capable of supporting the weight of the product.

3.2 INSTALLATION

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

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

C. Install site furnishings level, plumb, true, and securely anchored and/or 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 nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 ADJUSTING

A. Any loose or missing hardware should be tightened or replaced immediately.

B. If any part is found to be cracked or broken it is recommended that the product be taken out of service until the appropriate repairs can be made.

3.4 CLEANING

A. Metal Components:
   1. Should dirt from the environment build-up on this surface a wipe with a soft cloth and mild detergent will do the trick.
   2. Abrasive cleaners, brushes and steel wool should be avoided.
   3. If the finish is marred by a sharp object and the steel is exposed take a fine abrasive material to the area to improve the adhesion of the primer and touch-up paint. A quality grade exterior metal primer and top coat of matching color enamel should then be applied over the prepared surface.

3.5 PROTECTION

A. Protect installed furnishings until completion of project.

END OF SECTION 129300

SECTION 129400 – SHIPPING CONTAINER STORAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Shipping Container Storage Unit

1.2 ACTION SUBMITTALS

A. Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

B. Product Data: For each type of product.
1. Maintenance Instructions.
2. Storage and handling requirements and recommendations.
3. Installation instructions.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer’s original packaging, with order information and shipping documents.

B. Store products in manufacturer’s original packaging in a clean, dry environment until ready to be installed.

C. Handle products in accordance with manufacturer’s instructions and prevent damage. Protect products during delivery, storage, and handling.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Maintenance Instructions for field touch-up of finishes, cleaning, and maintenance.

PART 2 - PRODUCTS

2.1 SHIPPING CONTAINER

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

1. Out-Back Storage L.L.C. 11 Gavitt Ave, Westerly, RI 02891. Phone: (800) 517-0012. Website: www.outbackstoragecontainers.com.

B. Dimensions:
   1. Height: 8.5 Feet
   2. Length: 20 Feet
   3. Width: 8 Feet

C. Design:
   1. “One-Trip” or New Container.
   2. Easy open doors at one end.
   3. High-locking gear handles

D. Materials:
   1. Steel Frame
   2. Corrugated Steel Doors
   3. Wooden Floor

E. Color: Cream or White

F. Accessories:
   1. Lock Box on the front of the doors.

G. Installation:
   1. Must be delivered and installed on site before site work is completed.
   2. Allow for 75’ of straight clearance for delivery by flatbed truck or truck and trailer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates are properly prepared.

B. Verify that substrates are stable and capable of supporting the weight of the container.

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated.

B. Must be delivered and installed on site before site work is completed.

C. Install shipping container storage unit level, plumb, true, and securely anchored and/or positioned at locations indicated on Drawings.

3.3 ADJUSTING

A. Any loose or missing hardware should be tightened or replaced immediately.

B. Ensure that container is set to pitch toward the door to direct any water out.

3.4 PROTECTION

A. Protect unit until completion of project.

END OF SECTION 129400

SECTION 129500 - DUGOUTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Baseball Dugouts

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, mounting heights, and attachment details.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranty: Dugouts shall be guaranteed against defects in workmanship or material for a period of one year from date of invoice.

PART 2 - PRODUCTS

2.1 STEEL BASEBALL DUGOUT

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

1. Beacon Athletics. 8233 Forsythia St, STE 120, Middletown, WI 53562. Phone: (800) 747-5985. Website: www.beaconathletics.com.

B. Frame:

1. Support columns shall be fabricated of A500 square structural steel tubing with an electrically welded ½" thick A36 steel base plate.

2. Beams shall be fabricated A500 square structural steel tubing.

3. Steel frame members shall be blasted to near white metal, cleaned with an 8-stage pretreatment system, and zinc rich primer coated prior to the finished powder coat process. Powder coat finish shall be TGIC electrostatically applied polyester powder.

4. Roofing shall be precut 26 guage sm rib metal panels unless otherwise noted. 24 GA SM rib metal panels maybe available at an additional cost.

5. Fasteners shall be 1" diameter grade 5 bolts with flat washers with locknuts. Bolts meet ASMF.R18.2.1 with a minimum tensile strength of 120,000 PSI. All fasteners shall be concealed inside the tubing.

6. Anchors shall be ½" diameter x 8-1/2" zinc plated concrete wedge anchors.

7. Overall dimensions – see attached drawings.

8. Color: Black

C. Roof Panels:

1. Panel Profile: ¾" height rib 36" coverage width

2. Panel style: Side lap seam or exposed fastener

3. Gauge: 26 gauge

4. Substrate: Grade 80 galvanized steel sheet (G60) conforming to ASTM A446 for painted panels.

5. Texture: Smooth

6. Finish: Semcoat siliconized polyester (40 year warranty) unless otherwise noted.

7. Color: Forest Green

2.2 CONCRETE

A. Footings:

1. Footings shall bear upon undisturbed treated soil or soil compacted to at least 95% of standard proctor maximum dry density (ASTM D1557) for depth of at least three (3) feet below the bottom of the footing

B. Reinforcing steel shall be ASTM-A-615 grade 60 deformed new bullet steel conforming to ACC1301, AC1315, AC1318 and CRSI manual of standard practice latest editions. Minimum lap splice shall be 48 Bar Diameters unless noted otherwise.

C. All continuous vertical and horizontal reinforcing steel in footings, beams and columns shall be spliced a minimum of 48 bar diameters or 30" whichever is greater.

D. Concrete cover of reinforcing steel shall be as follows:
   1. Footings: 3" bottom and sides, 2" top
   2. Beams: 1 ½" bottom, sides and top
   3. Columns: 1 ½"
   4. Slabs on grade: 2" bottom, 1" top
   5. Others: Per actual

E. Foundation: 3,000 PSI @ 28 days, Type II concrete, 6 bag.

F. Floor Slab: 3000 PSI @ 28 days (5" concrete on 6" compacted crushed stone) max slump = 5", type II concrete 6 bag.
   1. Provide construction joints @ 144 Sq. Ft max in slabs.

G. All concrete slabs on grade shall be the thickness indicated on the drawings. Such slabs shall be reinforced with 6" x 6" #10/10 WWM lapped 8" at edges and ends or fiber mesh reinforce.

H. Fill under concrete slabs shall be clean sand or rock and free of debris and other deleterious material. Fill shall be compacted to a density of at least 95% of standard proctor maximum dry density (ASTM D1557).

I. Welded wire mesh shall conform to ASTM-A-1185, Free from oil, scale and rust and placed in accordance with the typical place details of ACI standards and specifications minimum lap shall be one space plus two (2) inches of fibermesh.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install following manufacturing recommendations.

END OF SECTION 129500

SECTION 129600 - SCOREBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sports Scoreboards and Control Systems

1.2 REFERENCES

A. ASTM A 36 - Standard Specification for Carbon Structural Steel; 2005.

B. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2005

C. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003.

D. ASTM C 33 - Standard Specification for Concrete Aggregates; 2003

E. ASTM C 150 - Standard Specification for Portland Cement; 2005.

1.3 PERFORMANCE REQUIREMENTS

A. Provide a scoreboard ETL or ETL-C tested to UL standard.

1.4 ACTION SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop drawings: Submit plan, section, elevation, and perspective view details as necessary to depict proper field fabrication and installation, and provide details on connections, terminations and joints.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors.

1.5 QUALITY ASSURANCE

A. Confirm all specifications with the factory prior to order.

B. Single Source Responsibility: Single manufacturer shall provide all components required to install the products specified in this section.

C. Manufacturers Qualifications: Manufacturers must have five years of experience in the manufacturing of scoreboards and message displays of the type specified.

D. Installer Qualifications: Factory-trained and experienced in the proper installation of scoreboards and message displays.

E. Welders: AWS certified.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Physical inspection of items required at time of delivery; any shipping damages must be reported at delivery prior to storage.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Work shall commence only after associated trade work has been sufficiently completed and will not interfere with the installation of the equipment specified in this section.

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

C. Do not install when threatening weather conditions exist.

D. Owner shall furnish soil tests as necessary to determine suitability for installation.

E. Owner shall clearly mark all underground utilities and notify the appropriate parties prior to work commencement.

1.8 WARRANTY

A. Provide manufacturer's standard warranty affirming that products specified in this section shall be free from defects in material and workmanship under normal use provided they are installed in accordance with all current application requirements
1. Duration: Five (5) years.

1.9 EXTRA MATERIALS

A. Contractor is responsible for providing all hardware, sealants, welding materials and other secondary installation products required for installation. Architect shall approve each product before or during the pre-installation conference.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Fair-Play Scoreboards, Trans-Lux Fair Play, which is located at: 1700 Delaware Ave. ; Des Moines, IA 50317; Toll Free Tel: 800-247-0265; Tel: 515-265-5305; Fax: 515-265-3364; Web: www.fair-play.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MULTIPURPOSE SCOREBOARD

A. Large, versatile scoreboard designed for multiple activity scoring. Home / visitor scoring style, inning /period and clock.
   1. Model: MP-7114-2.
      a. Minute / second clock.
      b. 9 additional indicator lights (3-2-2-2), with adjustable captioning.
      c. Dimensions: 14 feet wide by 5 feet 5 inches tall (4267mm x 1651mm).
      d. Clock and Score Digit Size: 18 inches (457mm).
      e. Other Digit Size: 15 inches (381mm).
      f. Power Usage: 224 Watts.

2.3 SCOREBOARD CONTROLS

A. Scoreboard Controllers:
   1. Model: MP-70 Scoreboard Control.
   2. Power source: 120V AC.
   3. Wireless Connectivity.

2.4 FINISH

A. Scoreboard color: Kelly Green

B. Trim Tape Color: White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates are properly prepared.

B. Examine all soils and footings to ensure solid and secure footings.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation

B. Install concrete footings at all locations at all locations noted on the drawings
   1. No chlorides shall be added to the concrete mixture.
   2. Footings shall have a minimum 3000 psi (2.1kgf/ square mm) compressive strength after 28 days.

C. Grade surrounding landscape prior to installation of scoreboards.

D. Prepare surfaces using the methods recommended to achieve the best result based on project conditions.

3.3 INSTALLATION

A. Follow manufacturer's current application requirements for installation under conditions specific to the project.

B. Install all structural steel components in accordance with manufacturers application instructions where specified on the drawings.
   1. All structural steel components shall be in accordance with ASTM A36 or A572.
   2. All Tube ends shall be covered with light gauge end caps.
   3. All new steel shall be primed and painted with a color approved by the architect.
   4. Weld steel using E70XX electrodes. Prime and paint all welds following installation.
   5. Unless otherwise specified in the drawings, all welds shall be continuous 1/4" (6mm) fillet welds.

C. Install all electrical equipment in accordance with all federal, state and local building codes.

D. Where manufacturer's requirements and building codes are in direct conflict, the more restrictive method of application shall prevail.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 129600

SECTION 129700 – COMPOSTING RESTROOM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Model C-11 Transportable Building
2. Composting Base
3. Solar powered ventilation system
4. Waterless 14” Toilet Fixture
5. Transitional Platform

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer’s original packaging, with order information and shipping documents.

B. Store products in manufacturer’s original packaging in a clean, dry environment until ready to be installed.

C. Handle products in accordance with manufacturer’s instructions and prevent damage. Protect products during delivery, storage, and handling.

1.4 WARRANTY

A. **5-Year Limited Warranty**: UPON RECEIPT AND CMI ENDORSEMENT OF CERTIFICATION attesting to installation in accordance with CMI requirements, CMI warrants the tank(s) identified by serial number, including non-electrical integral components thereof, toilet and urinal fixtures, and toilet chutes against defects in material and workmanship under normal use, operation and maintenance for a period of 5 years from the date of shipment. Unless the installation is certified within one year of the date of shipment, the warranty will not be validated.

B. **1-Year Limited Warranty:** UPON RECEIPT AND CMI ENDORSEMENT OF CERTIFICATION attesting to installation in accordance with CMI requirements, CMI warrants all electrical components manufactured by CMI, identified by model number, against defects in material and workmanship under normal use, operation and maintenance for a period of one year from the date of shipment. Unless the installation is certified prior to a claim, the Warranty will not be validated. This warranty applies to those parts supplied by and bought from CMI.

C. Exclusions:
   1. All component equipment not manufactured by CMI carries only the original manufacturer's warranty. CMI does not adopt these warranties.
   2. Any repairs or replacements necessitated by failure to conform to the installation, operation and maintenance instructions described in the CMI Installation and Maintenance Manuals.
   3. Any repairs or replacements necessitated by vandalism, neglect, abuse, misuse, accident, alteration or failure to adequately service the system.
   4. Any repairs or alterations performed without prior approval of CMI.
   5. Items which are not defective, but that must be replaced during the warranty period as a result of normal wear and tear.
   6. Any repairs or replacements due to usage above manufacturers stated annual usage capacity.

D. CMI's Obligation: Should CMI determine that a valid limited warranty claim has been submitted, the company shall correct the defects by suitable replacement or repair of the defective equipment at CMI discretion.

E. Purchaser's Obligation: Purchaser must use and maintain the system strictly in accordance with the installation, operation and maintenance instructions. Any claim under this limited warranty must be submitted in writing to CMI prior to the expiration of the warranty period and is subject to validation by CMI. Any such claim must include the tank serial number or component model number. All repairs or replacements required under this warranty will be made either locally at repair facilities designated by CMI or at CMI in Massachusetts at the sole discretion of CMI. Transportation expenses to the repair facility will be borne by the purchaser.

F. Note: Warranties are not extended for replacement of components under warranty for any period in excess of the original date of the warranty of the originally purchased component. CMI neither assumes nor authorizes any representative or other person to assume for it any obligation or liability other than is expressly set forth herein.

G. OTHER WARRANTIES: THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING ANY WARRANTY THAT THE UNIT IS MERCHANTABLE OR SUITABLE FOR THE CUSTOMER'S PARTICULAR PURPOSE. SOME STATES DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THAT EVENT, ANY IMPLIED WARRANTIES ARE LIMITED IN DURATION TO NINETY (90) DAYS FROM THE DATE OF DELIVERY OF THE PRODUCT. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE. SOME STATES DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. IN NO CASE SHALL CMI'S LIABILITY EXCEED THE PURCHASE PRICE FOR THE PRODUCT.

H. Remedies: Correction and/or replacement of defective components at the option of CMI of defects for the period of time provided herein shall constitute fulfillment of all obligations of the company for damages whether based on contract, negligence or otherwise, with respect to or arising out of the sale, installation, condition or operation of the unit. The remedies provided herein shall be the customer's sole remedies for breach of any warranty.

I. The company shall not be liable in contract or in tort to the customer or any other person for special, indirect, or consequential damages, such as, but not limited to damage to, loss of or loss of use of, other property or equipment, loss of profits or revenues, or claims or customers or tenants of the customer for service interruptions or losses of any kind.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Maintenance Instructions for field touch-up of finishes, cleaning, and maintenance.

C. Warranty Documentation: Submit sample of manufacturer’s warranty.

PART 2 - PRODUCTS

2.1 MODEL C-11 TRANSPORTABLE BUILDING

A. A unisex, handicapped-accessible, transportable, structural insulated wood panel building built to attach to a matching composting base foundation

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Clivus New England Inc., p.o. Box 127, North Andover, MA 01845. Phone: (978) 794-9400. Fax: (978) 794-9444. Website: www.clivusne.com. E-mail: 123CNE@clivusne.com.

C. Model: C-11 Transportable Building, Boral Truexterior® Siding

D. Dimensions:
1. Length: 7’-6”
2. Widgth: 5’-8”
3. Hieght (to roof peak): 9’-4”

E. Materials: The building shall be constructed of durable insulspan structural panels. These panels shall consist of an expanded polystyrene core with one pound of expanded polystyrene per cubic foot bonded between two outer layers of structural oriented strand board. Interior finish shall be seamless fiberglass-reinforced panel and laminated.
1. The panel core material (EPS) shall have the following characteristics:
    a. Structural integrity including permanent shape retention and resistance to shrinkage decomposition, and disintegration.
    b. Thermal stability – consistent insulating value
    c. Non-toxic – formaldehyde-free
    d. Permanence and low water absorption--rot-resistant and moisture-resistant
2. Specifications for panels, roof, floor, trim, and window:
    a. Front wall panel to be 3-½” thick.
    b. Side and rear wall panels to be 2” thick.

c. Roof panels to be 3-½" thick.
d. Ceiling panel to be 3-½" thick.
e. Large floor panel to be 3" thick with three splines as required for design load of 100 PSF.
f. Small floor panel (maintenance access lid) to be 3" thick; trimmed with aluminum channels; attached with Type 304 stainless steel continuous hinge.
g. Exterior walls to be covered with Boral Truexterior® clapboard siding.
h. Underside of overhangs to be covered with ¾" Boral Truexterior® trim.
i. Roof to receive traditional 3-tab organic asphalt shingles with 30-year limited warranty over 15 lb. felt covering with 8" galvanized drip edge.
j. Edges of roof panels to be trimmed with Boral Truexterior® ¾" fascia and rake boards.
k. Roof pitch to be 6:12
l. Wood edges at floor panels to be pressure-treated with rating for direct contact with soil.
m. Floor panels to have outer layers of ½" AB marine plywood.
   1) *Small floor pane*l will be finished with a1/8" thick aluminum diamond plate with 3" diamond plate sides to form a flashing down over the structural panel base on the front and two sides.
   2) *Large floor panel* will be finished with a 1/8" thick aluminum diamond plate with a seam in the middle running width wise, with 3" diamond plate sides [baseboards] to form a pan type insert to protect the floor.
n. Interior trim to be Sanalite finish, high density polyethylene [Federal Specification # L-P-390C, Type 1, Class H]; corner molding ¾" x ¾" with stainless steel fasteners.
o. Window to be ¼" obscure plexiglass DP 30, 17-3/4" x 35-1/2" mounted in rear wall.
p. Live load of roof to be 64 LB PSF.
q. Live load of floor to be 100 LB PSF.
r. Wind load of building to be 3,121 lb./lineal foot to withstand winds of 120 MPH.
s. Dead load of building to be 1,500 lb.

3. Specifications for capability of lifting building in one piece.
   a. Building shall be fitted with two integral 2-1/2" X 2-1/2" L galvanized coated steel angles with 1-1/4" nominal inside diameter steel tube threaded on inside at both ends and continuously welded to top and side of angle iron. Tube and angle are continuous through floor panel. Eyebolt screwed into end of each tube and used for lifting structure must be capable of carrying 3,000 lbs. each, with a total of 4.
4. Specifications for door and interior components:
   a. Door to be Series 1700 Supercore seamless, as manufactured by Amweld Building Products; polystyrene core construction; 18-gauge flat, cold-rolled steel panels (ASTM A366), electroplated; 1-3/4" X 3' X 6'8", with full louver top half, 24" X 24".
   b. Frame to be Series 2600, as manufactured by Amweld Building Products; 16-gauge cold-rolled steel, electroplated; 3' X 6'8" with 3-½" throat.
   c. Door closer to be Norton #1601-BF, aluminum
   d. Door handle to be PDQ SK Series, lever handle with privacy function, heavy gauge cold-rolled steel mechanism dichromated for corrosion resistance, US26D.
   e. Deadbolt to be PDQ SK series, 1" throw with case-hardened roller pin.
   f. Hinge to be BB21 US26.

g. Grab bars (2) to be B-6206 Series, as manufactured by Bobrick; 18-gauge, Type 304 stainless steel tubing with concealed mounting, 42" length, 1-1/2" diameter, complies with barrier-free design codes.
h. Toilet paper holder to be heavy-duty, vandal-resistant, 1/4" painted steel, double roll, with heavy duty lock.

5. An exterior, hinged floor (small floor panel) shall be installed over the composter base such that the battery storage shelf, liquid removal access port, and the compost maintenance and removal chamber can be easily accessed and locked separately from the building.
6. Specifications for concrete anchoring pads (two pads per building).
   a. Each pad shall be constructed of a monolithic pour over steel reinforcement with four pre-installed lifting points.
   b. Each pad shall weigh approximately 4000 lbs. and its dimensions shall be 9'x6' and shall be 6" thick.

2.2 SOLAR POWERED VENTILATION SYSTEM

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

1. Clivus New England Inc., p.o. Box 127, North Andover, MA 01845. Phone: (978) 794-9400. Fax: (978) 794-9444. Website: www.clivusne.com. E-mail: 123CNE@clivusne.com.

B. Materials: Specifications for solar powered ventilation system:
1. The standard solar-powered ventilation system is designed to provide fan ventilation 24 hours a day from May through October, or from dawn to dusk at "daylight-use only" sites, with panels, hardware, wiring, and appurtenances necessary for mounting on the roof of a building provided the solar window is a 170°arc of unobstructed direct sunlight, and includes:
   a. Ventilation fan: solar (photovoltaic)-operated, capable of supplying minimum required capacity to provide an odor-free building interior, 12VDC, 100 cfm, CSA and UL approved; as manufactured by Papst.
   b. Solar (photovoltaic) module or modules: 130 watts total
   c. Charge controller with low voltage disconnect: 12V, 10 amp, solid-state battery charge regulator.
   d. Battery: 12V, 110 amp hr., maintenance-free, valve-regulated, sealed gel cell, designed for deep-cycle photovoltaic applications.
   e. Roof mounting hardware.
   f. Add-on terminal kit to allow connection to the solar module.
   g. Output wiring kit.

2.3 COMPOSTING BASE

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

1. Clivus New England Inc., p.o. Box 127, North Andover, MA 01845. Phone: (978) 794-9400. Fax: (978) 794-9444. Website: www.clivusne.com. E-mail: 123CNE@clivusne.com.

B. Model: **M54 Base**

C. NSF Certification
1. Composting Base is to be certified by the National Sanitation Foundation under Standard 41

D. Dimensions: Length: 116”, Width: 66”, Height: 48”

E. Weight: 800 lbs

F. Capacity / Base Volume:
1. Solids Storage Capacity: 81 cubic feet; 604 US gallons
2. Liquid Storage Capacity: 40 cubic feet; 300 US gallons
3. Daily capacity at average temperature ≥65°F: 60 visits
4. Annual capacity at average temperature ≥65°F: 22,000 visits

G. Materials:
1. The Base is to be rotationally molded from high density linear polyethylene resin that conforms to the following Specifications:
   a. Density (ASTM TEST 4883): 0.938 g/cm3
   b. Tensile Strength at Yield (ASTM D 638): 2700 psi
   c. Dart Impact (-40°C, 250 mils thickness): 145 ft-lbs
   d. Envt. Stress Crack Resistance (D 1693): >400 hrs
2. The composting base consists of four major areas
   a. Composting Chamber
   b. Liquid End-Product Removal Area
   c. Compost End-Product Removal Area
   d. Liquid Storage Area

2.4 WATERLESS 14” TOILET FIXTURE

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

1. Clivus New England Inc., p.o. Box 127, North Andover, MA 01845. Phone: (978) 794-9400. Fax: (978) 794-9444. Website: www.clivusne.com. E-mail: 123CNE@clivusne.com.

B. Materials:
1. All waterless toilets include: fiberglass stool with sanitary white gel finish for ease of cleaning, white plastic seat and cover, toilet liner
2. Fixture:
   a. Liner: rotationally molded polyethylene and gray in color
   b. Chute opening: 14"
   c. Front to back: 23-3/4"
   d. Width: 18-1/2"
   e. Height of seat: 18"
   f. Weight: 26 pounds
   g. Toilet Chute: One flanged chute to connect to the compost tank
3. Flanged chute:

a. 14" dia. X 22-1/2" rotationally molded polyethylene and dark green in color

2.5 TRANSITIONAL PLATFORM

A. Materials
1. Platform will be constructed using pressure treated lumber rated for direct contact with the ground.
2. Decking material will consist of 5/4” composite decking material secured to sub-bracing of 2"x4" supports using corrosion resistant decking screws.
3. Platform construction will allow for a pressure treated header 4"x6" to be through-bolted to the composter using ½" diameter galvanized eyebolts and integrated galvanized 1/8” thick U-shaped saddles (2). This will allow for the ramp’s elevation to be field adjustable.

PART 3 - EXECUTION

3.1 INSTALLATION

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

B. The hole for the below-ground composter base needs to be dug 10' x 14' at a location with a 170° arc of unobstructed sunshine (for solar-powered systems only). This hole allows 2' around the unit for tamping (a compactor should be used), placing the concrete anchoring system, and making minor adjustments in composter placement. Either of the long sides must face south for the solar system. When AC electricity is available, the Trailhead may face any direction with no sunlight needed.

C. The door opening is on a 10' end. For the door opening to be at ground level for easy handicapped accessibility, the hole should be dug approximately 52" deep. The base itself in 4' high and the concrete pad is 6" thick

D. A transit is needed for leveling and pitching the base toward the door. This slight tilt prevents water from pooling inside the building after cleanings, and 1" from back to front is recommended.

E. The solar system must be attached to the south side of the roof.

F. Unless otherwise indicated, install restroom and components before landscaping and paving have been completed

END OF SECTION 129700

SECTION 310513 - SOILS FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. This specification outlines the technical requirements for the providing and installing and compaction of the import soils. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications.
Section Includes:
1. Subsoil materials
2. Compaction

1.2 UNIT PRICES – MEASUREMENT AND PAYMENT

A. Subsoils:
1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes supplying subsoil materials and stockpiling.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Hammer and a 457-mm (18-in.) Drop

B. ASTM International:
1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
B. Samples: for every 500 cubic yards of import, submit, in air-tight containers, 30 lb samples to qualified testing agency, sealed in air-tight containers, for each proposed soil material from borrow sources to be used as fill. Provide the Engineer with a copy of the results of the lab report.
C. Materials Source: Submit name of imported materials source.
D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.
B. Borrow: Satisfactory soil imported from off site for use as fill or backfill.

1.6 SUBSOIL MATERIALS FOR BACKFILL

A. Backfill and Fill: Use satisfactory soil materials.
   1. Satisfactory Soils: ASTM D 2487 soil classification groups GW or GM; free of rock or gravel larger than 3.5 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
   2. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, GM, SM, SC, MH, ML CL, CH, OL, OH, and Pt, or a combination of these group symbols. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction or with greater than 15% passing the No. 200 Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Structural Backfill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crashed sand; graded in accordance with ASTM C136 (AASHTO T27), within the following limits:

Sieve Size	Percent Passing
3.5"	100
3/4"	50-100
#4	25-75
#200	<15

C. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

1.7 SOURCE QUALITY CONTROL

A. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D1557.
B. Testing and Analysis of Bedding Course Material: Perform in accordance with ASTM D1557.
C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D1557.
D. When tests indicate materials do not meet specified requirements, change material and retest.
E. Furnish materials of each type from same source throughout the Work.

PART 2 EXECUTION

2.1 BACKFILLING AND COMPACTION

A. Backfill material shall be placed in lifts not to exceed 10 inches and shall be compacted to 95% AASHTO density

2.2 STOCKPILING

A. Stockpile and materials on site at locations indicated.
B. Stockpile in sufficient quantities to meet Project schedule and requirements.
C. Separate differing materials with dividers or stockpile apart to prevent intermixing or contamination.
D. Stockpile topsoil 15 feet high maximum.
E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
F. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of properly off-site.

2.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.
B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION 310513

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Removing existing vegetation.
   2. Clearing and grubbing.
   3. Stripping and stockpiling topsoil.
   4. Removing above- and below-grade site improvements.
   5. Disconnecting, capping, or sealing site utilities.
   6. Temporary erosion and sedimentation control.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 MATERIAL OWNERSHIP

A. Except for 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.

1.4 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.

B. 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. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

C. Removal of underground utilities is included in earthwork sections; in applicable utilities sections and Section 024119 "Selective Demolition."

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
2. Use only hand methods or air spade for grubbing within protection zones.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 4 inches or in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for walks, pavements, turf and grasses and plants.
3. Excavating and backfilling for structures.
4. Subbase course for concrete walks and pavements.
5. Subbase course and base course for asphalt paving.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.
7. Controlled Fill for back filling drilled pier foundations.

1.2 References

A. State of Connecticut - Department of Transportation Standard Specifications for Roads, Bridges, and Incidental Construction - Form 816, and all subsequent addenda

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 QUALITY ASSURANCE

A. Third Party Testing: Employ at the Owners expense a testing laboratory to evaluate compaction of materials.

B. Compaction Requirements
1. Compact each layer of fill and backfill for the following area classifications to the percentages of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than three percent direr or more than two percent wetter than the optimum content as determined by ASTM D689 (Standard Proctor) or 1557 (Modified Proctor)
   a. Landscape Areas: 85 Percent
   b. Pavements and Walks: 95 Percent
   c. Pipes and Tunnels: 95 Percent
   d. Pipe Bedding: 90 Percent
   e. Footings: 95 Percent
   f. Controlled Fill: 95 Percent
   g. Asphalt: 95 Percent

2. If a compacted layer fails to meet the specified percentage of maximum density, the layer will be recompacted and retested. If compaction cannot be achieved the material/layer will be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved.
3. Compaction testing shall be inspected each day material is being placed. Final grade establishment for the subbase should have a complete inspection across the site prior to pavement placement. Inspector should consult with Owners Representative for critical areas.

1.5 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct pre-excavation conference at Project site.

1.6 INFORMATIONAL SUBMITTALS

A. Material test reports.

1.7 FIELD CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.

B. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

C. Cold Weather Requirements:

1. Excavation: When freezing temperatures are predicted, do not excavate to final required elevations for pipe, conduit, or equipment requiring concrete work unless concrete can be placed immediately. Retain enough earth over the bottom elevation of excavations to prevent frost penetration.

2. Backfilling: If backfill is being placed during freezing temperatures the backfilling operations shall be monitored by the Owners Representative and the following procedures shall be followed:
   a. Frozen ground shall be removed in its entirety from beneath and five feet beyond the area of fill placement
   b. The fill material placed shall consist of Selected Fill and shall be free of all frozen chunks that exceed four inches in size. The material transported to the project site shall only consist of material excavated below the frost line.
   c. At the end of the work day, the area of fill placement shall be covered with insulated blankets, or left unprotected and covered with other means of protection including hay, wood chips, etc. provided it is approved by the Owners Representative.
   d. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Gravel Subbase Course: Stockpiled, crushed ledge rock or quarried rock. Comply with the gradation and material requirements specified in Section M.02.02 of Form 816.

E. Crushed Stone that complies with the gradation and material requirements specified in Section M.02.02 of Form 816.

F. Controlled Fill: Structural fill shall comply with the gradation and material requirements specified in Section M.02.06 "A" gradation of Form 816

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand with 100% passing a 3/8 inch sieve and no more than 10% passing a No. 200 sieve.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe; 6 inches either side of conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 12 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

D. Initial Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

E. Final Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

F. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and re-compact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Shape subbase course and base course to required crown elevations and cross-slope grades.
2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform inspections:

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 312513 - EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:

1. Section 31200 "Earth Moving"

2. Section 329200 "Turf and Grasses" for hydroseeding

3. Section 329300 "Plants" for live stakes

1.2 DEFINITIONS

A. Check Dam: Small barrier or dam constructed of stone, bagged sand or gravel to reduce velocity of flow.

B. Stabilized Construction Entrance: A stabilized pad of aggregate underlain with geo-textile where traffic enters a construction site to reduce or eliminate tracking of sediment to public roads.

C. Dust Control: Prevent surface and air movement of dust from disturbed soil surfaces

D. Sediment Basin: A barrier constructed across a drainage way to intercept and trap sediment

E. Silt Fence: A barrier of geo-textile fabric installed on contours across the slope to intercept runoff by reducing velocity. Replace after 1 year.

F. Fill: Soil materials used to raise existing grades.

G. Storm Drain Inlet Protection: A semi-permeable barrier installed around storm inlets to prevent sediment from entering a storm drainage system

H. Straw/Hay Bale Dike: Intercept sediment laden runoff by reducing velocity. Replace after 3 months.

I. Riprap: A layer of stone designed to protect slopes that are subject to erosion.

J. Rock Outlets: Rock placed at the outlet end of culverts, conduits or channels

K. Mulches: Hay, straw, wood cellulose, fiber mats, flexible growth medium and other materials approved by the Owner’s Representative

L. Temporary Seeding: Erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion.

M. Permanent Seeding: Grasses established and combined with shrubs to provide perennial vegetative cover on disturbed, denuded, slopes subject to erosion.

N. Topsoil: Placed before permanent seeding or sod is installed.

1.3 REFERENCES

A. Erosion and Sediment Control Guidelines: Conform to the latest edition of "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL" (2002) by CT Department of Energy and Environmental Protection Refer to these guidelines for construction and maintenance of all items (Temporary and Permanent Structural, Vegetative and Biotechnical).

B. Storm Water Management: Conform to the latest edition of "CONNECTICUT STORMWATER QUALITY MANUAL" prepared by CT Department of Energy and Environmental Protection.

1.4 RESPONSIBILITY

A. Provide any temporary sediment and erosion control measures that may be required within limits of the work, including any staging areas, throughout construction in conformance with the plan, and as directed by the Owner's Representative. Place the permanent control practices required before the removal of the temporary storm water diversion and control items.

B. During construction conduct operations in such a manner as to prevent or reduce to a minimum any damage to any water body from pollution by debris, sediment, chemical or other foreign material, or from the manipulation of equipment and/or materials in or near a stream or ditch flowing directly to a stream. Any water which has been used for wash purposes or other similar operations which become polluted with sewage, silt, cement, concentrated chlorine, oil, fuels, lubricants, bitumens, or other impurities shall not be discharged into any water body.

C. In the event of conflict between these specifications and the regulation of other Federal, Town, or local jurisdictions, the more restrictive regulations shall apply.

D. The Contractor shall adhere to all requirements of the Erosion and Sedimentation Control Plan as presented in the Drawings. Comply with all applicable CTDEEP and local Inland Wetlands regulatory requirements.

1.5 DESCRIPTION

A. The Work shall consist of furnishing, installing, inspecting, maintaining, and removing soil and erosion control measures as shown on the contract documents or as ordered by the Owner's Representative during the life of the contract to provide erosion and sediment control.

B. Temporary structural measures provide erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion. These are used during construction to prevent offsite sedimentation. Temporary structural measures shall include check dams, stabilized construction entrance, dust control, sediment basin, sediment traps, silt fence, storm drain inlet protection, straw/hay bale dike, or other erosion control devices or methods as required.

C. Permanent structural measures also control protection to a critical area. They are used to convey runoff to a safe outlet. They remain in place and continue to function after completion of construction. Permanent structural measures shall include, retaining wall, riprap, and rock outlets or other erosion control devices or methods as required.

D. Vegetative measures shall include mulching, seeding, and topsoil.

E. Weekly inspections will be completed by the Owner's Representative. Comply with and correct all deficiencies found as a result of these inspections. At the end of the construction season when soil disturbance activities will be finalized or suspended until the following spring, the frequency of the inspections may be reduced. If soil disturbance is completely suspended and the site is properly stabilized, a minimum of monthly inspections must be maintained. The stabilization activities must be completed before snow cover or frozen ground. If vegetation is required, seeding, planting and/or sodding must be scheduled to avoid die-off from fall frosts and allow for proper germination/establishment. Weekly inspections must resume no later than March 15.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 ACTION SUBMITTALS

A. Certification of grass seed.

B. Product data: For each type of product.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials for biotechnical slope protection:
   1. Permanent Seeding: Comply with Section 329200 "Turf and Grasses"
   2. Temporary Seeding: Comply with this Section. See Execution.
   3. Sedimentation Control Bales (hay) shall conform to DOT Article 2.18.02.

B. Erosion Control Matting:

1. Coir Mat 400: Woven matting of coir made from high strength coconut fiber.
    a. Color: Natural fiber
    b. Thickness: .30 inches per ASTM D 5199
    c. Mass per unit area min: 11.8 oz/sq. yd. per ASTM D 5261
    d. Dry tensile strength MDxCD: 42 lbs/in; 40 lbs/in as per ASTM D4595
    e. Wet tensile strength MDxCD: 38 lbs/in; 30 lbs/in as per ASTM D4595
    f. Dry elongation MDxCD: 33%; 31% as per ASTM D4595
    g. Wet elongation MDxCD: 36%; 31% as per ASTM D4595
    h. Stiffness: 4070x3923 mg - cm as per ASTM D1388
    i. Water absorption: 163% as per ASTM D1117
    j. Water velocity: 8 ft/sec.
    k. Sheer stress: 3.2 psf
    l. Open area: 65%
2. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
    a. Pinelands Nursery, 323 Island Road, Columbus, NJ 08022, 856-291-9486

C. Inlet Protection:
1. Dandy Curb Bag and Dandy Bag
    a. Elongation: 40% x 25% per ASTM D 4632
    b. Tensile Strength: 450lbs x 300lbs per ASTM D 4632
    c. Tear Strength: 165lbs x 150lbs per ASTM D 4533
    d. Burst Strength: 600psi per ASTM D 3786
    e. Puncture Strength: 130lbs per ASTM D 4833
    f. Flow rate: 250 gpm/sq. ft. per ASTM D 4491
    g. UV Resistance: 70% per ASTM D

2. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
    a. Dandy Products, Inc. PO Box 1980, Westerville, OH 43086, 800-591-2284

D. Silt Fence:
1. Mirafi Silt Fence
    a. Elongation: 15% x 15% per ASTM D 4632
    b. Tensile Strength: 124lbs per ASTM D 4632
    c. Tear Strength: 124lbs per ASTM D 4533
    d. Burst Strength: 300psi per ASTM D 3786
    e. Flow rate: 10 gpm/sq. ft. per ASTM D 4491
    f. UV Resistance: 70% per ASTM D

2. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
    a. Mirafi by TenCate, 365 South Holland Drive, Pendergrass GA 30567, 888-795-0808

E. Other Manufacturers:

1. North American Green, 14649 Highway 41 North, Evansville, IN 47725, (800) 772-2040, www.nagreen.com.
2. Nedia Enterprises, Inc., 22187 Vantage Pointe Place, Ashburn, VA 20148, (888) 725-6999, www.nedia.com.
3. Belton Industries, 5600 Oakbrook Parkway, Norcross GA., 30093, (800) 225-4099, www.beltonindustries.com.
4. KriStar, 1219 Briggs Ave., Santa Rosa, CA 95401, (800) 579-8819, www.kristar.com.
5. Rolanka International Inc., 155 Andrew Drive, Stockbridge GA 30281, (800) 760-3215, www.rolanka.com.
6. Apex Resources Inc., 12910 Shelbyville Road, Louisville, KY 40243 (888) 677-2739, www.apexr.com.
7. MonoSol, LLC, 707 E. 80th PL., Merrillville, IN 46410 (800) 237-9552, www.terraloc.com.

PART 3 - EXECUTION

3.1 WORK AREA

A. The Owner's Representative has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion measures to minimize damage to property and contamination of watercourses and water impoundments. Under no circumstances will the area of erodible earth material exposed at one time exceed 50,000 sq. ft. The Owner's Representative may increase or decrease this area of erodible earth material exposed at one time as determined by his analysis of project, weather and other conditions. The Owner's Representative may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor's demonstrated capability in protecting erodible earth surfaces with temporary, permanent, vegetative or biotechnical erosion control measures.

B. Schedule the work so as to minimize the time that earth areas will be exposed to erosive conditions. Provide temporary structural measures immediately to prevent any soil erosion.

C. Provide temporary seeding on disturbed earth or soil stockpiles exposed for more than 7 days or for any temporary shutdown of construction. In spring, summer or early fall apply rye grass at a rate of 1 lb/ 1000 sq.ft. In late fall or early spring, apply certified Aroostook Rye at a rate of 2.5 lbs./ 1000 sq. ft. Apply hay or straw at a rate of 2 bales/ 1000 sq. ft. or wood fiber hydromulch at the manufacturer's recommended rate. Hay or straw shall be anchored.

D. Prior to installation of erosion control matting, apply hydroseed using a 2 step application as defined in Section 329300 Turf and Grasses. Protect 6:1 to 4:1 slopes by laying Type 2 erosion control matting and for slopes steeper than 4:1 use erosion control matting Type 1. Unroll sheets parallel with the slope, securing the matting at the top of slope and toe of slope within 6 inch trenches laying 12 inches of matting within trench, stapling 12 inches on center, and backfilling with soil. Overlap seams 12 inches secure matting with staples 12 inches on center around edges and seams and no greater than 24 inches on center elsewhere. Once matting is secure, install live stakes.

E. Coordinate the use of permanent controls or finish materials shown with the temporary erosion measures.

F. All erosion and sediment control devices must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, re-grading, re-seeding, or re-mulching, must be performed immediately.

G. After final stabilization has been achieved temporary sediment and erosion controls must be removed. Areas disturbed during removal must be stabilized immediately.

END OF SECTION 312513

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt overlay.

B. Related Requirements:

1. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each paving material.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Connecticut Department of Transportation (ConnDOT) for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. Coarse Aggregate: AASHTO T 96, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

B. Fine Aggregate: AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

C. Mineral Filler: AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320, PG 64-22.

B. Tack Coat: AASHTO M 140 emulsified asphalt grade SS-1 OR SS-1H, or AASHTO M 208 cationic emulsified asphalt grade CSS-1 OR CSS-1H, slow setting, diluted in water, of suitable grade and consistency for application.

2.3 MIXES

A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by Connecticut Department of Transportation and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Base Course: Class 1.
3. Surface Course: Class 2.

PART 3 - EXECUTION

3.1 EQUIPMENT

A. Placing Equipment: The paver shall be a self-propelled unit with an activated screed or strike-off assembly, capable of being heated if necessary, and capable of spreading and finishing the mixture without segregation for the widths and thicknesses required. In general, track pavers have proved superior for Porous Asphalt placement. The screed shall be adjustable to provide the desired cross-sectional shape. The finished surface shall be of uniform texture and evenness and shall not show any indication of tearing, shoving, or pulling of the mixture. The machine shall, at all times, be in good mechanical condition and shall be operated by competent personnel. Pavers shall be equipped with the necessary attachments, designed to operate electronically, for controlling the grade of the finished surface.

Pavers shall be equipped with a sloped plate to produce a tapered edge at longitudinal joints. The sloped plate shall be attached to the paver screed extension. The sloped plate shall produce

a tapered edge having a face slope of 1:3 (vertical: horizontal). The plate shall be so constructed as to accommodate compacted mat thickness from 35 to 100 mm (1 1/4 to 4 inches). The bottom of the sloped plate shall be mounted 10 to 15 mm (3/8 to 1/2 inch) above the existing pavement. The plate shall be interchangeable on either side of the screed.

Pavers shall also be equipped with a joint heater capable of heating the longitudinal edge of the previously placed mat to a surface temperature of 95 °C (200 °F), or higher if necessary, to achieve bonding of the newly placed mat with the previously placed mat. This shall be done without undue breaking or fracturing of aggregate at the interface. The surface temperature shall be measured immediately behind the joint heater. The joint heater shall be equipped with automated controls that shut off the burners when the pavement machine stops and reignite them with the forward movement of the paver. The joint heater shall heat the entire area of the previously placed wedge to the required temperature. Heating shall immediately precede placement of the asphalt material.

B. Rollers: Rollers shall be in good mechanical condition, operated by competent personnel, capable of reversing without backlash, and operated at speeds slow enough to avoid displacement of the asphalt mixture. The mass (weight) of the rollers shall be sufficient to compact the mixture to the required density without crushing of the aggregate. Rollers shall be equipped with tanks and sprinkling bars for wetting the rolls. Rollers shall be two-axle tandem rollers with a gross mass (weight) of not less than 7 metric tons (8 tons) and not more than 10 metric tons (12 tons) and shall be capable of providing a minimum compactive effort of 44 kN/m (250 pounds per inch) of width of the drive roll. All rolls shall be at least 1 m (42 inches) in diameter.

A rubber tired roller will not be required on the open graded asphalt friction course surface.

3.2 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 2 inches.
2. Patch surface depressions deeper than 1 inch after milling, before wearing course is laid.

3.3 PATCHING

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of .12 ± .02 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.4 SUBGRADE PREPARATION

A. General: All soft and yeilding material and other portions of the subgrade which will not compact readily shall be removed and replaced with suitable material.

B. Compact subgrade to 95 percent of dry weight density as determined by ASTM D 698

C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

3.5 SUBBASE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Processed Stone: As per the construction details.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of .07 ± .02 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Forms: Asphalt forms shall be placed over the prepared subbase and solidly staked in place to prevent movement while laying the hot mix. Radii and walkway flairs shall be smooth without any straight segments. Forms shall be removed prior to placing topsoil.

3.6 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Spread mix at a minimum temperature of 250 deg F.
2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 8 feet wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.7 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.8 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to AASHTO T209, but not less than 90 percent or greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly. Edges of asphalt shall be formed to a 45 degree angle.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.9 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

B. Replace and compact hot-mix asphalt where core tests were taken.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 WASTE HANDLING

A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes Concrete Paving

1. Walks

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of product, ingredient, or admixture requiring color selection.

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.3 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Concrete Testing Service: Employ at contractor's expense a testing laboratory to perform material evaluation test and to design concrete mixtures.

C. Third Party Testing: Employ at the Owners expense a testing laboratory to evaluate concrete delivered to and placed at site.

D. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

E. Sampling and testing for quality assurance during placement of concrete includes the following:

1. Slump: ASTM C143; one test for each concrete load at point of discharge from truck, and one test for each set of compressive strength test specimens.

2. Air Content: ASTM C231 pressure for normal weight concrete; one for each set of compressive strength test specimens.

3. Concrete Temperature: Test hourly when air temperature is 40 degrees F and below, and when 80 degrees F and above; and each time a set of compressive test specimens are made.

4. Compression Test Specimen: ASTM C31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required.

5. Compressive Strength Test:

   a. ASTM C39; one for each 50 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 5,000 sq. ft. of surface area placed; 1 specimen tested at 7 days, 2 specimens tested at 28 days and one specimen retained in reserve for later testing if required

   b. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches from each batch if fewer than 5 are used.

   c. When strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

B. Comply with State of Connecticut Department of Transportation Section M.03; Section 4.01, and the requirements below.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from as-drawn steel wire into flat sheets.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating. Cut bars true to length with ends square and free of burrs.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.3 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150/C 150M, white portland cement Type I.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 4S, uniformly graded. Provide aggregates from a single source.

C. Water: Potable and complying with ASTM C 94/C 94M.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, cotton mats.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

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

a. BASF Corporation; Construction Systems.
b. Dayton Superior.
c. Sika Corporation.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

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

a. Dayton Superior.
b. W. R. Meadows, Inc.

2.5 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

A. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum W/C Ratio at Point of Placement: 0.45.
3. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
4. Slump: Between 2 and 4 inches: except when a water-reducing admixture is used, maximum slump shall be 6 inches and when a high range water reducing admixture is used, maximum slump shall be 8 inches.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated. Smooth joint-dowels shall be greased to prevent adhesion of concrete to bar.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed paving surface with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing moisture-retaining-cover curing curing compound or a combination of these.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

   1. Elevation: Plus 1/4 inch, no minus.
   2. Thickness: Plus 1/4 inch, minus 1/4 inch.
   3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/4 inch.
   4. Joint Spacing: 3 inches.
   5. Contraction Joint Depth: Plus 1/4 inch, no minus.
   6. Joint Width: Plus 1/8 inch, no minus.

3.10 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Joint-sealant backer materials.
3. Primers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each kind and color of joint sealant required.

C. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type SL.

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

    a. Dow Corning Corporation.

B. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.

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

    a. W.R. Meadows, Inc.

    b. Sika Group

2.3 JOINT-SEALANT BACKER MATERIALS

A. Backer Strips for Cold-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

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

    a. W.R. Meadows, Inc.
        1) CERAMAR – Flexible foam Expansion Joint

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Cleaning of Joints: Clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

C. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer.

D. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

E. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

F. Install joint sealants after 28-day concrete curing period, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

H. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

I. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

END OF SECTION 321373

SECTION 321640 – GRANITE CURBING

PART 1 – GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 02300

1.02 SUBMITTALS

A. Samples:

1. Granite Curb: Minimum 1 foot long section.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Stone:

1. Granite shall be tough, dense, sound and durable, of uniform light color, reasonably fine grained and free from seams, cracks or other structural defects. Granite shall be "New England" granite conforming to ASTM C 615, Class I Engineering Grade, suitable for curbstone use. Curb shall be light gray, free from seams which impair structural integrity, and with percentage wear less than 32 percent as determined by ASTM C 131 testing. Curbing shall consist of approved stone, furnished in accordance with the dimensions and details shown on the plans and consisting of 5" X 18" granite stone curbing, 5" X 18" granite curved stone curbing, granite curb corners, ramp transition curbing, and flush granite curbing at handicapped access curb cuts.

B. Granite Curbs:

1. Granite curb shall be of 3 dimensions and shall be located as shown on the site plans. 5" x 18" granite stone curbing, curved stone curbing, ramp transition curbing and flush curbing shall have the following dimensions: minimum length = 6 feet, width at top = 5 inches, depth = 17 inches to 19 inches. Ramp transition curbing will vary in depth but must have 12 inches minimum below finish grade.
2. Top surface of all granite curbing shall be sawn to a near true plane, having no projections or depressions greater than 1/8" and shall be thermal finished to create a non-slip surface.

3. Where the top surface meets the front face, the sharp edge should be honed to a 3/8" radii and thermal finished to create a non-slip surface. Where the top surface meets the back face, the sharp edge shall be thermal finished.
4. Front and back faces for granite curbing, curb corners, ramp transition and flush stones shall be at right angles to the planes of the top and ends and shall be smooth quarry split, free from drill holes and with no projection more than 1 inch and no depressions of more than 1/2 inches, measured from the vertical plane of the face through the arris line for a distance of 8 inches from the top surface. For the remaining distance there shall be no projection or depression greater than 1 inch.
5. The ends of curb segments shall be squared with the planes of the top and faces so that when the stones are placed end to end as closely as possible, no space shall show in the joint at the top and faces of more than 1/4 inches for the full width of the top and for 8 inches down the faces, after which the ends may break back not over 1 inch from the plane of the joint. No face of adjoining stones shall be more than 1/8 inch out of plane.

C. Concrete encasement: Encasement for all granite curb types shall be class "F" concrete poured to a depth indicated on the site plans.

D. Mortar: A cement mortar composed of one part portland cement and two parts sand by volume with sufficient water to form a workable, adhesive, and stiff mixture.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Vertical faces of all curb shall be vertically plumb with top parallel to adjacent surfaces. Curb shall be accurately set to the grades indicated within the site plans. Curb alignment shall be consistent, with smooth transitions between adjacent curb stones. Radius curb segments shall meet with a common tangent.

B. Backfill material in each side of the curb shall be as specified for the adjacent surface and shall be thoroughly compacted. Use extreme caution not to destroy curb alignment. Any curb sections that are disturbed shall be reset.

END OF SECTION 321640

SECTION 321713 - PARKING BUMPERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes wheel stops.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 PARKING BUMPERS

A. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, 4000-psi (27.6-MPa) minimum compressive strength, 4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1800 mm) long. Provide chamfered corners, transverse drainage slots on underside, and a minimum of two factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

1. Mounting Hardware: Galvanized-steel hardware as standard with wheel-stop manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install wheel stops according to manufacturer's written instructions unless otherwise indicated.

B. Install wheel stops in bed of adhesive before anchoring.

C. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer.

END OF SECTION 321713

SECTION 321723 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes painted markings applied to asphalt pavement.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Aexcel Inc.
2. Ennis-Flint.
3. Sherwin-Williams Company (The).

2.2 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.

1. Color: White.

B. Glass Beads: AASHTO M 247, Type 1 made of 100 percent recycled glass.

PART 3 - EXECUTION

3.1 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils. Apply paint so that it cannot run beneath the stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal.

END OF SECTION 321723

SECTION 321726 - TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place detectable warning tiles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for each type of exposed finish requiring color selection.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

2.2 DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
a. Engineered Plastics 300 International Drive, Suite 100, Williamsville, Ny 14221, 800-682-2525

2. Material: Vitrified Polymer Composite.
3. Color: Dark Grey.
4. Shapes and Sizes:

a. Rectangular panel, 12 by 12 inches (305 by 305 mm).

5. Dome Spacing and Configuration: 1.67-inch (42.4-mm) spacing, in manufacturer's standard pattern.
6. Mounting:

    a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.

2.3 ACCESSORIES

A. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 - EXECUTION

3.1 INSTALLATION OF TACTILE WARNING SURFACING

A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

C. Cast-in-Place Detectable Warning Tiles: Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping or vibrating. Set surface of tile flush with surrounding concrete and adjacent tiles. Remove concrete from tile surfaces and clean using methods recommended in writing by manufacturer.

D. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

E. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

SECTION 323113 - CHAIN LINK FENCES AND BACKSTOP

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Poly Vinyl Chloride (PVC) coated chain link fabric with PVC color coated galvanized steel framework and accessories for commercial or industrial applications
2. Baseball Backstop

1.2 REFERENCES

A. ASTM A780 Standard practice for Repair of Damaged and Uncoated Areas of Hot-dip Galvanized Coatings.

B. ASTM F552 Standard Terminology Relating to Chain Link Fencing

C. ASTM F567 Standard Practice for Installation of Chain Link Fence

D. ASTM F626 Standard Specification for Fence Fittings

E. ASTM F668 Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain Link Fence Fabric

F. ASTM F900 Standard Specification for Industrial and Commercial Swing Gates

G. ASTM F934 Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.

H. ASTM F1043 Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework

I. ASTM F1083 Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

J. ASTM F1664 Standard Specification for Polyvinyl Chloride (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used With Chain Link Fence

K. WLG2445 Chain Link Fence Manufacturers Institute, Chain Link Fence Wind Load Guide for the Selection of Line Posts and Line Post Spacing

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Changes in specifications may not be made after the bid date.

B. Product Data: Manufacturer's catalog cuts indicating material compliance and specified options.

C. Shop Drawings: Layout of fences and gates with dimensions, details, and finishes of components, accessories, and post foundations.

D. Include plans, elevations, sections, details, and attachments to other work.

E. Samples: If requested, samples of materials (e.g., fabric, wires, color, and accessories).

1.5 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company having manufacturing facilities in the United States with 5 years experience specializing in manufacturing of chain link fence products.

B. Fence contractor: Contractor having 5 years experience installing similar projects in accordance with ASTM F567.

C. Tolerances: ASTM current specification and tolerances apply and supersede any conflicting tolerance.

D. Substitutions: Alternate chain link products may be acceptable by the architect as equal if approved in writing ten days prior to bidding provided that the items submitted meet the specifications contained in this document.

E. Single source: To ensure system integrity obtain the chain link system, framework, fabric, fittings, gates and accessories from a single source.

1.7 WARRANTY

A. 15 Year Limited Warranty: Master-Halco warrants the original purchaser and not any other purchaser, or subsequent owner, that its PERMAFUSED® II Color ChainLink Fence System is free from defects in material or workmanship including peeling, blistering and from the development of red rust over five percent (5%) of the surface for a period of fifteen (15) years from date of purchase. This warranty applies to fence systems constructed entirely of components manufactured and/or supplied by Master-Halco.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Approved Manufacturer:
1. Master Halco, Inc.
One City Blvd. West, Suite 900
Orange, CA 92868
Phone (800) 229-5615 Fax (714) 385-0107

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7:

1. Design Wind Load: 120 mph.

a. Minimum Post Size: Determine according to ASTM F 1043 for post spacing not to exceed 10 feet for Material Group IA, ASTM F 1043, Schedule 40 steel pipe.
b. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified.

2.3 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:

1. Poly Vinyl Chloride (PVC) color coated steel chain link fabric per ASTM F668 Class 2b Fused and adhered to metallic coated steel wire.

2. Size and Height: Chain link fabric: **2 inch** mesh, **9 gauge** steel core wire having a break load of **1290 lbf** and **5740 N**, height: **8 feet.**

3. Backstop Size and Height: **2 inch** mesh, **6 gauge** chain link fabric for the bottom **12 feet** of height. **2 inch** mesh, **9 gauge** chain link fabric for the upper side panels and top canopy.

4. Selvage of fabric: knuckled at top and knuckled at bottom.

5. Color of chain link fabric per ASTM F934: **Black**

2.4 FENCE FRAMEWORK

A. Color of steel fence framework: **Black**

B. Steel pipe Type I: ASTM F1043 Group IA, ASTM F1083 standard weight schedule 40 hot-dip galvanized pipe having a zinc coating of 1.8 oz/ft² (550 g/m²) on the outside and 1.8 oz/ft² (550 g/m²) on the inside surface. Exterior of pipe to have F1043 PVC thermally fused color coating, minimum thickness 10 mils (0.254 mm).
Regular Grade: Minimum steel yield strength of 30,000 psi (205 MPa) [all sizes]
Intermediate Strength Grade: Minimum steel yield strength of 50,000 psi (344 MPa) [in sizes 6.625” and 8.625” (168.3, 219.1 mm) OD only]
High Strength 83000 Grade: Minimum steel yield strength 83,000 psi (572 MPa) [all sizes up to and including 4.00” OD (101.6mm)] [special order]

C. Pipe End and Corner Post: **2.875 inch OD**, **5.79 lbs/ft**

D. Pipe Line Post: **2.375 inch OD, 3.65 lbs/ft**

E. Pipe Rail and Braces: **1.660 inch OD, 2.27 lbs/ft**

F. Backstop Post: **4 inch O.D. minimum**.

G. Backstop Bottom and Mid Rails: **1.66 inch O.D**.

H. Backstop Top Rail and Canopy Pipe Framing: **1.9 inch O.D.** Rails to be of the same specification as the posts.

2.5 FITTINGS

A. All fittings to be PVC thermally fused color coated having a minimum thickness of 0.006” per ASTM F626. PVC color to match fabric and framework. Moveable parts, nuts and bolts to be field coated with PVC liquid touch up after installation.

B. Post caps: ASTM F626 galvanized pressed steel, malleable iron, or aluminum alloy weather tight closure cap for tubular posts. Provide one cap for each post. End and corner post top to be Dome option. When top rail is specified provide line post loop tops to secure top rail.

C. Rail ends: Galvanized pressed steel per ASTM F626, for connection of rails to post using a brace band.

D. Top rail sleeves: 7" galvanized steel sleeve per ASTM F626. [If expansion and contraction of the rail is of concern add a 0.137" wire diameter by 1.80" long expansion spring between the adjourning rails]

E. Wire ties: 9 gauge galvanized steel wire for attachment of fabric to line posts and rails. Pre-formed hog ring ties to be 9 gauge galvanized steel or aluminum for attachment of fabric to tension wire. Tie wire and hog rings PVC coated and in compliance with ASTM F626. Color to match fabric color.

F. Brace and tension (stretcher bar) bands: ASTM F626 galvanized 12 gauge pressed steel by 3/4" formed to a minimum 300 degree profile curvature for post attachment. Secure bands using minimum 5/16" galvanized carriage bolt and nut.

G. Backstop Brace and tension (stretcher bar) bands: ASTM F626 galvanized 12 gauge pressed steel by 3/8" thick by 1" galvanized steel bands.

H. Tension (stretcher) galvanized steel bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16" x 3/4" per ASTM F626. Provide tension (stretcher) bars where chain link fabric is secured to the terminal post.

I. Truss rod assembly: Galvanized steel minimum 5/16" diameter truss rod with pressed steel tightener, in accordance with ASTM F626

J. Backstop Canopy support truss assembly: galvanized steel truss rod assembly consisting of minimum ½" diameter truss rod with malleable or pressed steel turnbuckle.

K. Carriage bolts and nuts: Galvanized of commercial quality

2.6 TENSION WIRE

A. Tension wire: Poly Vinyl Chloride (PVC) coated metallic coated steel tension wire per ASTM F 1664, **9 gauge steel core wire, 0.148 inch.** PVC coating class and color to match chain link fabric

2.7 POST SETTING MATERIALS

A. Concrete: Minimum 28 day compressive strength of 3,000 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Ensure property lines and legal boundaries of work are clearly established.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FRAMEWORK INSTALLATION

A. Install chain link fence system in accordance with ASTM F567 and manufacturer's instructions.

B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30° or more.

C. Space line posts uniformly maximum 10' on center.

D. Concrete set posts: Dig holes in firm, undisturbed or compacted soil. For corner and end posts holes shall have diameter of 14 inches, and depths approximately 6" deeper than post bottom. For line posts holes shall have diameter of 12 inches, and depths approximately 6" deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post and slope to direct water away from posts.

E. For backstop, the minimum concrete footing size per ASTM F657, 16" diameter by 48" deep, depending on soil conditions.

F. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

G. Top rail: Install in lengths of 21'. Connect ends with sleeves forming a rigid connection, allow for expansion and contraction.

H. Center Rails: Install brace rails between line posts and attach to post using rail end or line rail clamps.

I. Bottom Rail: Install bottom rails between posts and attach to post using rail end or line rail clamps. Install 2 inches above finish grade.

J. Rail ends to be secured to the pipe rail by field drilling and bolting per drawing 16-1110 sheet 2.

K. Canopy Truss Assembly: the ½ inch diameter canopy truss assemblies shall be secured to the post and canopy frame using brace bands.

L. Touch up any nicks or scratches of the PVC color coating with liquid PVC paint.

M. Layout and Install backstop fence in accordance with Master Halco baseball backstop drawing 16-1110 sheets 1 and 2.

3.4 CHAIN LINK FABRIC INSTALLATION

A. Fabric: Install fabric on security side, pull fabric taut; thread the tension bar through fabric and attach to terminal posts with tension bands spaced maximum of 15" on center and attach so that fabric remains in tension after pulling force is released. Install fabric so that it is 2" above finish grade.

B. Backstop Fabric: Install fabric on the inside of the backstop. Revise tension band spacing to maximum of 12 inch on center. Install fabric so that it is maximum 1 inch above finish grade.

C. Secure fabric using wire ties to line posts at 15" on center and to rails and braces 24" on center, and to the tension wire using hog rings 24" on center. Tie wire shall be secured to the fabric by wrapping it two 360 degree turns around the chain link wire pickets. Cut off any excess wire and bend back so as not to protrude so as to avoid injury if a pedestrian may come in contact with the fence.

D. For Backstop: Secure fabric to line posts and rails using wire ties 12" inches on center. Tie wire shall be secured to the fabric by wrapping it two 360 degree turns around the chain link wire pickets. Cut off any excess wire and bend back so as not to protrude so as to avoid injury if a pedestrian may come in contact with the fence.

3.5 SITE CLEAN UP

A. Clean up area adjacent to fence line from debris and unused material created by fence installation.

END OF SECTION 323113

SECTION 328423 - IRRIGATION

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. Quick Coupling Valve

1.3 PERFORMANCE REQUIREMENTS

1.4 SUBMITTALS

A. Product Data: For each type of product indicated

B. Warranties for each component warranted by manufacturer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: The quick coupling valve shall be installed in accordance with the manufacturer’s published instructions. The quick coupling valve shall carry a warranty as advertised by Rain Bird Corporation for the specific series shown on the drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver quick coupling valve with factory-applied identification. Provide shipping, storage, and handling to prevent damage and to prevent entrance of dirt, debris, and moisture.

B. Store products as recommended by Rain Bird Corporation

1.7 WARRANTIES

A. Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components that fail in materials or workmanship within manufacturer’s specified warranty period for each component.

PART 2 - PRODUCTS

2.1 QUICK COUPLING VALVE

A. Brass Quick Coupling Valves:

1. Manufacturer: Subject to compliance with requirements, provide products by the following:

a. Rain Bird Corporation. Azusa, CA. Phone: (877)-727-8772.

B. Model: 3-RC

C. The valve body shall be constructed of red brass. The cover shall be a durable, protective self-closing rubber cover. When so specified, the cover shall be a locking rubber cover (LRC).

D. The valve shall be opened and closed by a brass key of the same manufacturer.
1. Valve Key Model: 33DK

2.2 VALVE BOX

A. Valve boxes shall be provided for each valve installation shown on the plans. No irrigation valve box shall be placed in pavement areas unless otherwise shown on the Drawings.

B. Valve Box:
1. Manufacturer: Subject to compliance with requirements, provide products by the following:
a. Rain Bird Corporation. Azusa, CA. Phone: (877)-727-8772.

C. Model: VB-6RND

D. Size: 6” Round
a. 6.1” top diameter x 9” height x 8.3” bottom diameter.
b. 2 pre-molded side openings (one ever 180 degrees) to accommodate up to 2” diameter pipe, height 2.8” x max. width 2.3”

E. Warranty: 5-year trade warranty.

F. The Valve boxes shall be used as durable, rigid enclosures for valves or other irrigation system components requiring subsurface protection for installation or maintenance. The valve box shall be made of HDPE resin that is resistant to UV light, weather, moisture, and chemical action of soils.

G. The body shall have two openings molded into the sides.

H. The valve box shall have corrugated sides.

I. Lids shall have beveled edges to prevent or minimize potential damage from lawn equipment.

2.2 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedules 40 and 80.

1. PVC Socket Fittings: ASTM D 2466, Schedules 40 and 80.
2. PVC Threaded Fittings: ASTM D 2464, Schedule 80.
3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.

2.3 PIPING JOINING MATERIALS

A. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

B. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.4 MISCELLANEOUS PIPING SPECIALTIES

A. Sleeves: Sleeves for pipes passing beneath paving shall conform to ASTM D2241, Schedule 40. Minimum diameter of 2 inch or 2 sizes larger than pipe scheduled to pass through them.

B. PVC Solvent Cement: Cement shall conform to ASTM D2564.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.

E. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.
2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

F. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.3 QUICK COUPLING VALVE INSTALLATION

A. Install quick coupling valve per Rain Bird Corp. written recommendations.

3.4 CONNECTIONS

A. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

3.5 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

B. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Division 31 Section "Earth Moving" for warning tapes.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that quick coupling valves are installed and connected according to the Contract Documents.

3.8 CLEANING

A. Flush dirt and debris from piping before installing other devices.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain valves.

END OF SECTION 328423

SECTION 329115 - SOIL PREPARATION (PERFORMANCE SPECIFICATION)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes planting soils specified according to performance requirements of the mixes.

B. Related Requirements:

1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.

1.2 DEFINITIONS

A. CEC: Cation exchange capacity.

B. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

C. Imported Soil: Soil that is transported to Project site for use.

D. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

E. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

F. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.

H. SSSA: Soil Science Society of America.

I. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

J. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

K. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

L. USCC: U.S. Composting Council.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each bulk-supplied material in sealed containers labeled with content, source, and date obtained; providing an accurate representation of composition, color, and texture.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

A. Existing Soil: Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Using preconstruction soil analyses and materials specified in other articles of this Section, amend existing, on-site surface soil to become planting soil complying with the following requirements:

1. Particle Size Distribution by USDA Textures: Classified as loam soil according to USDA textures.
2. Percentage of Organic Matter: Minimum 3 percent by volume.

3. Soil Reaction: pH of 6 to 7
4. CEC of Total Soil: Minimum 10 meq/100 mL at pH of 6.5
5. Soluble-Salt Content: 0.4 to 0.8 mmho/cm
6. Bulk Density: 1.0 g/cu. cm to 1.4 g/cu. cm at 85% compaction.
7. Total Porosity: Minimum 35 percent at 85% compaction.
8. Fertility: Optimal levels for Phosphorus, Potassium, Magnesium and Calcium shall be tested for and amendments added per the recommendations of the testing laboratory for the intended soil use.
9. Microbiological Content: Optimal levels for Zinc, Copper, Boron, Iron and Manganese shall be tested for by the testing laboratory for the intended soil use.

B. Planting Soil: Imported, naturally formed soil from off-site sources and consisting of loam soil according to USDA textures; and modified to produce viable planting soil. Amend imported soil with materials specified in other articles of this Section to become planting soil complying with the following requirements:

1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
2. Additional Properties of Imported Soil before Amending: Minimum of 3 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration. Clean soil to be of the following:

    a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
    b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 3 percent by dry weight of the imported soil.
    c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 1 inch in any dimension.

3. Percentage of Organic Matter: Minimum 3 percent by volume.
4. Soil Reaction: pH of 6 to 7
5. CEC of Total Soil: Minimum 10 meq/100 mL at pH of 6.5
6. Soluble-Salt Content: 0.4 to 0.8 mmho/cm
7. Bulk Density: 1.0 g/cu. cm to 1.4 g/cu. cm at 85% compaction.
8. Total Porosity: Minimum 35 percent at 85% compaction.
9. Fertility: Optimal levels for Phosphorus, Potassium, Magnesium and Calcium shall be tested for and amendments added per the recommendations of the testing laboratory for the intended soil use.

10. Microbiological Content: Optimal levels for Zinc, Copper, Boron, Iron and Manganese shall be tested for by the testing laboratory for the intended soil use.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.

E. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. Feedstock: Limited to leaves.
2. Reaction: pH of 6.5 to 7.0
3. Soluble-Salt Concentration: Less than 2.0 mmho/cm
4. Moisture Content: 35 to 55 percent by weight.
5. Organic-Matter Content: 30 to 40 percent of dry weight.
6. Particle Size: Minimum of 98 percent passing through a 1/2-inch sieve.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5.0 mmho/cm

C. 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, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Organic Fertilizer: Fully organic fertilizer of neutral character, consisting of fast- and slow-release nitrogen, derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 10 percent nitrogen, 10 percent phosphorous and 10 percent potassium, by weight.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches (or as determined from soil probing) and stockpile until amended.

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a combined maximum of 3 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: Pass unamended soil through a 1-inch sieve to remove large materials.

3.3 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Application: Spread planting soil to total depth indicated on Drawings, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Lifts: Apply planting soil in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

C. Compaction: Compact each lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.

D. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Mixing: Apply soil amendments, and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.

1. Mix lime and sulfur with dry soil before mixing fertilizer.
2. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

A. Application: Apply compost component of planting-soil mix to surface of in-place planting soil to depth indicated on drawings and till to 4 inch depth. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.6 PROTECTION AND CLEANING

A. Protection Zone: Identify protection zones according to Section 024100 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 329115

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.

1.2 DEFINITIONS

A. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

B. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 02920 "Soil Preparation" and drawing designations for planting soils.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Certification of grass seed.

B. Product certificates.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment with 5 years of experience.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
2. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

a. Landscape Industry Certified Technician - Exterior.
b. Landscape Industry Certified Lawncare Manager.
c. Landscape Industry Certified Lawncare Technician.

3. Pesticide Applicator: State licensed, commercial.

1.6 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.

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. Seed Species:

1. Quality: State-certified seed of grass species as listed below for solar exposure.
2. Quality: Seed of grass species as listed below for solar exposure, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:

3. Athletic Field Mix: Proportioned by weight as follows:

a. 70 percent Tall Fescue.
b. 20 percent Perennial Rye Grass.
c. 10 percent Kentucky Blue Grass.

Lebanon Turf Proscape Sports turf Mix or approved equal

2.2 FERTILIZERS

A. Organic Fertilizer: Fully organic fertilizer of neutral character, consisting of fast- and slow-release nitrogen, derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 10 percent nitrogen, 10 percent phosphorous and 10 percent potassium, by weight.

2.3 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

2.4 PESTICIDES

A. General: Pesticide, 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 unless authorized in writing by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329115 "Soil Preparation."

B. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a minimum rate of 6 lb/1000 sq. ft. over entire project area, or as directed by manufacturer.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. 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 thickness over seeded areas.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

E. Protect seeded areas with slopes greater than 1:6 by laying erosion control matting.

1. Comply with Section 02200 "Erosion and Sediment Control"

F. Protect seeded areas from hot, dry weather or drying winds by applying peat mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.3 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

3.4 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: 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. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: A healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

END OF SECTION 329200

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plants.
2. Edging.
3. Tree-watering devices.

1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

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. Some sources classify herbicides separately from pesticides.

C. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps organic fertilizers to produce a soil mixture best for plant growth. See Section 02920 "Soil Preparation" for drawing designations for planting soils.

D. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples of each type of mulch.

1.5 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Certificate of warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

B. Warranty Certificate

1.7 QUALITY ASSURANCE

A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

B. Handle planting stock by root ball.

C. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

D. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1.9 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance.
    b. Structural failures including plantings falling or blowing over.

2. Installer is not liable for the following:

    a. Vandalism or theft

B. Warranty Periods: From date of Substantial Completion.

1. Substantial completion is considered to be the date when all plant material has been installed per the construction drawings. When the contractor feels the planting is substantially complete, the Landscape Architect shall be notified to conduct a punch list to ensure all material has been installed correctly and quantities of plant materials are accurate per the planting schedule found within the construction drawings and or substitutions submitted by the contractor and approved by the Landscape Architect due to plant availability. The contractor is responsible to replace missing and or deceased plants, and complete any corrective measures indicated by the Landscape Architect. A second check will be made by the Landscape Architect to confirm all items have been corrected and shall issue a written approval of the planting confirming Substantial Completion. The date of this letter shall be the start of the warranty period. Plants shall be warranted for the following length of time:

    a. Trees, Shrubs, Vines, and Ornamental Grasses: 18 months.
    b. Ground Covers, Biennials, Perennials, and Other Plants: 18 months.
    c. Annuals: Three months.

C. Final Acceptance: At the end of each warranty period, the Landscape Architect shall conduct a punch list to ensure all plant material previously approved at the time of substantial completion are acceptably healthy and well established. The contractor is responsible to replace plants throughout the warranty period as defined within the 3.9 PLANT MAINTENANCE article and any plants which are not acceptably healthy as indicated on the punch list shall be replaced by the contractor. A second check will be made by the Landscape Architect to confirm all items have been corrected and shall issue a written approval of the planting confirming Final Acceptance of the planting.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

C. Annuals: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 5-gram tablet for ground covers, perennials and annuals; 10-gram tablet for Shrubs, 21-gram tablet for deciduous and evergreen trees.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

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

    a. Agritab Corporation

2.3 MULCHES

A. Organic Mulch: Dark Brown Shredded hemlock.

B. Mineral Mulch: Stone Screenings, to be installed under fence as maintenance strip, see construction details for width and depth of mulch.

1. Size Range: 1/4 inch minus.
2. Color: Readily available natural gravel color range, Grey tones.

2.4 PESTICIDES AND HERBICIDES

A. General: Pesticide 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 unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicides: Selective pre-emergence herbicide for the control of certain broadleaf weeds and annual grasses may be applied in ornamental beds. Apply at a rate recommended by the manufacturer to planting beds at the time of mulching.

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

a. Dow AgroScience LLC.

C. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.

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

a. Spectrum Products, Inc.

PART 3 - EXECUTION

3.1 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to Section 02920 "Soil Preparation."

B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.

C. Placing Rain Garden Soil: Place rain garden soil in-place over non-woven geotextile fabric wrapped stone with under drain.

D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter where planting occurs in undisturbed soil.
3. Excavate approximately one and one half times as wide as ball diameter where planting occurs in project fill.
4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

B. Backfill Soil: Subsoil removed from excavations may not be used as backfill soil unless otherwise indicated.

3.3 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Backfill: Planting soil or rain garden soil based on planting location.
2. Balled and Burlapped Stock: After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Container-Grown Stock: Carefully remove root ball from container without damaging root ball or plant. Scarify/loosen pot bound roots.

4. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 4 inch from root tips; do not place tablets in bottom of the hole.
6. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.4 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Landscape Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.5 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.

B. Use planting soil or rain garden soil for backfill based on planting location.

C. Dig holes large enough to allow spreading of roots.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.6 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 24-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.7 EDGING INSTALLATION

A. Shovel-Cut Edging: Separate mulched areas from turf areas with a 45-degree, 4- to 6-inch deep, shovel-cut edge as indicated on Drawings.

3.8 INSTALLING SLOW-RELEASE WATERING DEVICE

A. Provide one device for each tree.

3.9 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

D. Apply pesticides and other chemical products and biological control agents according to 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.

E. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

F. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.10 MAINTENANCE SERVICE

A. Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than warranty period listed under "1.9 WARRANTY" Article.

END OF SECTION 329300

SECTION 334600 - SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Perforated-wall pipe and fittings.
2. Geotextile filter fabrics.

B. Related Requirements:

1. Section 321313 "Concrete Paving" for concrete mix.

2. Section 321000 “Earth Moving”

1.2 ACTION SUBMITTALS

A. Product Data: For geotextile filter fabrics.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

A. Corrugated Perforated PE Pipe and Fittings NPS 3 to NPS 10: ASTM F 405 or AASHTO M 252, Type S; Class I perforations, for coupled joints.

2.2 SOIL MATERIALS

A. Soil materials are specified in Section 312000 "Earth Moving."

2.3 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP with flow rate range from 110 to 330 gpm/sq. ft. (4480 to 13 440 L/min. per sq. m) when tested according to ASTM D 4491.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. TenCate Geosynthetics,
   a. Type: Mirafi 140N
   b. Structure Type: Nonwoven, needle-punched continuous filament.
      1) Elongation: AASHTO M 288-06 Class 3; 50%
      2) Styles: Flat.

3) Tensile Strength: 120lbs
4) Tear Strength: 50lbs
5) Puncture Strength: 310lbs
6) Flow rate: 135 gpm/sq. ft.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 UNDER DRAIN INSTALLATION

A. Excavate for under drainage system taking care not to over excavate native sub-soils below the designed system depth. Do not compact native sub-soils, scarify soil surface to promote water infiltration into the soil. Sub-soils should be firm and free draining. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over prepared subgrade and geotextile filter fabric, to compacted depth of not less than 2 inches.

D. Install drainage piping as indicated in Part 3 "Piping Installation" Article for under drainage.

E. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

F. After satisfactory testing, cover drainage piping with drainage course to elevation indicated on site plans, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

3.3 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
   1. Under Drain Subdrainage: Install piping level.
   2. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 24 inches unless otherwise indicated.
   3. Lay perforated pipe with perforations down.
   4. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install thermoplastic piping according to ASTM D 2321.

3.4 PIPE JOINT CONSTRUCTION

A. Join perforated PE pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.

B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.5 CLEANOUT INSTALLATION

A. Cleanouts for Under Drain Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. In non-vehicular-traffic areas, use NPS 4 (DN 100) PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches (300 by 300 by 100 mm) deep with the top of concrete set 6" below grade. Set top of cleanout 2 inches (50 mm) above grade.
3. Comply with requirements for concrete specified in Section 321313 "Concrete Paving."

3.6 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.7 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 334600