PROJECT MANUAL

FOR

PLAYGROUND AT EAST WINDSOR PARK

EAST WINDSOR, CONNECTICUT

DATE: MARCH 29, 2023

TOWN OF EAST WINDSOR
11 RYE STREET
EAST WINDSOR, CONNECTICUT 06016

Prepared by:

BSC GROUP

655 Winding Brook Drive
Glastonbury, CT 06033

Invitation to Bid
Town of East Windsor, Connecticut
Playground at East Windsor Park
March 29, 2023

You are invited to submit a sealed bid for providing materials and construction services for a new playground at East Windsor Park at 27 Reservoir Avenue. The scope of this project includes all work necessary for the complete installation of site improvements and playground equipment.

Sealed bids will be received at the office of the First Selectman ATTN: Melissa LaBelle, 11 Rye Street, Broad Brook, CT. until 10:00 am on May 1, 2023, at which time they will be publicly opened and read aloud. Bids transmitted by facsimile will not be accepted. All bids received must be in a sealed envelope. Each envelope is to be marked on the front with the name of the bidder and project name: "Playground at East Windsor Park". No Bid will be accepted after the time set for the opening of Bids and no Bidder may withdraw his Bid within 60 days of opening thereof. The Town of East Windsor reserves the right to waive any informality or to reject any or all bids when such action is deemed in the best interest of the Town.

A mandatory pre-bid walk through of the project will be held at the picnic pavilion at East Windsor Park on Tuesday April 18 at 10:00 a.m.

The Instruction to Bidders, Bid Form, Drawings, Specifications, and other contract documents may be obtained or examined at the First Selectman Office, 11 Rye Street, Broad Brook, CT Monday – Wednesday 8:30am – 4:30pm Thursday 8:30am-7:00pm Friday 8:30am-1:00pm (860) 623-8122 Plans and Specifications for the Playground Project will be available on Thursday, March 29, 2023.

Any questions should be directed to BSC Group c/o Rachel Salch at rsalch@bscgroup.com. Requests for Information (RFI) to be given consideration must be received at least seven (7) days prior to date fixed for opening of bids. Interpretations will be made in the form of written addenda to the Contract Documents, which addend shall become a part of the Contract. Not later than five (5) days prior to date fixed for opening of bids, addenda will be provided to all persons who obtained Contract Documents and provided information to be included on the list of Bidders. Failure of any bidder to receive any such addend shall not relieve bidder from any obligation under his proposal as submitted.

The bids are due at the First Selectman ATTN: Melissa LaBelle, 11 Rye Street, Broad Brook, CT. until 10:00 am on May 1, 2023. All bids must be clearly marked on the outside of a sealed envelope, "Playground at East Windsor Park" with the name of the bidder.

AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER
MBE's, WBE's, SBE's and SECTION 3 DESIGNATED ENTERPRISES
ARE ENCOURAGED TO APPLY

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EAST WINDSOR, CONNECTICUT

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Instructions to Bidders
Town of East Windsor, Connecticut
Playground at East Windsor Park

1. RECEIPT OF OPENING BIDS

   Sealed bids of proposals for performing the work described herein will be received at the First Selectman Office ATTN: Melissa LeBelle, 11 Rye Street, Broad Brook,06016, until the time and date as shown on the Invitation to Bid.

   Copies of contract documents may be obtained from the Department of Public Works, during the hours specified on the Invitation to Bid.

   Proposals must be made on the forms furnished herein. Prior to the time and date designated for receipt of bids, a bid submitted may be modified or withdrawn by notice to the party receiving bids at the place designated for receipt of bids. A change shall be so worded as not to reveal the amount of the original bid.

   Withdrawn bids may be resubmitted up to the date and time designated for the receipt of bids provided that they are then fully in conformance with these instructions to bidders.

   Unless stated otherwise in the Advertisement or Invitation to Bid, the properly identified bids received on time will be opened publically and will be read alound. The owner shall have right to reject any or all bids, reject a bid not accompanied by a required bid security or by any data required by these Contract Documents, or reject a bid, which is in any way incomplete or irregular.

2. TAX EXEMPTION

   Purchase of materials for this project are exempt from Connecticut sales tax.

3. BID BOND

   A 5 % bid bond is required for this project. Any bid may be withdrawn by the bidder prior to the time scheduled for receipt of bids. The Bid Bond shall be duly executed by the Bidder as principal and having a surety thereon, which shall be acceptable to the Owner. No bid may be withdrawn within 60 days of the bid opening.

4. METHOD OF AWARD

   The contract will be awarded to the responsible bidder submitting the lowest bid complying with conditions of these Contract Documents. The bidder to whom the award is made will be notified at the Owner's convenience. The successful bidder shall execute and deliver to the Owner, within ten (10) days after receiving the Notice of Award, an Agreement in the form provided by the Owner, in such number as the Owner shall require.

The Owner also reserves the right to reject any or all bids, for any reason the Owner deems advisable, and to award the contract or contracts to any Contractors bidding on the work regardless of the amount of bid. It is intended that the contract or contracts will be awarded to the lowest responsible and eligible bidder possessing skill, ability and integrity necessary to provide faithful performance of the work.

5. INSURANCE

The bidder awarded this bid must provide a current certificate of insurance to the Office of the First Selectman prior to the commencement of work with the following requirements:

- Liability limits for bodily injury and persona injury $1,000,000 per occurrence.
- Liability limits for property damage including that caused by motor vehicle $1,000,000 per occurrence.
- Contractual liability $1,000,000 per occurrence.
- Owner's protective liability and property damage.
- Workers' compensation as required by Connecticut state statute.
- The Town of East Windsor is to appear as an additional insured on all certificate of insurance.
- All insurance is to be provided by a company authorized to issue such insurance in the State of Connecticut. The insurance company rating should be no less than A-VII by A.M. Best.
- Insurance may not be canceled or modified without sixty (60) days written notice by registered US mail to Office of the First Selectman, Town of East Windsor, 11 Rye Street Broad Brook, CT 06016.

6. FAILURE TO EXECUTE CONTRACT

The bidder to whom the contract is awarded will be required to execute the Agreement within ten (10) calendar days from the date when the Notice of Award is delivered to the Bidder. In case of failure of the Bidder to execute the Agreement, the Owner may, at its option, consider the Bidder in default, in which case the bid security accompanying the proposal shall be called.

7. QUALIFICATION OF BIDDERS

It is the intent of the Owner to engage a general contractor with experience with the tolerances, scheduling and curing involved with the construction site improvements and installation of playground equipment. As such, the successful bidder shall meet the following minimum requirements:

1. Qualified responsible general bidders shall have successfully completed at least five (5) similar projects within the past 3 years.
2. Qualified sub-contractors for playground surfacing: Qualified playground surfacing sub-contractors shall have completed a minimum of fifteen (15) similar surfacing projects within the past 5 years.

3. Qualifications shall be documented on the included Qualifications Form. Substitutes for this form shall not be accepted. The town may make such investigations as it deems necessary to determine the ability of the bidder to perform the work and the bidder shall provide the Town with any information requested for this purpose. The Town reserves the right to reject any bid if the investigation of such bidder indicates that the bidder is not qualified to complete the project or has previously failed to properly perform or complete on time any contract.

8. ACCEPTANCE AND AWARD OF CONTRACT

Upon receipt of acceptable signed Agreement, the Owner will, within ten (10) days, enter into and sign the Agreement unless it deems it not in the best interest of the Town.

The notice to proceed shall be issued within ten (10) days of the execution of the Agreement by the Owner. Should there be reasons why the notice to proceed cannot be issued within such period, the time may be extended by mutual agreement.

9. PAYMENT

The Owner shall pay the Contractor 100% of the Contract value upon completion of the work, minus any penalties for delay of completion of work.

10. TIME OF COMPLETION

The Bidder must agree to commence work on or before the date specified in the Notice to Proceed and to faithfully complete the project within sixty (60) calendar days. The Owner may deduct $100 per day from payment due to the contractor for everyday beyond this time limit.

11. CONDITIONS OF WORK

At the date fixed for opening of bids, it will be presumed that each Bidder has made an examination of location and site work to be done under contract; has satisfied himself as to actual condition, requirements, and quantities of work; and has read and become thoroughly familiar with Contract Documents, including Contract Drawings and addenda.

12. PERMITS

All permits, and inspections are the responsibility of the contractor.

13. COORDINATION AND SCHEDULING OF WORK

Since some of the work under this project may occur while the park facility is in use, certain conditions regarding access, deliveries, personnel, noise control and any other restrictions will be at the discretion of the Owner or his/her designee.

14. DAMAGES

The Contractor shall pay and make good repair to all losses or damages arising from any cause connected with the Contract, and shall indemnify and hold harmless the Town of East Windsor from any and all liability and responsibility of every nature and kind for any loss, damage or injury which any person(s) may sustain or suffer by reason of, or in any, arising out of the contract, and shall defend any suit of any nature which may be brought again the town or its agents, by reason of, or connected with, the work under the Contract, and shall pay all costs or expenses of every kind, character and nature whatever, accruing upon or arising out of the Contract.

15. CLEAN UP

Before the work is considered complete, the Contractor shall thoroughly clean all work areas, and remove all rubbish, debris, unused and surplus materials resulting from the work, leaving the premises in a condition satisfactory to the Owner.

PLAYGROUND AT EAST WINDSOR PARK BASE BID SCHEDULE	
ITEM #	**ITEM DESCRIPTION IN WORDS AND FIGURES**
1	**SITE PREPARATION** The work under this item shall include all personnel and equipment necessary for mobilization and administrative costs including bonding; the movement of all the contractor's storage facilities; safety fencing, temporary signs, site security features; transport of equipment to and from the project site; temporary toilet facilities; necessary daily cleanup; construction staking and layout; and the removal of bituminous concrete pavements, concrete pavements, sod, subgrade; storm drainage, and materials encountered incidental to construction as described in the Contract Drawings and Technical Specifications for the lump sum cost of: Lump Sum ($ _____) Written figures
2	**SEDIMENTATION AND EROSION CONTROL** The work under this item shall include all materials, equipment and labor for the installation and maintenance of a construction entrance pad and sedimentation and erosion controls, including but not limited to construction entrance, sediment filter fence, hay bales, and inlet protection required either by the plans, or Town staff or assigned representative, in accordance with the Contract Drawings and Technical Specifications for the lump sum cost of: Lump Sum ($ _____) Written figures
3	**EARTHWORK AND GRADING** The work under this item shall include all materials, equipment and labor to perform necessary grading operations as shown on the Contract Drawings and described in the Technical Specifications. Work under this item shall include all fine grading brought to the subgrade elevation required prior to the application of stone base material, processed stone or topsoil as shown in the contract documents. This work includes any importation of materials or removal of materials from the site as required to achieve proposed subgrade elevations for the lump sum cost of: Lump Sum ($ _____) Written figures
4	**SITE IMPROVEMENTS** The work under this item shall include all materials, equipment and labor to furnish and construct site improvements, including concrete sidewalk and bituminous concrete paving; drainage work; all required bases, footings or slabs; lawn, and plantings; and all other associated work shown on the Contract Drawings and as specified in the Technical Specifications for the lump sum cost of: Lump Sum ($ _____) Written figures

5	**PLAYGROUND INSTALLATION AND PLAYGROUND SURFACING** The work under this item shall include all materials, equipment and labor to receive delivery and install Owner supplied playground equipment, playground surfacing; all required bases, footings or slabs; and all other associated work shown on the Contract Drawings and as specified in the Technical Specifications for the lump sum cost of: Lump Sum ($)
	Written figures

LUMP SUM BID (LUMP SUM BID ITEMS 1-5 INCLUSIVE):

LUMP SUM BID TOTAL ($_____)

Written Figures

PLAYGROUND AT EAST WINDSOR PARK ADD ALTERNATE SCHEDULE	
ITEM #	**ITEM DESCRIPTION IN WORDS AND FIGURES**
ALT 1	**ADD ALTERNATE NO. 1 – Swings** The work under this item shall include removal of sod and subgrade; installation of subbase material, drainage, and safety surfacing; purchase of swingset; installation of swingset equipment; all required bases, footings or slabs and all other associated work as shown and in accordance with the Contract Drawings and Technical Specifications for the lump sum cost of: Lump Sum ($)
	Written figures

Submission of prices on all Bid Items and all Alternate Bid Items is **MANDATORY** and failure to provide such pricing shall render the bid non-responsive and subject to rejection by the Town.

Should any or all of the proposed Alternate Bid Items be accepted and incorporated into the project, the amount of the Contract shall be adjusted by the amount associated with each accepted Alternate Bid Item.

All bid items (and any alternate bid items accepted by the Town) shall include all costs necessary to perform the work and the costs for all materials, equipment, tools, labor and work incidental thereto, including profit and overhead.

All items in the Bid Form shall include all applicable taxes, fees and other incidental costs. Proposer's must fill in all blank spaces on the Bid Form and must summit a price for every item.

Proposer's must fill in all blank spaces on the Bid Form, including without limitation lump sum prices, unit prices, extended prices and total prices, as requested therein, or the Proposal will not be considered and shall be void. The price of each item on the form shall be stated in format requested.

Prices are to be written in words and figures. In the event of mathematically incorrect calculations of

individual items or totals, the mathematically correct amount using any estimated quantities and/or unit prices shall govern in determining the Bid pricing. In case of a discrepancy in prices, the bid amount in words shall prevail.

The undersigned also agrees that any quantities indicated are for price comparison purposes only and are not represented to be actual quantities to be procured and/or required for completion of the Project.

The undersigned hereby certifies under the penalties of perjury that this Bid Form is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this section, the work "person" shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.

Respectfully submitted by:

_____	_____
Business/Corporate Name (Print or Type)	Signature of Authorized Official (Print or Type)
	_____
	Printed Name of Authorized Official (Print or Type)
	_____
	Title of Authorized Official (Print or Type)

Proposer shall provide Proposer's Contact Information below:

_____	_____
Business Address: (Print or Type)	Business Fax Number: (Print or Type)
_____	_____
City, State, Zip Code: (Print or Type)	Business Mobile Number: (Print or Type)
_____	_____
Business Telephone Number: (Print or Type)	Business Email Address: (Print or Type)

Note: If the Proposer is a corporation, indicate State of incorporation under signature, and affix corporate seal; if a partnership, give full names and residential addresses, if different from business address.

END OF BID FORM

BIDDER'S STATEMENT OF QUALIFICATIONS
(To be returned with Bid)

All questions must be answered and the data given must be clear and comprehensive. The cover sheet must be notarized. If necessary, questions may be answered on separate sheets. Contractor may submit any additional information he desires.

Attachments:

1. Complete the attached References Form.

Information Required (*type or print clearly in blue or black ink*)

1. Name of Contractor.

_____

2. Permanent main office address.

_____

_____

_____

3. When were you organized (month/year): _____

4. How many years have you been engaged in the contracting business under your present firm or trade name?

_____years

5. If a corporation, indicate the following:

   Date of Incorporation: _____ State or Incorporation: _____

   President (or other chief executive as applicable): _____

6. If a Partnership, indicate the following:

   Date of Organization: _____

   Type of Partnership: _____

Names and Addresses of Partners/Officers:

1. _____ 2. _____

_____ _____

_____ _____

3. _____ 4. _____

_____ _____

_____ _____

5. _____ 6. _____

_____ _____

_____ _____

6. General character of work performed by your company.

_____

_____

_____

_____

_____

7. Have you ever failed to complete a project? If yes, identify the project(s) and provide an explanation.

_____

_____

_____

_____

_____

8. Have you ever defaulted on a contract? If yes, identify the project(s) and provide an explanation.

_____

_____

9. Contracts on hand: (Show the contract amount of each contract and the anticipated date of completion; attach additional sheets if necessary.)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

10. List your major equipment available for this Contract.

_____

_____

11. List the work to be performed by subcontractors and summarize the dollar value of each subcontract.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

12. Do you have adequate resources to complete the project within the required schedule and/or by the required completion date? Yes ☐ No ☐

13. Complete the attached **References Form** to list (at a minimum) references for projects completed, surety company reference, and bank reference.

14. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Town? Yes ☐ No ☐

The undersigned hereby authorizes and requests any persons, firm, or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated at _____this _____ day of _____, 20_____,

_____
(Name of Bidder)

By: _____

Title: _____

State of _____)
SS:
County of _____)

_____ being duly sworn, deposes and

says that he is _____ of

and that the answers to the foregoing questions and all statements therein are true and correct

and sworn under penalties of perjury.

Subscribed and sworn to before me this _____ day of _____ 20____.

(Notary Seal)

_____
(Notary Signature)

My Commission Expires:_____

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER
(To be returned with Bid)

State of _____

County of _____

_____, being first duly sworn, deposes and says that:

1. He is _____ of

   _____, the Bidder who has submitted the attached bid;

2. He is fully informed respecting the preparation and contents of the attached bid and of all pertinent circumstances respecting such Bid;

3. Such Bid is genuine and is not a collusive or sham Bid;

4. Neither the said Bidder, nor any of its officers, partners, owners, representatives, employees, or parties in interest, including this affiant has in any way colluded, conspired, connived or agreed, directly or indirectly with any other bidder, firm or person to submit a collusive or sham bid in connection with the contract for which the attached bid has been submitted or refrain from bidding in connection with such contract, or has in any manner, directly or indirectly, sought agreement or collusion or communication or conference with any other bidder, firm or person to fix the price or prices in the attached bid or of any other bidder, or to fix any overhead, profit, or cost element of the bid price or the bid price of any bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the _____ (Owner), or any other person interested in the contract; and

5. The price or prices quoted in the attached bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

_____
Signature

_____
Printed Name

_____
Title

Sworn and subscribed before me on this

_____ day of _____, 20 _____.

_____
Commissioner of the Superior Court or Notary Public

(Notary Seal)

_____
My Commission Expires

SECTION 00 5200

AGREEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. American Institute of Architects (AIA) Document A101-2007. Such document is attached hereto and is hereby incorporated into this Project Manual.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

AIA® Document A201™ – 2007 Instructions

General Conditions of the Contract for Construction

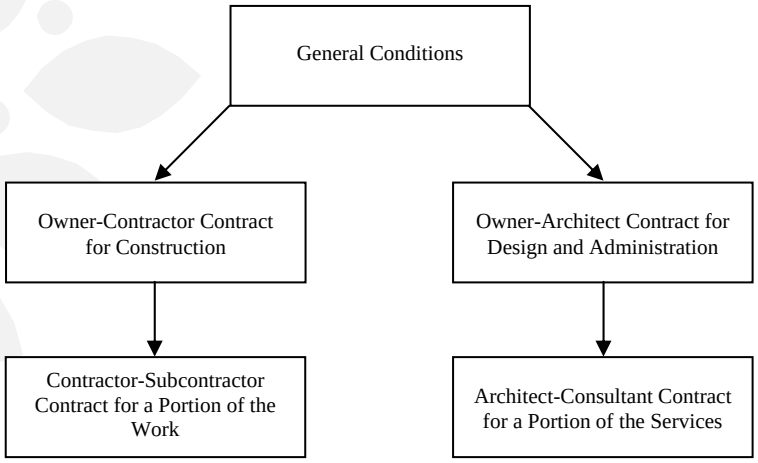
GENERAL INFORMATION

Purpose. AIA Document A201–2007, a general conditions form, is considered the keystone document of the Conventional (A201) Family of Documents because it provides the terms and conditions under which the Owner, Contractor and Architect will work together during the building construction process. When adopted into an Owner-Contractor agreement, A201–2007 provides an essential component of the construction contract. In addition, A201–2007 is incorporated by reference into the Owner-Architect and Contractor-Subcontractor agreements in the A201 Family, thus establishing a common basis for the primary and secondary relationships on the typical medium to large size, or complex (involving fast track scheduling or multiple bid packages) construction project.

For smaller or less complex construction projects, document users should consider using A107™–2007, Agreement Between Owner and Contractor for Projects of a Limited Scope. For single family residential projects, or even smaller and less complex commercial projects, users may wish to consider A105™–2007, Agreement Between Owner and Contractor for a Residential or Small Commercial Project.

Related Documents. A201–2007 is incorporated by reference into three AIA Owner-Contractor agreements, A101™–2007, A102™–2007, and A103™–2007; into A401™–2007, Agreement Between Contractor and Subcontractor; and into two AIA Owner-Architect agreements, B101™–2007 and B103™–2007. A201–2007 may be adopted by indirect reference into the Architect-Consultant agreement when the prime Agreement between the Owner and Architect adopts A201–2007 and it is in turn adopted into the Architect-Consultant agreement, AIA Document C401™–2007. Such incorporation by reference is a valid legal drafting method, and documents so incorporated are generally interpreted as part of the respective contract.

The Contract Documents, including A201–2007, record the Contract for Construction between the Owner and the Contractor. The other Contract Documents are the Owner-Contractor agreement, Supplementary Conditions, Drawings, Specifications, and Modifications. Although the AIA does not produce standard documents for Supplementary Conditions, Drawings or Specifications, a variety of model and guide documents are available, including AIA's MASTERSPEC and AIA Document A503™–2007, Guide for Supplementary Conditions. As mentioned above and diagrammed below, A201–2007 is a vital document used to allocate the proper legal responsibilities of the parties.



On construction projects, contractual relationships are created between owners, architects, architects' consultants, contractors, subcontractors, sub-subcontractors, and others down through the multiple tiers of participants. If custom-crafted agreements were written in isolation for each of those contractual relationships, the problems of overlaps and gaps in the numerous participants' responsibilities could lead to mass confusion and chaos. To prevent and solve this problem, the construction industry commonly uses standardized general conditions, such as AIA Document A201–2007, for coordinating those many relationships on the project by its adoption into each contract.

The AIA expends significant time and resources in the development of A201 and its related agreements to provide coordinated linkages in the tiers of legal relationships. AIA documents related to A201 are crafted with common phrasing, uniform definitions and a consistent, logical allocation of responsibilities down through the tiers of relationships. Together these documents are known as the Conventional (A201) Family of Documents, and are listed below:

A101™–2007, Agreement Between Owner and Contractor (Stipulated Sum)
A102™–2007, Agreement Between Owner and Contractor (Cost Plus Fee, with GMP)
A103™–2007, Agreement Between Owner and Contractor (Cost Plus Fee, without GMP)
A401™–2007, Agreement Between Contractor and Subcontractor
A503™–2007, Guide for Supplementary Conditions
A701™–1997, Instructions to Bidders
B101™–2007, Agreement Between Owner and Architect
B103™–2007, Agreement Between Owner and Architect for a Large or Complex Project
B201™–2007, Architect's Services: Design and Construction Contract Administration
B209™–2007, Architect's Services: Construction Contract Administration
B503™–2007, Guide for Amendments to AIA Owner-Architect Agreements
C401™–2007, Agreement Between Architect and Consultant

The A201 Family is augmented by a number of standard contract administration documents (G-series) used generally for processing payments to the Contractor and formalizing changes in the Work.

The AIA publishes two other general conditions documents that parallel A201–2007, one for the Construction Management-Adviser Family of Documents, AIA Document A201™CMa–1992, and the other for the Interiors Family of Documents, AIA Document A251™–2007.

Dispute Resolution—Mediation and Arbitration. This document contains provisions for mediation and arbitration of claims and disputes. Mediation is a non-binding process, but is mandatory under the terms of this document. Arbitration is no longer mandatory under the terms of the 2007 Conventional (A201) Family of Documents but may be selected in the Owner-Contractor agreement. If arbitration is selected as the method of binding dispute resolution, that selection is binding in most states and under the Federal Arbitration Act. In a minority of states, arbitration provisions relating to future disputes are not enforceable but the parties may agree to arbitrate after the dispute arises. Even in those states, under certain circumstances (for example, in a transaction involving interstate commerce), arbitration provisions may be enforceable under the Federal Arbitration Act.

The AIA does not administer dispute resolution processes. To submit disputes to mediation or arbitration or to obtain copies of the applicable mediation or arbitration rules, call the American Arbitration Association at (800) 778-7879, or visit their Web site at www.adr.org.

Why Use AIA Contract Documents. AIA contract documents are the product of a consensus-building process aimed at balancing the interests of all parties on the construction project. The documents reflect actual industry practices, not theory. They are state-of-the-art legal documents, regularly revised to keep up with changes in law and the industry—yet they are written, as far as possible, in everyday language. Finally, AIA contract documents are flexible: they are intended to be modified to fit individual projects, but in such a way that modifications are easily distinguished from the original, printed language.

Use of Non-AIA Forms. If a combination of AIA documents and non-AIA documents is to be used, particular care must be taken to achieve consistency of language and intent among documents.

Standard Forms. Most AIA documents published since 1906 have contained in their titles the words "Standard Form." The term "standard" is not meant to imply that a uniform set of contractual requirements is mandatory for AIA members or others in the construction industry. Rather, the AIA standard documents are intended to be used as fair and balanced baselines from which the parties can negotiate their bargains. As such, the documents have won general acceptance within the construction industry and have been uniformly interpreted by the courts. Within an industry spanning 50 states—each free to adopt different, and perhaps contradictory, laws affecting that industry—AIA documents form the basis for a generally consistent body of construction law.

Use of Current Documents. Prior to using any AIA Contract Document, users should consult www.aia.org or a local AIA component to verify the most recent edition.

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CHANGES FROM THE PREVIOUS EDITION

AIA Document A201–2007 revises the 1997 edition of A201 to reflect changes in construction industry practices and the law. Comments and assistance in this revision were received from numerous individuals and organizations, including those representing owners, architects, engineers, specifiers, general contractors, subcontractors, independent insurance agents, sureties, attorneys and arbitrators.

A number of substantial changes have been made to A201–2007. The principal changes are described below:

Article 1. A definition of Instruments of Services is now added and the ownership and use of drawings, specifications and other instruments of services is further clarified. Additionally, the parties are now required to establish necessary protocols to govern the electronic transmission of data. This article also adds Initial Decision Maker as a defined term (refer to Article 15).

Article 2. Following commencement of the Work, the Contractor may only require the Owner to provide reasonable evidence that adequate financial arrangements have been made if certain enumerated conditions (of a type that would cause the Contractor to have concerns about the Owner's ability to meet its financial obligations) exist.

Article 3. Since 1997, many construction projects have suffered delays due the discovery of burial grounds, archaeological sites, and wetlands. New Section 3.7.5 addresses the Owner's and Contractor's responsibilities in the event these are not noted on the Contract Documents, but discovered during construction. Section 3.3.1 now clarifies the extent of the Owner's responsibility for the costs associated with Owner-required means and methods of construction. Also, new requirements for the Contractor to notify the owner of its proposed superintendent are set out in Section 3.9.

Article 4. This article is revised to coordinate with changes to the 2007 AIA Owner-Architect agreements that incorporate A201–2007 and is now re-titled "Architect." The process for making, deciding and resolving Claims is substantially revised and is relocated from Article 4 to a new Article 15.

Article 7. Section 7.3.9 is now revised to provide a more efficient process for making payments to the Contractor for changes to the Work completed under Construction Change Directives.

Article 9. New Section 9.5.3 allows the Owner to issue joint checks, if the Architect withholds certification for payment as a result of the Contractor's failure to make payments properly to the Subcontractors or to lower tier subcontractors and suppliers. Section 9.5.3 now grants the Owner authority to request written evidence from the Contractor that the Contractor has properly paid the Subcontractors, etc.

Article 10. New Section 10.3.5 now adds a reciprocal indemnity provision whereby the Contractor indemnifies the Owner for costs and expenses related to hazardous materials the Contractor brings to the site and negligently handles, except where such costs and expenses are due to the Owner's fault or negligence.

Article 11. This article deletes the optional Project Management Protective Liability insurance added in 1997 to cover vicarious liability for construction operations. To diminish the costs to the Project team of third-party claims, a new Section 11.1.4 requires the Contractor to add the Owner, Architect and Architect's consultants as additional insureds on its commercial liability coverage for claims caused by the Contractor's negligence during the Contractor's operations. The Contactor is also required to add the Owner as an additional insured on its commercial liability coverage for claims caused by the Contractor's negligence during the Contractor's completed operations.

Article 13. Section 13.5.1 now makes the Owner responsible for the costs of tests when applicable codes, such as the International Building Code, prohibit the Owner from delegating the costs. Section 13.7, establishing the time period in which the Owner and Contractor must bring Claims, is amended to more closely follow state statutes of limitations and repose and to require compliance with state law.

Article 15. New Article 15 consists of revised Claims and Disputes language from Article 4 of A201™–1997. Article 5 introduces the concept of an Initial Decision Maker (IDM). Unlike the 1997 edition, A201–2007 allows for Claims to be decided initially by someone other than the Architect. The Owner and the Contractor have an opportunity to identify an IDM other than the Architect in the Owner-Contractor agreement. If the Owner and Contractor do not select a third party IDM, however, the Architect will serve as the IDM, thus maintaining its traditional role as the initial decider of Claims. For most Claims, a decision by the IDM remains a condition precedent to proceeding to mediation. As in A201–1997, mediation is a condition precedent to the method of binding dispute resolution selected in the Owner-Contractor agreement. While arbitration is no longer mandatory in the 2007 Conventional (A201) Family of Documents, Article 15 sets forth the requirements for arbitration if it is the selected method of binding dispute resolution. Unlike in the 1997 edition, however, A201–2007 allows for consolidation of arbitrations and joinder of necessary third parties.

USING A201–2007

Modifications. Particularly with respect to professional or contractor licensing laws, building codes, taxes, monetary and interest charges, arbitration, indemnification, format and font size, AIA Contract Documents may require modification to comply with state or local laws. Users are encouraged to consult an attorney before completing or modifying a document.

In a purchased paper AIA Contract Document, necessary modifications may be accomplished by writing or typing the appropriate terms in the blank spaces provided on the document, or by attaching Supplementary Conditions, special conditions or referenced amendments.

Modifications directly to purchased paper AIA Contract Documents may also be achieved by striking out language. However, care must be taken in making these kinds of deletions. Under NO circumstances should standard language be struck out to render it illegible. For example, users should not apply blocking tape, correction fluid or Xs that would completely obscure text. Such practices may raise suspicion of fraudulent concealment, or suggest that the completed and signed document has been tampered with. Both parties should initial handwritten changes.

Using AIA software, modifications to insert information and revise the standard AIA text may be made as the software permits.

By reviewing properly made modifications to a standard AIA Contract Document, parties familiar with that document can quickly understand the essence of the proposed relationship. Commercial exchanges are greatly simplified and expedited, good faith dealing is encouraged, and otherwise latent clauses are exposed for scrutiny.

AIA Contract Documents may not be retyped or electronically scanned. Retyping can introduce typographic errors and cloud legal interpretation given to a standard clause. Furthermore, retyping and electronic scanning are not permitted under the user's limited license for use of the document, constitute the creation of a derivative work and violate the AIA's copyright.

Cover Page

Project. The Project should be identified with the same name, and location or address as set forth in the Owner-Contractor agreement.

Owner. The Owner should be identified using the same legal name and the address as set forth in the Owner-Contractor agreement.

Architect. Similarly, the Architect should be identified using the same legal name and the address as set forth in the Owner-Contractor agreement.

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor *where the basis of payment is a Stipulated Sum*

AGREEMENT made as of the day of
in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

The Owner and Contractor agree as follows.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than
( ) days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be
($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of percent (%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of percent (%);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2007

☐ Litigation in a court of competent jurisdiction

☐ Other: *(Specify)*

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

§ 8.3 The Owner's representative:
(Name, address and other information)

§ 8.4 The Contractor's representative:
(Name, address and other information)

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of Insurance or Bond	Limit of Liability or Bond Amount ($0.00)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

BID BOND

KNOW ALL MEN BY THESE PRESENTS,

That we, _____, hereinafter called the Principal,

of _____, as Principal,

and, _____hereinafter called Surety,

a corporation organized and existing under the laws of the State of_____, and duly authorized to transact a surety business in the State of Connecticut, as Surety, are held and firmly bound unto the Owner, as Obligee, in the penal sum of ten(10) percent of the amount of the bid set forth in a proposal hereinafter mentioned, "_____", in _____, Connecticut, dated _____.

lawful money of the United States of America, for the payment of which, well and truly to be made to the Obligee, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That, whereas the Principal has submitted or is about to submit a proposal to the Obligee related to a contract for "_____", dated_____.

NOW, **THEREFORE**, if the said contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the said contract in writing with the Owner and give the required bonds, with surety acceptable to the Obligee, or if the Principal shall fail to do so, pay to the Obligee the damages which the Obligee may suffer by reason of such failure not exceeding the penalty of bond, then this obligation shall be void, otherwise to remain in full force and effect,

SIGNED, SEALED AND DELIVERED this _____ day of _____, 2012

_____	_____
Principal's Signature	Surety
_____	_____
(Print Name)	Its attorney in fact
_____	_____
Company Name	(Print name)

PERFORMANCE BOND

Know all men by these presents

THAT _____of the Town of _____, County of_____, and State of _____, as Principal (hereinafter called the Principal), and _____

(a surety company authorized to transact business in the State of Connecticut) as Surety (hereinafter called the Surety) are held and firmly bound unto **XXXXXXX** with offices located at **XXXXXX** in the **XXXXXXXXX, Connecticut** (hereinafter called the Obligee) in the full penal sum of:

_____

Amount in Words

($_____) Dollars,

lawful money of the United States, to be paid to said Obligee, to which payment well and truly to be made and done, the said Principal binds himself, his heirs, executors, administrators and assigns (or itself, its successors and assigns), and the said Surety binds itself, its successors and assigns jointly and severally firmly by these presents.

Signed, sealed and delivered this_____ _day of _____A.D. _____.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT

WHEREAS said Principal will enter into a certain written contract with said Obligee, to be dated the _____ day of _____A.D._____, which written contract shall provide for the following:

which written contract, which contract, including any hereafter made extension, modification or alteration thereof, is hereby referred to, incorporated in and made a part of this bond as though herein fully set forth.

NOW, THEREFORE, if the Principal fails to complete the required work, undertakings, covenants, terms, conditions, and agreements described in the said Contract, the Surety will be responsible to arrange for the completion of all the Work, as defined in said Contract, and other undertakings, covenants, terms, conditions, and agreements in the said Contract, to the satisfaction of the Owner, and if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall

reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then his obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

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

IN TESTIMONY WHEREOF, the said Principal has hereunto set his / its hand and seal, and the said Surety has caused this instrument to be signed by its attorney in fact and its corporate seal to be hereunto affixed, the day and year first written.

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	(Corp. Seal)	Company:	(Corp. Seal)
_____		_____	
Signature		Signature	
_____		_____	
Name		Name	
_____		_____	
Title		Title	

(Space is provided below for signatures of additional parties, if required.)

Company:	(Corp. Seal)	Company:	(Corp. Seal)
_____		_____	
Signature		Signature	
_____		_____	
Name		Name	
_____		_____	
Title		Title	

PAYMENT BOND

Know all men by these presents

THAT _____of the Town of _____, County of_____, and State of _____, as Principal (hereinafter called the Principal), and

_____

(a surety company authorized to transact business in the State of Connecticut) as Surety (hereinafter called the Surety) are held and firmly bound unto **XXXXXXX** with offices located at **XXXXXX** in the **XXXXXXXXX, Connecticut** (hereinafter called the Obligee) in the full penal sum of:

_____

Amount in Words

($_____) Dollars,

lawful money of the United States, to be paid to said Obligee, to which payment well and truly to be made and done, the said Principal binds himself, his heirs, executors, administrators and assigns (or itself, its successors and assigns), and the said Surety binds itself, its successors and assigns jointly and severally firmly by these presents.

Signed, sealed and delivered this_____ _day of _____A.D. _____.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT

WHEREAS said Principal will enter into a certain written contract with said Obligee, to be dated the _____ day of _____A.D._____, which written contract shall provide for the following:

which written contract, which contract, including any hereafter made extension, modification or alteration thereof, is hereby referred to, incorporated in and made a part of this bond as though herein fully set forth.

NOW, THEREFORE, if the Principal fails to make any payments as set forth below or as described in or related to said contract, it will be the responsibility of the said Surety to pay for the said promptly, to the satisfaction of the Owner, and if said Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including, but not limited to, all amounts due for materials, lubricants, oil, gasoline, diesel fuel, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance

premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications. PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN TESTIMONY WHEREOF, the said Principal has hereunto set his / its hand and seal, and the said Surety has caused this instrument to be signed by its attorney in fact and its corporate seal to be hereunto affixed, the day and year first written.

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	(Corp. Seal)	Company:	(Corp. Seal)
_____		_____	
Signature		Signature	
_____		_____	
Name		Name	
_____		_____	
Title		Title	

(Space is provided below for signatures of additional parties, if required.)

Company:	(Corp. Seal)	Company:	(Corp. Seal)
_____		_____	
Signature		Signature	
_____		_____	
Name		Name	
_____		_____	
Title		Title	

GENERAL CONTRACTOR FINAL AFFIDAVIT WAIVER OF LIEN

Project: Playground at East Windsor Park

State of: Connecticut

County of: Hartford

Location: 27 Reservoir Avenue, East Windsor, CT

To Whom It May Concern:

I. We the undersigned, been fully sworn and having entered into an agreement with

the Town of East Windsor, CT for _____
(work/materials)

on the construction of _____

on the premises of the Owner _____

at said project _____

state that all labor, material and services contracted for have been fully paid and indebtedness discharged to the date of this affidavit unless otherwise noted in section II of this document.

II. Furthermore, for and in consideration of $ _____ the undersigned does hereby waiver release and relinquish any and all claims of right of lien, which the undersigned may now have upon the premises above described for labor, materials and/or services.

III. Liability to the State of CT for sales and/or use tax, where applicable, has been discharged.

_____
Firm's Name

_____ _____
Authorized Signature Printed Name

State of Connecticut:
County of: _____ Date: _____

Subscribed and sworn to before me, this _____ day of _____, 20____.

_____
Notary Public Signature

My Commission Expires: _____

SUBCONTRACTOR/SUPPLIER FINAL AFFIDAVIT WAIVER OF LIEN

Project: Playground at East Windsor Park

State of: Connecticut

County of: Hartford

Location: 27 Reservoir Avenue, East Windsor, CT

To Whom It May Concern:

I. We the undersigned, been fully sworn and having entered into an agreement with

_____ for _____
(subcontractor/supplier) (work/materials)

on the construction of _____

on the premises of the Owner _____

at said project _____

state that all labor, material and services contracted for have been fully paid and indebtedness discharged to the date of this affidavit unless otherwise noted in section II of this document.

II. Furthermore, for and in consideration of $ _____ the undersigned does hereby waiver release and relinquish any and all claims of right of lien, which the undersigned may now have upon the premises above described for labor, materials and/or services.

III. Liability to the State of CT for sales and/or use tax, where applicable, has been discharged.

_____
Firm's Name

_____ _____
Authorized Signature Printed Name

State of Connecticut:
County of: _____ Date: _____

Subscribed and sworn to before me, this _____ day of _____, 20____.

_____
Notary Public Signature

My Commission Expires: _____

CONSENT OF SURETY COMPANY TO FINAL PAYMENT

Project Name: Playground at East Windsor Park

Location: 27 Reservoir Avenue, East Windsor, CT

To (Owner): _____

Address: *Street:* _____

City: _____ *State:* _____ *Zip Code:* _____

Contractor: _____ **Contract Date:** _____

Surety: _____

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the *(insert name and address of Surety Company)*

_____, SURETY COMPANY,

on bond of *(insert name and address of Contractor)*

_____, CONTRACTOR, _____

hereby approved of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety Company of any of its obligations to *(insert name of Owner)*

_____, OWNER,

as set forth in the said Surety Company's bond.

IN WITNESS WHEREOF,
the Surety Company has hereunto set its hand this _____ day of _____, 20_____.

_____
Surety Company Name

Attest:

_____
Signature of Authorized Representative

_____
Printed Name of Authorized Representative

(SEAL)

_____
Title

Minimum Rates and Classifications for
Heavy/Highway Construction

ID#: 23-45536

Connecticut Department of Labor
Wage and Workplace Standards

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: Project Town: East Windsor
State#: FAP#:
Project: Installation of New Playground at East Windsor Park

CLASSIFICATION	Hourly Rate	Benefits
1) Boilermaker	44.46	28.51
1a) Bricklayer, Cement Masons, Cement Finishers, Plasterers, Stone Masons	39.92	34.47
2) Carpenters, Piledrivermen	36.07	26.15
2a) Diver Tenders	36.07	26.15
3) Divers	44.53	26.15
03a) Millwrights	37.02	27.66
4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	55.0	23.75
4a) Painters: Brush and Roller	37.22	23.40
4b) Painters: Spray Only	40.22	23.40

As of: February 28, 2023

4c) Painters: Steel Only	39.22	23.40
4d) Painters: Blast and Spray	40.22	23.40
4e) Painters: Tanks, Tower and Swing	39.22	23.40
4f) Elevated Tanks (60 feet and above)	46.22	23.40
5) Electrician (Trade License required: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	41.75	31.47+3% of gross wage
6) Ironworkers: Ornamental, Reinforcing, Structural, and Precast Concrete Erection	39.7	38.77 + a
7) Plumbers (Trade License required: (P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2) and Pipefitters (Including HVAC Work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4 G-1, G-2, G-8, G-9)	47.03	34.05
----LABORERS---- -		
8) Group 1: Laborer (Unskilled), Common or General, acetylene burner, concrete specialist	32.0	24.40
9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen	32.25	24.40
10) Group 3: Pipelayers	32.5	24.40
11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders (cement/concrete), catch basin builders, asphalt rakers, air track operators, block paver, curb setter and forklift operators	32.5	24.40

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12) Group 5: Toxic waste removal (non-mechanical systems)	34.0	24.40
13) Group 6: Blasters	33.75	24.40
Group 7: Asbestos/lead removal, non-mechanical systems (does not include leaded joint pipe)	33.0	24.40
Group 8: Traffic control signalmen	18.0	24.40
Group 9: Hydraulic Drills	32.75	24.40
----LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and Liner Plate Tunnels in Free Air.----		
13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	34.23	24.40 + a
13b) Brakemen, Trackmen, Miners' Helpers and all other men	33.26	24.40 + a
----CLEANING, CONCRETE AND CAULKING TUNNEL----		
14) Concrete Workers, Form Movers, and Strippers	33.26	24.40 + a
15) Form Erectors	33.59	24.40 + a
----ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:----		
16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers, Miners Helpers	33.26	24.40 + a
17) Laborers Topside, Cage Tenders, Bellman	33.15	24.40 + a

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18) Miners	34.23	24.40 + a
----TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR: ----		
18a) Blaster	40.72	24.40 + a
19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	40.52	24.40 + a
20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	38.54	24.40 + a
21) Mucking Machine Operator, Grout Boss, Track Boss	41.31	24.40 + a
----TRUCK DRIVERS----(*see note below)		
Two Axle Trucks, Helpers	31.16	28.78 + a
Three Axle Trucks; Two Axle Ready Mix	31.27	28.78 + a
Three Axle Ready Mix	31.33	28.78 + a
Four Axle Trucks	31.39	28.78 + a
Four Axle Ready-Mix	31.44	28.78 + a
Heavy Duty Trailer (40 tons and over)	33.66	28.78 + a
Specialized earth moving equipment other than conventional type on-the road trucks and semi-trailer (including Euclids)	31.44	28.78 + a

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Heavy Duty Trailer (up to 40 tons)	32.39	28.78 + a
Snorkle Truck	31.54	28.78 + a
----POWER EQUIPMENT OPERATORS----		
Group 1: Crane Handling or Erecting Structural Steel or Stone, Hoisting Engineer (2 drums or over). (Trade License Required)	50.27	26.80 + a
Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and over.	46.07	26.80 + a
Group 2: Cranes (100 ton rate capacity and over); Bauer Drill/Caisson. (Trade License Required)	49.91	26.80 + a
Group 2a: Cranes (under 100 ton rated capacity).	49.06	26.80 + a
Group 2b: Excavator over 2 cubic yards; Pile Driver ($3.00 premium when operator controls hammer).	45.71	26.80 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.). (Trade License Required)	44.86	26.80 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper).	44.42	26.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Spreader; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" mandrel)	43.73	26.80 + a

Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	43.73	26.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	43.38	26.80 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under Mandrel)	42.99	26.80 + a
Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine.	42.54	26.80 + a
Group 9: Front End Loader (under 3 cubic yards), Skid Steer Loader regardless of attachments (Bobcat or Similar); Fork Lift, Power Chipper; Landscape Equipment (including hydroseeder), Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	42.04	26.80 + a
Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.	39.7	26.80 + a
Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment.	39.7	26.80 + a
Group 12: Wellpoint Operator.	39.63	26.80 + a
Group 13: Compressor Battery Operator.	38.97	26.80 + a
Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).	37.66	26.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	37.2	26.80 + a
Group 16: Maintenance Engineer.	36.46	26.80 + a

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Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator., Portable Grout Plant Operator, Portable Water Filtration Plant Operator.	41.39	26.80 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license).	38.61	26.80 + a

**NOTE: SEE BELOW

----LINE CONSTRUCTION----(Railroad Construction and Maintenance)----

20) Lineman, Cable Splicer, Technician	48.19	6.5% + 22.00
21) Heavy Equipment Operator	42.26	6.5% + 19.88
22) Equipment Operator, Tractor Trailer Driver, Material Men	40.96	6.5% + 19.21
23) Driver Groundmen	26.5	6.5% + 9.00
23a) Truck Driver	40.96	6.5% + 17.76

----LINE CONSTRUCTION----

24) Driver Groundmen	30.92	6.5% + 9.70
25) Groundmen	22.67	6.5% + 6.20
26) Heavy Equipment Operators	37.1	6.5% + 10.70

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27) Linemen, Cable Splicers, Dynamite Men	41.22	6.5% + 12.20
28) Material Men, Tractor Trailer Drivers, Equipment Operators	35.04	6.5% + 10.45

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.*

***Note: Hazardous waste premium $3.00 per hour over classified rate*

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

~~Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work ~~

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.
Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.
The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.
The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.
All subsequent annual adjustments will be posted on our Web Site for contractor access.
Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

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~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

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DIVISION 01
GENERAL REQUIREMENTS

SECTION 01 2973

SCHEDULE OF VALUES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Preparation and submittal of a Schedule of Values.

2. Updating Schedule of Values.

1.2 DEFINITIONS

A. The Schedule of Values is an itemized list that establishes the value of each part of the Work for a stipulated price contract and for major lump sum items in a unit price contract. The Schedule of Values is used as the basis for preparing applications for payments. Quantities and unit prices may be included in the schedule when designated by Engineer.

1.3 SCHEDULE OF VALUES SUBMITTAL

A. Submit a Schedule of Values to Engineer within ten (10) days of executing an Agreement with Owner. Upon Engineer's request, Contractor will provide supportive data substantiating their correctness. Use Schedule of Values only as basis for Contractor's Application for Payment.

B. Form of Submittal: Submit Schedule of Values on AIA Document G703, or computer generated form of the same style, using Table of Contents of these Specifications as basis for format for listing costs of work for all Divisions.

C. Identify each line item with number and title as listed in Table of Contents in these Specifications. Each line item shall be identified with number and title of the specification section, value, and quantities (if requested).

1. Itemize separate line item cost for each of the following general cost items: Performance and Payment Bonds (if applicable), field supervision and layout, temporary facilities and controls.

2. Line items including Subcontract work shall be subdivided so as to indicate value of such work.

3. For each line item which has installed value of more than $20,000, break down costs to list major products for operations under each item, rounding figures to nearest dollar.

D. Make sum of total costs of all items listed in Schedule equal to total Contract Sum.

1.4 REVIEW AND RESUBMITTAL

A. After Engineer's review and approval, the Schedule of Values shall be reviewed and approved by the bonding company (if applicable). A letter of approval from the bonding company (if applicable) approving the Schedule of Values shall accompany the final submittal of the Schedule of Values to Engineer.

B. Payment based on the Schedule of Values shall not be until all approvals are obtained. If requested, revise and resubmit Schedule of Values until approvals are obtained.

1.5 MODIFICATIONS

A. During progress of the Work, the Schedule of Values as approved by Owner shall be modified to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract. Such updated Schedule of Values shall be used for Applications for Payment.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 3120

QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Quality assurance and control of installation
2. References
3. Field samples
4. Inspection and testing laboratory services
5. Manufacturers' field services and reports.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference to any technical society, organization, group or regulation are made in accordance with applicable designation and unless otherwise noted or specified, all work shall conform to the latest edition as applicable.

B. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.3 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 Engineer.

C. 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.

D. 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.

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

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

G. Testing Laboratory: An entity engaged to perform specific laboratory tests.

H. Testing Agency: An entity engaged to collect samples, perform specific in-field tests, and/or inspections. The Testing Laboratory may provide the services of the 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.

J. 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).

K. Experienced: When used with an entity or individual, “experienced” means having successfully completed the minimum number and type of projects indicated in individual Specification Sections, or in the absence of such specified minimum number and type, a minimum of ten (10) years in the execution of projects that are similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of all authorities having jurisdiction.

1.4 SUBMITTALS

A. Contractor’s Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor’s quality-control personnel.

C. 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:

D. 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.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.

2. Entity responsible for performing tests and inspections.

3. Description of test and inspection.

4. Identification of applicable standards.

5. Identification of test and inspection methods.

6. Number of tests and inspections required.

7. Time schedule or time span for tests and inspections.

8. Requirements for obtaining samples.

9. Unique characteristics of each quality-control service.

1.5 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five (5) days prior to the preconstruction conference. Submit in format acceptable to Engineer. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project. Project quality-control manager, who may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.

2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."

3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.6 REPORTS AND DOCUMENTS

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

1. Date of issue.
2. Project title and number.
3. Name, address, 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 re-inspecting.

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

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

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.

2. Statement that equipment complies with requirements.

3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

4. Statement whether conditions, products, and installation will affect warranty.

5. Other required items indicated in individual Specification Sections.

D. 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.

1.7 QUALITY ASSURANCE

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

B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

C. Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship, to produce Work of specified quality.

D. Comply fully with manufacturers' instructions, including each step in sequence.

E. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

F. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.

G. Perform work by persons qualified to produce workmanship of specified quality.

H. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

I. 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.

J. 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.

K. 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.

L. 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.

M. 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.

N. Testing Laboratory and Testing Agency Qualifications: An independent agency with the experience and capability to conduct inspection, sampling, testing, and analysis required, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

O. Preconstruction Testing: Where Testing Agency or Testing Laboratory 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. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

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

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

1.8 QUALITY CONTROL

A. Sampling, Testing, and Inspection

1. Reports will be submitted by the independent firm to Engineer, Owner, Construction Manager, affected Engineers and Contractor, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

2. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm as required and/or on instructions by Engineer. Payment for retesting will be charged to Contractor by deducting inspection or testing charges from the Contract Sum/Price.

3. Testing by Owner, Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified Testing Agency to perform these services.

    a. 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.

    b. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.

    c. Costs for re-testing and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by deduct Change Order.

4. Testing by Owner, Discretionary Testing

    a. Engineer reserves the right to perform any material testing or in-field testing on the project, reserves the right to determine the suitability of all materials to be used for in the work, and to reject any material or completed construction that is not in conformance with applicable Specifications or standards.

5. Contractor Responsibilities: Where quality-control services are indicated as Contractor's responsibility, retain the services of a third-party Testing Agency and Testing Laboratory to perform sampling, testing, monitoring, or inspection as required. 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.

    a. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

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

    c. Notify Testing Agency at least 24 hours in advance of time when Work that requires sampling, testing, monitoring, or inspecting will be performed.

    d. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

    e. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

    f. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

C. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

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

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

1. Notify Engineer 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.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications Sections for review.

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Engineer.

1.10 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment and test, adjust and balance of equipment as applicable and to initiate instructions when necessary.

B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

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 Engineer.

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 Engineer'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 in Division 01 Section "Execution."

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

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

END OF SECTION

SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Requirements and procedures for preparing and transmitting data to Engineer.

2. Various submittals are specified under applicable Specification Sections.

B. Unless otherwise stipulated herein, all submittals requiring review for conformance with the design documents shall be transmitted by electronic mail to the following address:

rsalch@bscgroup.com

1.2 DEFINITIONS

A. No Exceptions Taken: The term "No Exceptions Taken," when applied by the Engineer to the Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents are satisfactory from the standpoint that the Engineer has not observed any statement or feature that appears to deviate from the Specifications requirements. The Contractor shall retain the entire responsibility for complete conformance with all of the Specification's requirements.

B. Approved As Noted: The term "Approved As Noted" when applied by the Engineer to the Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents conform as defined above, except that the changes shown are necessary to be in conformance with the Specification's requirements. On the basis that the Contractor shall retain the entire responsibility for compliance with all of the Specification's requirements, the Contractor shall either:

1. Incorporate the changes into its work, drawings or documents if the change does not affect the Contractor's responsibility under warranty.

2. Inform the Engineer that the changes cannot be made without prejudice to the Contractor's responsibility under the warranty and resubmit with explanations of the reasons therefore.

C. Rejected or Revise and Resubmit: The terms "Rejected" or "Revise and Resubmit" when applied by Engineer to Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents are not satisfactory from the standpoint that the Engineer has observed statements or features that appear to deviate from the Specifications requirements.

1.3 CONTRACTOR RESPONSIBILITIES

A. Prepare submittals and review for accuracy prior to submission and respond to Engineer's action.

B. Determine and verify:

1. Field measurements;

2. Field construction criteria; and

3. Conformance to Specifications.

C. Coordinate each submittal with requirements of Work and of Contract Documents.

D. Notify Engineer in writing, at time of submission, of any deviations in submittals from requirements of drawings, Specifications and Contract Documents.

1.4 SUBMITTAL PROCEDURES

A. Coordinate preparation and processing of submittals with performance of construction activities. Unless a specific submittal time-frame is specified in the related specification Section, transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with phases of the Work that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

3. At a minimum, submittals shall be provided to Owner and Engineer in duplicate. Additional requirements for the number of submittals are contained in the specific Specification Sections.

4. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals.

a. Allow five (5) working days for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

b. Any submittals which may require review and/or approval by an outside Agency (City, Town, utility, etc.) shall be allocated a minimum of twenty (20) working days. The Owner shall not be held responsible for any delay associated with the approval or rejection of any substitution or other revisions proposed by the Contractor.

c. If an intermediate submittal is necessary, process the same as the initial submittal.

d. Allow five (5) working days for reprocessing each submittal.

e. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label, cover page or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label, cover page or title block.

1. Provide a space approximately 4″ x 5″ on the label, cover page or beside the title block to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken:

a. Submittal name, number and topic.

b. Date of submission.

c. Name and address of Contractor.

d. Number and title of appropriate Specification Section annotated in accordance with this Section.

e. Drawing number and detail references, as appropriate.

f. Identification of revisions on re-submittals.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than Contractor will be returned without action.

1. All submittals shall be sent with an official transmittal.

2. With each submittal, provide the Specification Section or sheet number the item submitted is found under and a descriptive generic name based on its content.

3. Number each transmittal consecutively starting with 001. If requested by Engineer, match the submittal numbering indicated on the Submittal Schedule or Submittal Log.

4. All submittals shall be numbered conforming to the following example, with each component separated by a dash (-):

Submittal Numbering Format

A	B	C
001	01 5713	Silt Fence
002	31 2310	Granular Fill
002A	31 2310	Granular Fill
002B	31 2310	Granular Fill

a. The chronological identification number assigned to the submittal package.

b. The Specification Section or sheet number the item submitted is found under.

c. Keyword(s) from the descriptive generic submittal name.

d. The status of the submittal.

Example

001-01 5713-Silt Fence-REV

5. When re-submitting a rejected submittal or additional information, identify submittal with the original submittal number followed by a letter, starting with "A" and continuing for each subsequent re-submittal, to designate the additional submission(s).

6. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

7. Distribution: Following response to the initial submittal, Contractor shall print and distribute copies to the Subcontractors and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

8. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

1.5 SUBMITTAL SCHEDULE

A. As part of the development and acceptance of Contractor's construction schedule, prepare a schedule of submittals, complete and accurate to the best of Contractor's ability. Submit the schedule to the Engineer within five (5) business days following Contractor's receipt of the Notice of Award.

B. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.

C. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted and verify that each item, and the submittal for it, conforms in all respects with the requirements of the Contract Documents. By affixing his signature to each submittal, Contractor is certifying that this coordination has been performed.

D. Coordinate the schedule with all necessary subcontractors to ensure their understanding of the importance of adhering to the approved schedule and their ability to so adhere. Coordinate as required to ensure the grouping of submittals as appropriate.

E. Distribution: Following response to initial submittal schedule, print and distribute copies to the Engineer, Subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

F. Tracking: Provide Engineer, at the beginning of each month, a list of all submittals over the previous month. Include the date each submittal was sent to Engineer, the content of each transmittal and the disposition of the submittal.

1.6 ENGINEER'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. No Exceptions Taken: The term "No Exceptions Taken" when applied by the Engineer to the Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents are satisfactory from the standpoint that the Engineer has not observed any statement or feature that appears to deviate from the Contract Specifications, Drawings, or other applicable Contract Documents. That part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Specifications, Drawings, or other applicable Contract Documents; final acceptance will depend upon that compliance. Contractor shall retain the entire responsibility for complete conformance with such Contract Specifications, Drawings, or other applicable Contract Documents.

2. Furnish as Corrected: The term "Furnish as Corrected" when applied by the Engineer to the Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents conform as defined above, except that the changes shown are necessary to be in conformance with the Contract Specifications, Drawings, or other applicable Contract Documents. That part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Specifications, Drawings, or other applicable Contract Documents; final acceptance will depend on that compliance. On the basis that, Contractor shall retain the entire responsibility for compliance with all of the Specification's requirements, the Contractor shall either:

a. Incorporate the changes into its work, drawings or documents if the change does not affect the Contractor's responsibility under warranty.

b. Inform the Engineer that the changes cannot be made without prejudice to the Contractor's responsibility under the warranty and resubmit with explanations of the reasons therefore.

3. Revise and Resubmit: The terms "Revise and Resubmit" when applied by Engineer to Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents are not satisfactory from the standpoint that the Engineer has observed statements or features that appear to deviate from the Contract Specifications, Drawings, or other applicable Contract Documents. Contractor shall not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. In response to this stamp, Contract shall either:

a. Revise the submittal to conform with the Contract Specifications, Drawings, or other applicable Contract Documents and re-submit.

b. Update the submittal with additional information as required and re-submit.

c. Prepare a new submittal in accordance with notations and/or the requirements of the Contract Specifications, Drawings, or other applicable Contract Documents and re-submit.

4. Rejected: The term "Rejected," when applied by Engineer to Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents are not satisfactory from the standpoint that the Engineer has observed statements or features that appear to deviate from the Contract Specifications, Drawings, or other applicable Contract Documents. Contractor shall not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Submittals that are rejected shall be revised as required to conform with the Contract Specifications, Drawings, or other applicable Contract Documents.

   a. Do not permit submittals marked "Rejected" to be used at the Project site, or elsewhere where Work is in progress.

5. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will not be returned unless specifically requested and will be marked "Action Not Required" on Contractor's record of submittal. Submittals which are prepared but are not required will not be processed.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 5713

TEMPORARY EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Installation of temporary erosion and sedimentation control measures

2. Maintenance of temporary erosion and sedimentation control measures.

3. Monitoring of site condition and installation of supplemental temporary erosion and sedimentation control measures.

4. Sediment removal and disposal

5. Temporary seeding or other surface stabilization measures.

6. Removal of temporary erosion and sedimentation control measures.

7. Monitoring, documentation, and recordkeeping.

8. Installation of permanent erosion control materials.

9. Final cleanup.

B. Erosion and sediment control techniques include, but are in no way limited to, silt fence, hay bales, drainage structure inserts/filters, mulching with hay/straw, netting/matting, grassing, stone dikes/berms/check-dams, compost blankets and berms, barriers, diversions, traps, basins, and appurtenances which will ensure that erosion and sediment pollution will be either eliminated or maintained within acceptable limits.

C. The measures specified herein are the minimum requirements which Contractor shall comply to control erosion and siltation throughout execution of the work. Contractor shall provide additional work if necessary to control erosion and siltation throughout the duration of the construction as conditions dictate, or as directed by Engineer.

D. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

E. Contractor is responsible for all health and safety.

1.2 SUBMITTALS

A. Submit material specifications and shop drawings for all materials furnished under this Section.

B. Prior to the start of the construction, submit schedule for the construction of required stormwater detention basins, temporary and permanent erosion and sedimentation control measures, clearing and grubbing, grading, structures at watercourses, construction, and paving.

C. During construction, submit to Engineer schedule changes that affect timing of construction.

D. Submit copies of all inspection and maintenance report forms.

1.3 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Regulations of Connecticut State Agencies (RCSA)

1. 22a-315-10 through 19, Soil and Water Conservation

C. Connecticut Department of Energy and Environmental Protection (DEEP)

1. Connecticut Guidelines for Soil Erosion and Sediment Control, DEEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.

D. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020 and any supplements.

1.4 PERMIT CONDITIONS

A. Contractor and Subcontractors are bound to comply with any project-related permits obtained by Owner or Engineer for the work of the project. Such permits will affect performance of the work, and Contractor and Subcontractors are bound to comply with requirements of such permit and representations contained in permit application as though Contractor and Subcontrator were the Permittee/permit-holder. Requirements and conditions set forth in Owner or Engineer-obtained project-related permits and permit applications shall be binding on Contractor just as any Specification would be.

1.5 QUALITY CONTROL

A. Contractor shall be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the erosion of soil or movement of sediment from construction activities to off-site areas via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of Contractor.

B. Where additional erosion and sedimentation control measures are required beyond what is indicated on the Drawings or herein, comply with applicable sections of the Connecticut Guidelines for Soil Erosion and Sediment Control, DEEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.

C. If applicable, comply with applicable provisions of the Connecticut Department of Energy and Environmental Protection (DEEP) General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, (DEEP-WPED-GP-015), latest revision thereof. Conditions of such General Permit, other conditions of approval or authorizations, and associated Stormwater Pollution Control Plan (SWPCP) shall become part of the Contract Documents.

D. Engineer has the authority to order immediate, additional, temporary control measures to prevent contamination of adjacent streams or other watercourses, or other areas of water impoundment and damage by erosion.

E. If Engineer observes construction procedures and operations that jeopardize erosion control provisions, Engineer will notify Contractor. If such construction procedures and operations are not corrected promptly, Engineer may suspend the performance of any or all construction until corrections have been made, and such suspension shall not be the basis of any claim by Contractor for additional compensation, nor for an extension of time to complete the Work.

F. Should construction materials be washed away or otherwise rendered ineffective in the opinion of Engineer during the progression of the Work, Contractor shall replace the installations at no additional cost to the Owner.

1.6 COORDINATION WITH PERMANENT EROSION CONTROL PROVISIONS

A. Coordinate temporary erosion and sedimentation control measures with permanent erosion control features to the extent practical to ensure economical, effective and continuous erosion control throughout construction and post-construction periods.

PART 2 PRODUCTS

2.1 HAY BALES

A. Hay bales shall be made of cut hay with forty (40) pounds minimum weight and 120 pounds maximum weight. Bales shall be free of rotten or degraded hay, significant splits or voids. Hay bales shall be held together with a minimum of two bands made of either wire or heavy twine.

B. Stakes to anchor the bales shall be a minimum of 36 inches long and made of hardwood with a minimum dimension of 1½-inch by 1½-inch normal size. Metal stakes may be used instead of wooden stakes. Metal stakes shall be round, “U,” “T,” “L,” or “C” shaped with a minimum weight of 0.5 pounds per foot.

C. Replace individual hay bales upon loss of 30% of original mass or volume, whichever is less.

2.2 SILT FENCE

A. Woven Polypropylene geotextile having a minimum weight of 3.1 ounces per square yard conforming to the following:

1. Mechanical and Physical Properties of Silt Fence Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Weight	ASTM D3776	oz/yd^2	5.6
Grab Tensile Strength	ASTM D4632	Pounds	60
Grab Elongation (Max percent)	ASTM D4632	Percent (%)	15–30
Trapezoidal Tear	ASTM D4533	Pounds	30
Puncture	ASTM D4833	Pounds	30
Mullen Burst	ASTM D3786	psi	150–200
Permittivity	ASTM D4491	Sec^{-1}	0.15
Flow Rate	ASTM D4491	gal/min/ft2	15–20

Apparent Opening Size	ASTM D4751	(U.S. Sieve)	30–35
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70

B. Silt fence shall be constructed of a minimum thirty-six (36) inch wide continuous woven geotextile. The material shall have a high sediment filtration capacity, high slurry flow and minimum clogging characteristics. Edges of the fabric shall be finished to prevent the outer fibers from pulling away from the geotextile. Geotextile shall be free of defects or flaws that significantly affect its physical and/or filtering properties.

C. Fabric shall be securely fastened to stakes a minimum of 42 inches long and made of hardwood with a minimum dimension of 1½ inch by 1½ inch normal size such that a 6 to 8 inch length of fabric is unattached at the bottom for anchorage in soil. Metal stakes may be used instead of wooden stakes. Metal stakes shall be round, "U," "T," "L," or "C" shaped with a minimum weight of 0.5 pounds per foot. Stakes shall be spaced not greater than ten feet apart. When required, wire or another type of support shall be constructed between the geotextile fabric and the posts to improve the load carrying capacity of the silt fence.

2.3 CATCH BASIN INSERT

A. Manufactured "bag type" catch basin insert of woven polypropylene geotextile with integral lifting loops or straps conforming to the following:

1. Mechanical and Physical Properties of Catch Basin Insert

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength	ASTM D4632	Pounds	315
Grab Elongation (Max percent)	ASTM D4632	Percent (%)	30 (max)
Trapezoidal Tear	ASTM D4533	Pounds	40x50 (min)
Puncture	ASTM D4833	Pounds	135 (min)
Mullen Burst	ASTM D3786	psi	420 (min)
Permittivity	ASTM D4491	gal/min/sq ft	0.7
Flow Rate	ASTM D4491	gal/min/ft2	50 (min)
Apparent Opening Size	ASTM D4751	(U.S. Sieve)	20-40
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	80 (min)

Note: Catch basin inserts for catch basins with curb openings shall be equipped with integral curb deflector.

2.4 STRAW MULCH

A. Straw mulch shall be comprised of threshold straw of oats, wheat, barely, or rye that is free from noxious weeds, mold or other objectionable material. Straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment. Straw mulch shall be utilized on all newly graded areas with slopes exceeding 5% to protect areas against washouts and erosion unless other erosion control measures are provided.

2.5 FILTER BERM COMPOST

A. Where establishing vegetation is not planned, compost shall be a decomposed, weed free organic matter source derived from agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. Compost shall possess a moisture content of 30 to 60% and a organic matter content of 25 to 100%. The maximum particle length shall be 6″, and 100% passing a 3″, 90 to 100% passing a 1″, 70% to 100% passing a 3/4″, and 30% to 75% passing a 1/4″ screen. However, no more than 50% passing a 1/4″ screen in high rainfall/flow rate situations.

B. Where establishing vegetation is planned, compost shall be use a well decomposed, stable, weed free organic matter source derived from agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. Compost shall possess a moisture content of 30 to 60%, a pH of 6.0 to 8.5 and an organic matter content of 25 to 65%. The maximum particle length shall be 6″, and 100% passing a 3″, 90 to 100% passing a 1″, 70% to 100% passing a 3/4″, and 30% to 75% passing a 1/4″ screen. However, no more than 60% passing a 1/4″ in high rainfall/flow rate situations. It shall contain no substances toxic to plants, shall possess no objectionable odors, and shall not resemble the raw material from which it was derived.

2.6 COMPOST SOIL BLANKET

A. Compost soil blankets may be utilized on slopes of up to 2:1.

B. Slightly scarify slopes and remove large clods, rocks, stumps, roots larger than 2 inches in diameter and debris on slopes, where vegetation is to be established. This soil preparation step may be eliminated where approved by the Landscape Architect/Designer, or where seeding or planting isn't planned. Track (compact) slope using a bulldozer before applying compost.

C. Apply compost at the following rates:

Compost Application Rates

Annual Rainfall/Flow Rate	Total Precipitation & Rainfall Erosivity Index	Application Rate for Slopes to be Vegetated (Note 1)	Application Rate for Slopes not being Unvegetated
Low	1″–25″ & 20–90	½″–¾ ″	1″–1½″
Average	26″–50″ & 91–200	¾″–1″	1½″–2″
High	51″ and above, & 201 and above	1″–2″	2″–4″

D. Lower application rates indicated for slopes to be vegetated should only be used in conjunction with seeding, and for compost blankets applied during the prescribed planting season for the particular region.

E. Compost shall be uniformly applied using an approved spreader unit, including bulldozers, side discharge manure spreaders, etc. Track (compact) the compost layer using a bulldozer or other appropriate equipment. (This step may be eliminated where impractical or where deemed unnecessary by the Landscape Architect/Designer.) Alternatively, apply compost using a pneumatic (blower) unit, or other unit that propels the product directly at the soil surface, thereby preventing water from moving between the soil-compost interface. Thorough watering

may be used to improve settling of the compost. Apply compost layer approximately 3 feet (90 cm) over the top of the slope, or overlap it into existing vegetation.

F. On highly unstable soils, use compost in conjunction with appropriate structural measures.

G. Dry or hydraulic seeding may be completed following compost application, as required, or during the compost application itself, where a pneumatic unit is used to apply the compost.

2.7 STONE CHECK DAM

A. Stone shall be graded as follows:

Gradation of Stone for Check Dam (ConnDOT M.01.01 Grading No. 3)

Sieve	Percent Passing by Weight
2 1/2″	100
2″	90–100
1 1/2″	35–70
1	0–15
1/2″	0–5

Stone shall be sound, tough, durable, angular, not subject to disintegration, on exposure to water, or weathering, be chemically stable and shall be suitable in all other respects for the purpose intended.

B. Geotextile may be used under the stone to provide a stable foundation and to facilitate removal of the stone.

2.8 EROSION CONTROL SEED MIXTURE

Erosion Control Seed

Species (Note 1)	Application Rate, Pounds Per Acre	Application rate, Pounds Per 1,000 sf	Optimum Seed Depth, inches (Note 2)	Optimum Seeding Dates (Note 3)
Annual ryegrass Lolium multiflorum	40	1.00	0.5	3/1–6/15 and 8/1–10/15
Perennial ryegrass Lolium perenne	40	1.00	0.5	3/15–7/1 and 8/1–10/15
Winter Rye Secale cereale	120	3.00	1.00	4/5–7/1 and 8/15–10/15
Oats Avena sativa	86	2	1	3/1–6/15 and 8/1–9/15
Winter Wheat Triticum aestivum	120	3	1	4/15–7/1 and 8/15–10/15
Millet Echinochloa crusgalli	20	.5	1	5/15–7/15
Sudangrass Sorghum sudanese	30	.7	1	5/15–8/1
Buckwheat Fagopyrum esculentum	15	.4	1	4/1–9/15

Weeping lovegrass Eragostis curbula	5	.2	.25	6/1–7/1
ConnDOT All Purpose Mix	150	3.4	.5	3/1–6/15 and 8/1–10/15

Notes:

1 – Listed species may be used in combinations to obtain a broader time spectrum. If used in combinations, reduce each species planting rate by 20% of that listed

2 – Seed at twice the indicated depth for sandy soils.

3 – May be planted throughout summer if soil moisture is adequate or can be irrigated. Fall seeding may be extended 15 days in the coastal towns

2.9 EROSION CONTROL MATTING

A. Temporary Erosion Control Blanket shall be 1) Curlex® Excelsior Blanket, as manufactured by American Excelsior Company, 2) ERO-MAT® V75S(FD), as manufactured by Verdyol Plant Research, Ltd., or 3) Landlok® S2 RD, as manufactured by SI® Geosolutions, or 4) approved equal.

B. Degradable Erosion Control Fabric Netting shall be Landlok® 407 GR, as manufactured by 1) SI® Geosolutions, or 2) GeoJute® as manufactured by Belton Industries, Inc., or 3) BioNet® S150BN™ Double Net Straw Blanket, as manufactured by North American Green, or 4) approved equal.

C. Long-Term and Non-degradable Turf Reinforcement Mats shall be 1) Pyramat®, as manufactured by SI® Geosolutions, or 2) Recyclex® Turf Reinforcement Matting, as manufactured by American Excelsior Company, or 3) Vmax3 C350™, as manufactured by North American Green, or 4) approved equal.

D. Erosion control matting shall be secured with staples or an alternative attachment device such as geotextile pins or plastic pegs as recommended by the manufacturer. The Contractor shall submit a sample of the alternative attachment device for the Engineer's approval prior to installation.

PART 3 EXECUTION

3.1 GENERAL

A. Install erosion and sedimentation control measures as shown on the Drawings prior to any site disturbance.

B. No work shall be started until erosion control schedules and installation have been accepted by Engineer.

C. Engineer has the authority to control the surface area of each material exposed by construction operations and to direct Contractor to immediately provide permanent or temporary pollution control measures to prevent contamination of adjacent watercourses or other areas of water impoundment. Every effort shall be made by Contractor to prevent erosion on the site and abutting properties or areas.

D. Contractor shall construct all permanent erosion and sediment control features at the earliest practical time as outlined in the accepted schedule. Temporary erosion and sediment control measures shall be used to correct conditions that develop during construction, which were unforeseen, but are needed prior to installation of permanent control features, or that are needed temporarily to control erosion or sedimentation which develops during construction operations.

E. Contractor shall limit as necessary the surface area of the earth material exposed to sufficiently maintain and protect the slopes to prevent pollution. Where erosion is likely to be a problem, clearing and grubbing operations shall be scheduled and performed so that grading operations and permanent erosion and sediment control features can follow immediately thereafter, if conditions permit; otherwise, temporary control measures will be required between successive construction stages.

F. Erosion control measures shall be maintained by Contractor, and he shall remove such installations only upon completion of the work and the site is stabilized or when authorized to do so by Engineer.

G. Contractor shall operate all equipment and perform all construction operations so as to minimize pollution. Contractor shall cease any of his operations, which will increase pollution during rainstorms.

H. Failure by Contractor to control erosion, pollution, and siltation shall be cause for the Engineer to employ outside assistance to provide the necessary corrective measures. The cost of such assistance, including engineering costs, will be charged to Contractor and appropriate deductions made to Contractor's payment.

3.2 HAY BALES

A. Hay bales shall be positioned as indicated on the Drawings and/or as necessary to prevent off site movement of sediment produced by, or as a result of, construction activities, or as direct by the Engineer.

B. Hay bales shall be utilized on all catch basins and drainage facilities on the Project Site to prevent the entry of sediments or other debris. Maintain such protection throughout execution of the work until such drainage facilities have been abandoned/removed.

C. Bales shall be placed lengthwise with ends of adjacent bales tightly abutting one another to form a continuous barrier. Bales shall be entrenched to a depth of 4 inches and backfilled, with the backfill placed toward the potential source of runoff and sediment. All bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms. Each bale shall be anchored with a minimum of two stakes, driving the first stake in each bale towards the previously laid bale to drive the bales together. Stakes must be driven a minimum of 18 inches into the ground. Loose hay shall be inserted between bales as required to prevent water from escaping between the bales.

3.3 GEOTEXTILE SILT FENCE

A. Install a filter fabric silt fence prior to construction and remove after full surface restoration has been achieved. Install silt fence as indicated on the Drawings and/or as necessary to prevent off site movement of sediment produced by, or as a result of, construction activities.

B. Install as follows:

1. Hand shovel excavate a small trench a minimum of six inches wide by six inches deep on the upslope side of the desired fence line location.

2. Unroll the siltation fence system, position the post in the back of the trench (downhill side), and hammer the post at least 12 inches into the original ground.

3. Fabric rolls shall be spliced at posts. The fabric shall be overlapped six inches, folded over and securely fastened to posts.

4. Lay the bottom 6 inches of the fabric into the trench to prevent undermining by storm water run-off.

5. Backfill the trench and compact. Compaction is necessary to prevent the run-off from eroding the backfill.

6. For slope and swale installations, extend the ends of the trench sufficiently up slope such that the bottom end of the fence will be higher than the top of the lowest portion of the fence.

3.4 CATCH BASIN INLET SEDIMENT CONTROL

A. Install catch basin inlet sediment control devices in each exiting catch basin as long as it remains in use in accordance with manufacturer's guidelines at the locations shown on the Drawings.

B. A catch basin sediment filter shall be installed and changed/cleaned per the manufacturer's recommendations, or as directed by Engineer during construction.

C. New catch basins shall have a filter installed immediately upon completion of construction. In addition, a hay bale, or similar, barrier shall be installed around the new basin and maintained in place until binder is placed or disturbed areas draining to it are stabilized.

D. Catch basins with curb openings shall have filter fabric covering the opening and the edges of the fabric shall be secured. A filter boom shall also be placed over the opening.

3.5 TEMPORARY SEDIMENT BASINS

A. Temporary sedimentation basins shall be employed as required during construction. Sedimentation shall be periodically removed from the basins and from behind erosion and sedimentation control devices. The Contractor shall direct all possible site runoff to the temporary sedimentation basins.

B. The temporary sedimentation basins shall be maintained from the start of construction until construction of the permanent detention basins is completed and perimeter areas are stabilized.

3.6 TEMPORARY MULCHING

A. Apply temporary mulch to areas where rough grading has been completed but final grading is not anticipated to begin within 30 calendar days of the completion of rough grading or where final grading has been completed but seeding is not anticipated for 20 days.

1. Straw/Hay Mulch

   Exposure Period: 6 months

   Application Method: By hand or machine

   Application Rate: 110 lbs/1,000 square feet.

2. Bark Chips/Shredded Bark

   Exposure Period: Less than one year

   Application Method: By hand or machine

   Application Rate: 6 cubic yards /1,000 square feet.

3.7 TEMPORARY EROSION CONTROL MATS

A. Erosion control mats shall be furnished, installed, maintained, and later removed in ditches or swales, on embankment slopes, and excavation slopes at the locations shown on the Drawings in accordance with the manufacturer's recommendations.

B. All areas shall be smooth graded and compacted. Remove all rocks, dirt clods, vegetation and other obstructions that may cause damage to the mats.

C. Unroll mats parallel to the direction of water flow and lay flat against the ground. Overlap roll ends 1–2 feet with upslope mat on the top to prevent uplift of mat end by water flow. Overlay adjacent edges of mat by six inches. Extend mat 2–3 feet above the crest of steep slopes and anchor by excavating a 6-inch-deep trench, and secure end of mat in trench, backfill and compact. Secure mat to the ground using staples or pins furnished by manufacturer of mat.

D. When no longer required, as determined by the Engineer, temporary erosion control mats shall become the property of the Contractor and be removed and properly disposed.

E. Ground disturbances, including holes and depressions caused by the installation and removal of the temporary erosion control blanket shall be backfilled and repaired.

3.8 INSPECTIONS AND MAINTENANCE

A. Contractor is responsible to maintain the sediment and erosion control features at all times throughout the project duration and until the completion certification and approval has been issued.

B. Regular erosion and sediment control system inspections shall be conducted by Contractor throughout the project duration. At a minimum, Contractor shall conduct daily inspections and maintain erosion control systems in good operating condition. Report the results of the inspection and the recommended maintenance and/or repair requirements to Engineer.

C. Additional inspections may be required and/or directed prior to, or immediately following, a storm event >0.1 inches. Repairs shall be made as necessary.

D. In the event that the sedimentation and erosion control measures employed by Contractor prove to be inadequate as determined by the Engineer, Contractor shall adjust operations to the extent necessary to prevent erosion and sediment transport.

E. Surface water shall be pumped to maintain excavations free of water. Comply with applicable requirements of the Connecticut Department of Environmental Protection, specifically those requirements related to the management of stormwater and dewatering wastewaters associated with construction activities.

F. Hay bales and/or silt fences.

1. Remove accumulated sediment once it builds up to one-half of the height of the bale or fabric.

2. Replace damaged or degraded bales as necessary or when directed by the Engineer.

3. Replace damaged fabric, or patch with a 2-ft minimum overlap. Overlaps may only be made at fence posts.

4. Make other repairs as necessary to ensure that the bales/fence is filtering all runoff.

G. Erosion Control Mats shall be inspected at least once a week. Areas where the mat has become dislodged from the soil surface or become torn shall be re-graded and re-seeded as necessary and the mat re-installed. When repetitive failures occur at the same location review conditions and modify erosion control measures to reduce failure rate. Temporary erosion control blanket damaged during the progress of work or resulting from the Contractor's vehicles, equipment, or operations shall be repaired or replaced at the expense of the Contractor.

H. Clean catch basin inlet sediment control devices in accordance with manufacturer's guidelines.

I. Any catch basins that collect sediment as a result of Contractor's work shall be thoroughly cleaned out by Contractor.

END OF SECTION

SECTION 01 5714

TEMPORARY DUST CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing and spreading water, calcium chloride, and/or mulch on the subgrade, or in other areas of a Project Site or associated off-site areas, for the purpose of controlling dust emissions.

B. The requirements set forth in this section of the specifications apply to all phases and areas of construction.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Regulations of Connecticut State Agencies (RCSA)

1. RCSA Section 22a-174-1 through 43, Abatement of Air Pollution.

C. ASTM International (ASTM)

1. ASTM D98, Standard Specification for Calcium Chloride.

PART 2 PRODUCTS

2.1 MATERIALS

A. Only water, calcium chloride, and mulch are approved for dust control. No asphalt or petroleum-based products may be utilized for dust control.

B. Water used shall be clean, non-polluted water obtained from sources approved by Engineer.

C. Calcium chloride, ASTM D98. Calcium chloride in pellet form and flake form shall be acceptable.

1. Calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.

2. Engineer may reject calcium chloride failing to meet the requirements of the aforementioned specifications or which has become caked or sticky in shipment.

D. Mulch

1. Straw mulch: Threshold straw of oats, wheat, barely, or rye that is free from noxious weeds, mold or other objectionable material. Straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer.

2. Wood chips: Processed tree trimmings free of trash or other physical contaminants such as metal and plastic.

PART 3 EXECUTION

3.1 GENERAL

A. Dust control shall be the responsibility of Contractor and dust control operations shall meet the requirements of the State of Connecticut Department of Environmental Protection.

B. Construction sequencing shall be organized and conducted in a manner to leave existing pavement or ground coverings in place until just prior to earth excavation for the purpose of minimizing the migration of dust beyond the Project Limits into the surrounding area.

C. Engineer reserves the right to conduct active dust monitoring using visual methods and may utilize particulate measurement equipment during the course of the work. If the amount of fugitive dust and/or particulate generated during the work is deemed unacceptable in the Engineer's judgment or exceeds baseline Project Site conditions at Engineer's monitoring locations, Engineer may require Contractor to stop work and implement corrective measures. No claim for delay will be considered for work stoppage based upon the results of Engineer's active dust monitoring results.

D. Stockpiled materials from which particle have the potential of becoming airborne shall be securely covered with a temporary waterproof covering made of polyethylene, polypropylene, hypalon, or approved equal. The covers must be in place at all times when work with the stockpiles is not occurring.

E. Subcontractor shall sweep all adjacent roads and neighboring parking lots and driveways that are impacted by the work. Whenever dirt is tracked from the site it shall be cleaned as necessary to prevent it from becoming a nuisance or hazard. At a minimum, adjacent streets shall be swept once per week.

3.2 WATER

A. The application of water shall be under the control of Engineer at all times. It shall be applied only at the locations, and at such times, and in the amount as may be directed by Engineer. Quantities of water wasted or applied without authorization will not be paid for.

B. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding or pollution.

C. Contractor shall have available and maintain in an operable condition at all times, sufficient equipment for the purpose of applying water for dust control.

D. Watering equipment shall consist of pipelines, tanks, tank trucks, distributors, pumps, meters, hose or other devices, approved by Engineer, which are capable of applying a uniform spread of water over the surface. A suitable device for a positive shut-off and for regulating the flow of water shall be located so as to permit positive operator control.

E. Applications of water for dust suppression include, but are not necessarily limited to, the following:

1. Demolition activities, material handling, material processing, and loading.

2. Earthwork.

3. Open excavation faces and dust-prone areas of the work.

4. Temporary access roads and roadway surfaces within and around the Project Site.

3.3 CALCIUM CHLORIDE

A. Calcium chloride shall be applied only at the locations, at such times and in the amount as may be directed by the Engineer and only in areas that will not be adversely affected by the application. Refer to Section 01 3543 – Environmental Protection.

B. Calcium chloride shall be uniformly applied at the rate of one and one-half (1½) pounds per square yard (lb/yd2) or at any other rate as directed by Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The number and frequency of applications shall be to Engineer's satisfaction.

3.4 MULCH FOR DUST CONTROL

A. Coordinate the use of mulch for dust control with erosion and sedimentation control measures.

B. Straw mulch shall be applied at a rate of 100 pounds per 1,000 square feet (100 lb/1,000 ft2).

C. Wood chips or wood mulch shall be applied at such a rate as to form a layer one (1) inch thick.

3.5 OTHER DUST CONTROL MEASURES

A. A temporary seed mixture may be spread in lieu of, or in addition to mulch over areas where the suspension of grading work in disturbed areas is expected to be more than 30 calendar days and as directed by Engineer.

END OF SECTION

SECTION 01 7124

AS-BUILT SURVEY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Final Survey of completed construction.

2. Preparation of "As-Built" Drawings after construction is completed.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut, Regulations of Connecticut State Agencies (RCSA)

1. Sections 20-300b-1 through 20-300b-20, Standards for Surveys and Maps in the State of Connecticut.

1.3 SUBMITTALS

A. Surveyor: Submit name and qualifications of Professional Land Surveyor who will be responsible for the work of this Section.

B. Certificates: Submit a certificate signed by a Connecticut-licensed Land Surveyor (PLS) certifying that the location and elevation of improvements comply with the Contract Documents and any approved changes in the work.

C. Final Survey: Prepare and submit two (2) copies of the final as-built survey.

D. Project Record Documents: Submit other pertinent documentation as may be required or appropriate.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Surveyor: Engage a Land Surveyor licensed as a Professional Land Surveyor (PLS) in the State of Connecticut to perform survey work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 FINAL SURVEY

A. Provide Improvement Location Survey to depict the horizontal and vertical location of all new construction.

3.2 AS-BUILT DRAWINGS

A. Prepare final As-Built Drawings which accurately depict the final configuration of all new construction. Document by means of appropriate details and notes all changes from the Drawings or Specifications which were made in the work or additional information which was uncovered in the course of construction.

B. As-Built Drawings shall depict the horizontal and vertical location of above-grade and below grade construction. Collect sufficient survey data to accurately represent the project scope and area.

1. Location: Survey shall include locations of all physical features installed during the construction with appropriate labelling.

a. Subsurface construction shall depict the actual location, depth, and configuration.

b. Utilities shall include type, size, material of construction and depth. Include all appurtenances such as valves, tees, cleanouts, etc. Include reference to permanent surface improvements.

c. Include field changes of dimension and detail.

d. Include detail not on original Contract Drawings.

e. Include changes or modifications which result from punch lists or final inspection.

2. Topographic data: From established survey control, conduct a topographic survey of the project area after construction is complete. Generate one-foot contours throughout the area of work and show breaks in slope and other notable features.

a. Pedestrian routes shall depict sufficient topographic data to confirm compliance with handicapped accessibility requirements.

b. Accessible Routes: A minimum of three (3) elevations at each edge and centerline (cross-section), spaced at a minimum of 5 feet along the route.

c. Ramps: Elevation shall be depicted with a minimum of three (3) elevations at bottom and top of each sloped segment. Elevation of landings associated with a ramp shall be depicted with a minimum of four (4) elevations at each corner.

d. Curb Ramps: Elevation shall be depicted with a minimum of three (3) elevations at bottom and top of the accessible ramp section. Elevation of flare (wings) sections (wings) shall be depicted with a minimum of three (3) elevations at each triangle corner.

e. Accessible Parking Spaces: Elevation of the parking area and Access Isle shall be depicted with a minimum of four (4) elevations at each corner, respectively.

C. Submit two prints of the final as-built drawings to Engineer prior to submittal of Application for Final Payment.

END OF SECTION

SECTION 01 7700

PROJECT CLOSE-OUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Substantial Completion.

2. Warranties.

3. Inspections.

4. Final cleaning.

5. Final Acceptance.

6. Project record documents.

1.2 SUBMITTALS

A. Submit Close-Out Submittals as indicated herein. Provide other Close-Out submittals that may be called-for in other Specification Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for Certification of Substantial Completion, complete the following (list exceptions in the request).

B. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as Substantially Complete. Include supporting documentation for completion as indicated in the Contract Documents and a statement showing an accounting of changes to the Contract Sum if applicable.

C. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

D. Submit warranties, workmanship bonds, maintenance agreements, testing results, final certifications, and similar documents.

E. Obtain and submit releases enabling the Owner unrestricted use of the work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

F. Deliver spare parts, extra stock, equipment, and similar items required.

G. Complete start up testing of systems, and instruction of the Owner’s operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock ups, and similar elements.

H. Complete final clean up requirements, including touch up painting. Touch up and otherwise repair and restore marred exposed finishes.

I. Coordinate temporary erosion and sedimentation control measures with permanent erosion control features to the extent practical to ensure economical, effective and continuous erosion control post-construction.

1.4 INITIAL CLOSE-OUT INSPECTION

A. On receipt of a request for inspection, Engineer will either proceed with inspection or advise Contractor of unfilled requirements.

B. Following Initial Inspection, Engineer will prepare a list of items to be completed or corrected ("Punch List").

C. Engineer will prepare a Certificate of Substantial Completion following Initial Inspection, or advise Contractor of construction that must be completed or corrected before the certificate will be issued. If a Certificate of Substantial Completion is issues, the Punch List will be attached.

1.5 WARRANTIES

A. Submit written warranties to Engineer prior to the date certified for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of Engineer.

1.6 FINAL CLEANING

A. Remove all temporary controls unless otherwise indicated to remain.

B. Remove tools, construction equipment, machinery, and surplus materials.

C. Remove and properly dispose of all garbage, rubbish, litter, and other substances.

D. Clean exposed surfaces of installed equipment and similar items.

1.7 FINAL CLOSE-OUT INSPECTION

A. On receipt of a request for Final Inspection, Engineer will either proceed with inspection or advise Contractor of unfilled Punch List requirements.

B. Results of the Final Inspection will form the basis of requirements for final acceptance.

C. Engineer will repeat Final Inspection following notation of Punch List items that must be completed or corrected.

1.8 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final acceptance and final payment, complete the following (list exceptions in the request).

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum if applicable.

3. Submit Consent of Surety to final payment, and final lean releases (lien waiver) from all suppliers, subcontractors, and second-tier subcontractors.

B. Following completion of acceptable Close-Out Inspection and receipt of all required Close-Out Submittals, Engineer will prepare a certificate of final acceptance.

1.9 RECORD DOCUMENT SUBMITTALS

A. Record Drawings: In addition to Record Drawing requirements that may be defined in individual Specification Sections, at a minimum, maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever Drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

3. Note related Change Order numbers where applicable.

4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

5. Upon completion of the project, submit (2) copies of Record Drawings to Engineer.

B. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark up of Record Drawings and Specifications.

1. Upon completion of mark up, submit complete set of record Product Data to Engineer.

C. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to Engineer.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 7836

WARRANTIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. General administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on materials, products, or equipment and special warranties on installations.

2. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Specification Sections.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on warranties do not relieve Contractor of the warranty on the Work that incorporates the materials, products, or equipment, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign Special Warranties with Contractor.

C. This Section does not nullify guarantees which may be associated with materials, products, equipment, or installations and warranties shall be considered in addition to any guarantee.

1.2 DEFINITIONS

A. Standard Warranties: Preprinted written warranties published by individual manufacturers for particular materials, products, or equipment specifically endorsed by the manufacturer to the Owner.

B. Special Warranties: Written warranties required by, or incorporated into, the Contract Documents, either to extend time limits provided by Standard Warranties or to provide greater rights for Owner.

1.3 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.4 SUBMITTALS

A. Submit written warranties to Engineer prior to the date certified for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of Engineer.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to Engineer within fifteen (15) days of completion of that designated portion of the Work.

B. When a Special Warranty is required to be executed by Contractor, or Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to Owner through Engineer for approval prior to final execution.

1. Refer to individual Specification Sections for specific content requirements, and particular requirements for submittal of Special Warranties.

C. Bind Warranties in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 1/2″ by 11″ paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the material, product, equipment, or installation. Provide a typed description of the material, product, equipment, or installation, including the name, model number, part number, or other identifier, and the name, address, and telephone number of the installer.

2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES," the project title or name, and the name of Contractor.

3. When operating and maintenance manuals are required for warranted materials, products, equipment, or installations, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.5 FORM OF WARRANTY

A. Furnish documents in the following manner:

1. Provide Warranties to Owner's designated personnel.

2. All Warranties shall reference the project name and number as indicated in the Contract Documents.

3. All required Warranties will be by the respective company made out to Owner.

4. All Warranties supplied by subcontractors or manufacturers shall be countersigned by Contractor.

5. All work shall be covered by a one (1) year guarantee. Contractor shall visit the project site at 11 months into the guarantee period to determine the scope of any required guarantee work. Contractor shall contact Owner prior to this visit so that Owner's representative may attend.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

DIVISION 02
EXISTING CONDITIONS

SECTION 02 4113

UTILITY DEMOLITION AND ABANDONMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Termination of utility services.

2. Demolition or abandonment of drainage, sewer, and water pipe

3. Demolition or abandonment of miscellaneous below-grade utilities and related facilities including but not necessarily limited to electric and communications ducts, steam lines, and gas lines.

4. Demolition or abandonment of manholes, catch basins, vaults, and similar utility structures.

5. Demolition or abandonment of above-grade utilities and related facilities including but not necessarily limited to electric, telephone, cable systems, and data communications.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut.

1. State of Connecticut Solid Waste Management Regulations, Sections 22a-209 including any amendments thereto.

2. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020 and any supplements.

D. ASTM International (ASTM)

1. ASTM C33 – Standard Specification for Concrete Aggregates.

2. ASTM C55 – Standard Specification for Concrete Building Brick.

3. ASTM C91 – Standard Specification for Masonry Cement.

4. ASTM C94 – Standard Specification for Ready-Mixed Concrete.

5. ASTM C144 – Standard Specification for Aggregate for Masonry Mortar.

6. ASTM C150 – Standard Specification for Portland Cement.

7. ASTM C230 – Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.

8. ASTM C270 – Standard Specification for Mortar for Unit Masonry.

9. ASTM C387 – Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.

10. ASTM C476 – Standard Specification for Grout for Masonry.

11. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).

1.3 SAFETY

A. Conduct the work of this Section in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.4 SUBMITTALS

A. Abandonment procedures required by the owner of each utility prior to performing the work of utility termination/cutting/capping/plugging.

B. Material specifications and shop drawings for all materials and equipment furnished under this section, prior to performing the work of utility abandonment.

C. Schedule indicating the timing of termination for each utility.

D. Copies of permits, licenses, approvals, insurance, or bonds associated with termination of utility service.

E. Copies of utility termination letters confirming termination of service from each utility owner/operator.

F. Quality Control Submittals (prior to commencement of work)

1. Schedule of demolition activities.

2. Methods of demolition, including sequence and equipment proposed for same.

G. Contract Closeout Submittals (prior to authorization of final payment):

1. As-built drawings showing locations of all terminated/cut/capped/plugged utilities and service disconnections at or before project close-out.

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out

1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).

2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.

3. Not all subsurface facilities or structures will be identified through the Call-Before-You-Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Utility Coordination

1. Inform all utility owners of the necessity of test pit work. Prove reasonable advance notice to allow for coordination.

2. Coordinate the excavation of all test pits with the respective utility owners having facilities in the vicinity of the test pit location.

3. If so desired by the respective utility owners, all or part of the work under this Section may be accomplished by their crews and/or supervised by them.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with the material specifications required by the owner of each utility. Where such material specifications may conflict with this Specification, utility owner's requirements shall prevail.

B. Gravel Borrow: Conform to applicable Specifications.

C. Sand: ASTM C33.

D. Portland Cement: ASTM C150, Type II.

E. Masonry Cement: ASTM C91.

F. Mortar Aggregate: ASTM C144, standard masonry type, clean, dry, free of deleterious materials.

G. Concrete: Design of mix in accordance with ASTM C94; ASTM C150, Type II Portland Cement, washed and graded sand, and aggregate with maximum size of 1-inch; or pre-packaged concrete mix with maximum aggregate size of 1-inch, ASTM C387. Minimum 28-day compressive strength of 4,000 psi.

H. Masonry Mix: Washed and graded mason sand, lime, and Portland Cement, ASTM C270; or pre-packaged, dry, sand/lime/cement mortar mixture, ASTM C387. Minimum 28-day compressive strength of 1,800 psi (Type S).

I. Grout: Bagged, pre-mixed formulations of non-shrink grout shall meet the requirements of ASTM C1107, Grade B or site mixed, ASTM C476.

1. Unconfined compressive strength: 7,500 psi at 28 days.

2. Grout shall be non-metallic, non-gaseous, and non-shrink when tested in accordance with ASTM C1107 Grade B or C at a fluid consistency (flow cone) of 20 to 30 seconds. Thirty-minute-old grout shall flow through the flow cone after slight agitation, in temperatures of 40 degrees F to 90 degrees F.

3. Mix Design: Obtain prior written approval of Engineer for any proposed mix design. Mix design shall include the proportions of hydraulic cement, potable water, fine aggregates, expansive agent, and any other necessary additive or admixture.

4. Grout shall be mixed to a flowable consistency as determined by ASTM C230. All bagged material shall be clearly marked with the manufacturer's name, date of production, batch number, and written instructions for proper mixing, placement and curing of the product.

5. Contractor may formulate and design a grout mix for use on the project in lieu of using a pre-bagged product.

J. Water: Potable.

K. Solid Concrete Masonry Unit: ASTM C55, sized per pipe diameter to minimize requirements for cutting.

PART 3 EXECUTION

3.1 GENERAL

A. Verify site conditions before proceeding with demolition work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any hazardous conditions and/or discrepancies.

B. Existing utilities at the Project Site have not been clearly defined as to location, size, and as-built condition, and all utility information shown on the Drawings or described herein must be considered approximate.

C. Primary structures and other site features are shown on the Drawings; other smaller structures and features not shown on the Drawings may exist and shall be demolished as part of the work of this Section at no additional cost.

D. Contractor shall have sole responsibility for verification of actual field conditions. Contractor shall bear full responsibility for obtaining information regarding the location, layout, and as-built configuration of existing site improvements, including aspects of such improvements which are not readily visible, including but not necessarily limited to above-ground and underground utilities, utility structures, their connections, and other above- and below-grade construction that my affect, or be affected by, the work of this Seciton.

E. Utility services to buildings outside the limits of work shall be maintained and all resulting costs or charges shall be the responsibility of Contractor.

F. Although surficial features such as manholes, catch basins, valves and junction boxes may be visible and/or shown on the Drawings, Contractor is required to perform exploratory excavations as he deems appropriate to ascertain the location and nature of all subsurface utilities components which are to be terminated, abandoned, or demolished, or otherwise affected by the work.

G. Provide all required coordination with owners of the various utilities serving, or present at, the Project Site as required to complete termination, demolition and abandonment work.

H. Prior to physically cutting, disconnecting, demolishing or abandoning any facility, verify that service has been terminated and no active connections remain.

I. Coordinate as required for permanent termination of service, temporary termination of service, relocation of facilities, abandonment of facilities, demolition of facilities, cutting, capping, plugging, and bracing.

J. Comply at all times with the procedures for terminations of utility services as required by the owner of each utility.

K. When utilities are encountered that are not indicated on the Drawings, notify Engineer before proceeding with the work.

3.2 PROTECTION OF UTILITIES

A. Locate and identify existing utilities that are to remain and protect them from damage. Provide protection as required such as marking, blocking, bracing, stabilizing, supporting, and retaining.

B. Before excavating near any utility, notify the utility owner, coordinate protective work, and comply with the utility owners' requirements.

C. When uncharted or incorrectly charted utilities are encountered during excavation, stop work and notify Engineer immediately. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

D. Utilities to remain which are damaged by Contractor shall be repaired/replaced to the satisfaction of the utility owner at Contractor's expense.

E. Retaining Structures

1. Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utilities, paving, light standards, piping or conduit. Assume responsibility for the strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto.

3.3 UTILITY TERMINATION

A. Termination: Where "Terminate" is indicated, permanently terminate utility service as indicated on the Drawings in accordance with each utility owner's specific requirements, or coordinate with the utility owner in those cases where the utility owner will perform termination.

B. Coordinate and secure required permits, licenses, approvals, insurance, or bonds associated with termination of service.

C. Coordinate inspections by utility company personnel, or if privately-owned, coordinate inspections by qualified, authorized personnel on behalf of the utility owner.

D. Provide completed and executed utility termination forms as required by each utility owner's requirements.

E. Secure any required utility termination letters from each utility which confirm that service has been terminated and no active connections remain.

F. Termination Procedure

1. Water

a. Do not impact any water pipe that may be constructed of asbestos-containing materials unless asbestos abatement specifications are part of the contract documents and the work is completed by qualified personnel in accordance with the requirements contained therein.

b. Cut and cap water pipe as indicated on the Drawings or in accordance with the water utilities' requirements. Do not leave "dead-end" pipe runs.

c. Provide restraining blocks at all capped ends.

2. Electrical and Communications

    a. Remove conductors to nearest structure unless otherwise indicated. Plug openings in structures per the details or in accordance with the utilities' requirements.

    b. Cut and cap conduits at each end. Caps shall match conduit type.

    c. Direct-Bury Cable: Comply with the cable owner's requirements.

    d. Secure termination documentation.

3. Gas

    a. Comply with gas company requirements.

4. Steam

    a. Prior to impacting any steam pipe, confirm that no asbestos-containing materials are present, or confirm that all asbestos-containing materials have been properly abated.

    b. Provide concrete plug at open ends.

3.4 UTILITY ABANDONMENT

A. Abandonment: Where "Abandon" or "Abandon in-place" is indicated, terminate utility service, cut, cap and otherwise separate the facility from portions to remain and implement abandonment procedure as defined herein.

B. Sewer and Drainage Systems

1. Less than 6 inches in diameter: Provide 6-inch concrete plug at open ends on either side of the length to be abandoned as indicated on the Drawings.

2. Greater than 6 inches in diameter: Fill abandoned section with grout/flow-fill and provide 6-inch concrete plugs on either side of the length to be abandoned as indicated on the Drawings.

    a. Where the filling of pipe is called-for, submit plan of proposed procedure to the owner of such utility and Engineer for approval.

    b. Filling of pipe shall be with pressure (pumping) methods.

3. Where the filling of pipe or conduit is called-for, Contractor shall submit a plan of his proposed procedure to the owner of such utility and Engineer for approval.

4. All structures which are to be abandoned in-place shall have their tops or roof slabs removed and floor slabs broken so as to permit the free passage of water.

5. Unless otherwise indicated, structures which are to be abandoned in-place may be demolished such that only that portion of the structure from finished grade to a point five feet below finished grade are removed.

C. Water Pipe

1. Do not impact any water pipe that may be constructed of asbestos-containing materials unless asbestos abatement specifications are part of the contract documents and the work is completed by qualified personnel in accordance with the requirements contained therein.

2. Cut and cap water pipe on either side of the length to be abandoned as indicated on the Drawings.

3. Provide restraining blocks at all capped ends of water pipe to remain in service.

D. Electrical and Communications

1. Remove conductors to nearest structure unless otherwise indicated.

2. Cut and cap conduits on either side of the length to be abandoned as indicated on the Drawings. Caps shall match conduit type.

E. Gas

1. Comply with gas company requirements.

F. Steam

1. Prior to impacting any steam pipe, confirm that no asbestos-containing materials are present, or confirm that all asbestos-containing materials have been properly abated.

2. Provide concrete plug on either side of the length to be abandoned as indicated on the Drawings.

G. Utility Structures

1. Comply with utility owner's requirements.

2. All structures which are to be abandoned in-place shall have their tops or roof slabs removed and floor slabs broken so as to permit the free passage of water.

3. Unless otherwise indicated, structures which are to be abandoned in-place may be demolished such that only that portion of the structure from finished grade to a point five feet below finished grade are removed.

4. Backfill to match adjacent grade and restore surface area to match adjacent grade unless otherwise indicated.

3.5 UTILITY DEMOLITION

A. Where "Remove," "Demolish," or "R&D" is indicated on the Drawings, such facility or structure shall be completely removed and disposed-of, after termination.

B. Subsurface Utilities: Demolition shall include complete removal of the utility system and any associated concrete encasement, catch basins and related structures; sanitary sewerage manholes, pumps, and related facilities; valves, backflow devices, vents, reducers, couplings, meters, hydrants, fittings, thrust blocks, anchors; vaults, pull boxes, splice boxes, and handholes; or other ancillary components of the utility located within the limits to be demolished. The plugging or capping of utilities at the limit of demolition shall be as indicated on the Drawings. Where no plugging or capping is shown, comply with the requirements for utility termination at the limit of demolition.

C. Above-grade Utilities: Demolition shall include complete removal of the utility system and any associated utility poles, guys, wires, transformers, light standards, utility and light pole foundations, supports and ancillary equipment.

D. Do not demolish any utility until termination and plugging/capping has been completed and verified.

E. Prior to the demolition of any lighting system, verify that power supplies which may be shared with other lighting systems outside the Project Limits have been segregated.

F. Asbestos-Containing Materials

1. Do not impact any asbestos-insulated utility where “Remove” or “Demolish” is indicated on the Drawings until all asbestos-containing materials have been properly abated and verification of same has been either

a. Completed and verified by qualified personnel; or

b. If asbestos abatement specifications are part of the contract documents the work has been completed by Contractor’s qualified personnel or subcontractor in accordance with the requirements contained therein.

2. Do not impact any asbestos-containing pipe where “Remove” or “Demolish” is indicated on the Drawings unless asbestos abatement specifications are part of the contract documents and the work is completed by qualified personnel in accordance with the requirements contained therein. If asbestos abatement specifications are not part of the contract documents coordinate with Owner’s abatement contractor for completion of the work.

3.6 MATERIAL DISPOSITION

A. Salvage of Utility Materials

1. If requested by the utility owner, frames and covers of manholes and catch basins to be demolished or abandoned shall remain the property of the utility owner. They shall be removed and transported to a designated storage area by Contractor.

2. Notify the utility owner at least 24 hours before salvaged materials are transport so that the exact place and time for delivery can be arranged.

3. Other utility materials which are to be salvaged or reused are indicated on the Drawings.

B. Disposal of Utility Materials

1. The loading of utility demolition materials for disposal shall be performed in a manner that prevents materials and activities from generating excessive dust and ensure minimum interference with roads, sidewalks and streets both onsite and offsite.

2. Transport of all materials off-site shall be in accordance with applicable Department of Transportation Regulations. All utility demolition materials leaving the site shall become the property of Contractor.

3. Disposal of utility demolition materials shall be conducted in accordance with all applicable regulations and occur only at facilities approved/licensed or permitted by the Connecticut Department of Energy and Environmental Protection.

4. Disposal of Demolition Materials: All materials resulting from utility demolition shall be removed from the Project Site by Contractor for disposal, reuse, salvage or recycling. Disposal shall be conducted in accordance with all applicable regulations.

3.7 FILL AND BACKFILL

A. Backfill excavations from utility work in accordance with applicable Specification Sections.

3.8 DOCUMENTATION

A. Field Identification

1. Physically mark the location of each subsurface utility termination with a surveyor's stake, with such stake identifying the utility type and depth below grade. Where the use of stakes at a utility termination location may be inappropriate, Contractor shall provide staking at an adjacent location(s) and include appropriate offset dimensions or other suitable demarcation.

B. As-Built Drawings

1. Provide as-built documentation for each utility termination, including location, depth, and method and material of construction for termination. Such as-built documentation shall be noted on the appropriate Drawings.

2. Contractor shall be solely responsible for complying with the requirements of local permitting authorities for preparation and submittal of as-built drawings. The requirements for the preparation of as-built drawings as defined herein shall be considered the minimum requirements of Engineer, but shall in no way relive Contractor from satisfying the requirements of local permitting authorities.

3. As work progresses, record the following on two (2) sets of Drawings:

4. All changes and deviations from the design in location, grade, size, material, or other feature as appropriate.

5. Any uncharted locations of utilities or other subsurface feature encountered during installation, including the characteristics of such uncharted utility or subsurface feature such as utility type, size, depth, material of construction, etc.

6. Recording of changes shall be clearly and neatly marked in red pen or pencil. All changes shall be noted on the appropriate Drawing sheets.

7. Make measurements from fixed, permanent points on the Project Site to accurately locate the work completed. Such measurements shall consist of at least three (3) ties showing the distance of each item relative to each of the fixed, permanent points.

8. As-Built Drawings shall be complete and shall indicate the true measurement and location, horizontal and vertical, of all new construction. As-Built drawings shall also contain any additional information required by Engineer.

3.9 CLEAN UP

A. Contractor shall remove all debris, residuals, and materials at the conclusion of utility termination, demolition, and abandonment activities.

END OF SECTION

SECTION 02 4123

SITE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. General Site Demolition.

2. Demolition of site structures, retaining walls, signage, light standards, foundations and appurtenances, pavement, curbing, and similar site improvements.

3. Filling of voids and excavations resulting from site demolition.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut.

1. State of Connecticut Solid Waste Management Regulations, Section 22a-209 including any amendments thereto.

1.3 DEFINITIONS

A. Demolition: Any operation including the dismantling or wrecking of a structure, assembly, appurtenance, or any portion thereof, including major and minor components, parts, and systems. Demolition shall be inclusive of the removal, handing, processing, segregation, loading, and proper off-site disposition of materials. Demolition shall be interpreted as complete and total removal unless otherwise indicated. The term Remove shall be synonymous with Demolition.

B. Bulky Waste: Land clearing debris and non-contaminated or hazardous waste material resulting directly from demolition activities other than Clean Fill, including such materials as tree stumps, tree tops, concrete, wood, brick, plaster, roofing materials, wallboard, metals, carpeting, insulation, furniture, and furnishings. Bulky Waste shall include Construction and Demolition Debris and Construction and Demolition Waste.

1.4 SAFETY

A. Conduct the work of this Section in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out

1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).

2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.

3. Not all subsurface facilities or structures will be identified through the Call-Before-You-Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Utility Coordination

1. Inform all utility owners of the necessity of test pit work. Provide reasonable advance notice to allow for coordination.

2. Coordinate the excavation of all test pits with the respective utility owners having facilities in the vicinity of the test pit location.

3. If so desired by the respective utility owners, all or part of the work under this Section may be accomplished by their crews and/or supervised by them.

1.6 REGULATORY REQUIREMENTS

A. Comply with all applicable federal, state, and local safety and health requirements regarding all aspects of the work. Do not proceed until all permits or other approvals are secured.

B. Contractor is bound to comply with any project-related permits or approval obtained by Owner, including all requirements of such permit and representations contained in permit application as though Contractor were the permittee. Requirements and conditions set forth in Owner-obtained project-related permits and permit applications shall be binding on Contractor just as any Specification would be.

C. Do not close or obstruct roadways, sidewalks, hydrants, or other infrastructure without permits or authorization from local municipal authorities or other authorities having jurisdiction.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 IDENTIFICATION OF EXISTING FEATURES

A. Prior to commencing construction activities, Contractor shall identify and delineate those areas or specific improvements that are not to be disturbed. Areas or specific improvements within the Limits of Work/Contract Limits and general work areas which are not to be disturbed shall be clearly marked or fenced. Monuments and markers shall be protected before construction operations commence. Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting designated areas, specific improvements, monuments, and markers at the Project Site.

3.2 PROTECTION OF EXISTING FEATURES

A. General

1. All areas or specific improvements, including but not limited to vegetation, utilities, poles, wires, fences, curbs, monuments/property-line markers, and other structures, which must be preserved in place without being temporarily or permanently relocated shall be carefully supported and otherwise protected from damage by Contractor.

2. As excavation/demolition work approaches underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools.

B. Pavements

1. On paved surfaces to remain, Contractor shall not use or operate heavy equipment, other power-operated equipment, or store tools, equipment, or materials which may mar, cut, or otherwise damage such surfaces. If there is no alternative to the operation of heavy equipment, other power-operated equipment, or storage of tools, equipment, or materials on paved surfaces to remain, Contractor shall take all measures necessary to protect such surfaces.

2. All surfaces, which have been damaged by Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of construction operations. Such restoration shall meet the approval of Engineer and may include repair or complete replacement at Contractor's expense.

C. Planted Areas

1. All planted areas, including lawn/turf areas and landscaped areas, which have been damaged by Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of construction operations.

D. Utilities

1. Locate and identify existing utilities that are to remain and protect them from damage. Provide protection as required such as marking, blocking, bracing, stabilizing, supporting, and retaining.

2. For utility termination, removal, or abandonment, refer to Section 02 4113 – Utility Demolition and Abandonment.

3. Before excavating near any utility, notify the utility owner, coordinate protective work, and comply with the utility owners' requirements.

4. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs.

5. Where known utilities are encountered, notify Engineer and document location and type of utility before proceeding with work in such area.

6. When uncharted or incorrectly charted utilities are encountered, stop work and notify Engineer. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

E. Retaining Structures: Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utility systems, paving, or other improvements. Contractor assumes responsibility for the strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto.

3.3 SITE DEMOLITION

A. Conduct site demolition as shown on the Drawings.

B. Conduct site demolition operations in a manner that will prevent damage to adjacent structures, utilities, pavements and other facilities to remain.

C. Remove from the site and properly dispose of all materials resulting from site demolition operations.

3.4 DUST CONTROL

A. Implement fugitive dust suppression to prevent unacceptable levels of dust resulting from site demolition operations or other activities required by the Contract Documents. It shall be the Contractor's responsibility to supervise fugitive dust control measures and to monitor airborne particulate matter. Comply with applicable provisions of Section 01 5714 – Temporary Dust Control.

3.5 REPLACEMENT

A. In case of damage, Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. When the Owner does not wish to make the repairs themselves, all damage shall be repaired by Contractor, or, if not promptly done by him, Engineer may have the repairs made at the expense of Contractor.

B. Contractor shall patch, repair and/or replace all adjacent materials and surfaces damaged through the prosecution of work at no expense to Owner. All repair and replacement work shall match the existing in-kind. Final acceptance of said work shall be at the sole judgment of Owner.

END OF SECTION

DIVISION 03
CONCRETE

SECTION 03 3200

SITE CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Site cast-in-place concrete, including but not necessarily limited to, sidewalks, ramps, driveways, curbing, pads, bases, retaining walls, and thrust blocks.

2. All facilities, labor, materials, tools, equipment, appliances, transportation, supervision, and related work necessary to complete the Work shown on the Drawings and as specified herein.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. ASTM International (ASTM)

1. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

2. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

3. ASTM A767 – Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

4. ASTM A775 – Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

5. ASTM A996 – Standard Specification for Rail-Steel and Axle-Steel Deformed Bars or Concrete Reinforcement.

6. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

7. ASTM C29 – Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate

8. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
9. ASTM C33 – Standard Specification for Concrete Aggregates.
10. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
11. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
12. ASTM C70 – Standard Test Method for Surface Moisture in Fine Aggregate.
13. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
14. ASTM C117 – Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing.
15. ASTM C127 – Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
16. ASTM C128 – Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
17. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
18. ASTM C138 – Standard Test Method for Density ("Unit Weight"), Yield, and Air Content (Gravimetric) of Concrete.
19. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.
20. ASTM C150 – Standard Specification for Portland Cement.
21. ASTM C156 – Standard Test Method for Water Retention by Concrete Curing Materials.
22. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
23. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
24. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
25. ASTM C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
26. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
27. ASTM C233 – Standard Test Method for Air-Entraining Admixtures for Concrete.
28. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
29. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

30. ASTM C311 – Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.

31. ASTM C387 – Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.

32. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.

33. ASTM C566 – Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying.

34. ASTM C595 – Standard Specification for Blended Hydraulic Cements.

35. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

36. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

37. ASTM C685 – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

38. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.

39. ASTM C803 – Standard Test Method for Penetration Resistance of Hardened Concrete.

40. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.

41. ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete.

42. ASTM C989 – Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars.

43. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.

44. ASTM A1078 – Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement.

45. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

46. ASTM D1752 – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

47. ASTM D2628 – Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

48. ASTM D4397 – Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.

49. ASTM D5249 – Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints.

50. ASTM D5893 – Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

51. ASTM E329 – Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

D. Concrete Reinforcing Steel Institute (CRSI).

1. CRSI Manual of Standard Practice, latest edition.

E. State of Connecticut

1. 2018 Connecticut State Building Code, including all Amendments, Supplements, and Errata.

F. American Concrete Institute (ACI)

1. ACI 224R – Control of Cracking on Concrete Structures.

2. ACI 224.3R – Joints in Concrete Construction.

3. ACI 301 – Specifications for Structural Concrete.

4. ACI 302.1R – Guide for Concrete Floor or Slab Construction.

5. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.

6. ACI 305R – Guide to Hot Weather Concreting.

7. ACI 306R – Guide to Cold Weather Concreting.

8. ACI 308R – Guide to Curing Concrete.

9. ACI 318-14 - Building Code Requirements for Structural Concrete

10. ACI 318R-14 - Commentary on Building Code Requirements for Structural Concrete

G. American Welding Society (AWS).

1. AWS A5.1/A5.1M (2004; Errata 2004) Carbon Steel Electrodes for Shielded Metal Arc Welding.

2. AWS D1.4/D1.4M (2005; Errata 2005) Structural Welding Code – Reinforcing Steel.

1.3 SUBMITTALS

A. Sampling and Testing Laboratory – Submit name and qualifications of commercial sampling and testing laboratory for Engineer's approval. Submit applicable documentation of credentials, licenses, etc.

B. Testing Agency – Submit name and qualifications of third-party in-field quality control Testing Agency for Engineer's approval. Submit applicable documentation of credentials, licenses, etc.

C. For each type of specially furnished concrete provide a description of methods and the sequence of placement.

D. Manufacturer's catalog data for the following items shall include printed instructions for admixtures, bonding agents, epoxy-resin adhesive binders, waterstops, and liquid chemical hardeners:

1. Concrete Aggregates.
2. Portland Cement.
3. Ready-Mix Concrete.
4. Form Facing Materials.
5. Reinforcement Materials.
6. Joint Materials.
7. Water-Vapor Barrier Subgrade Cover.
8. Bonding Materials.
9. Finish Materials.
10. Concrete Curing Materials.
11. Form release agent.
12. Concrete coloring additive.
13. Elastomeric joint sealant.
14. Preformed joint filler

E. Submit samples of the following:

1. Preformed joint filler.
2. Manufacturer's color charts showing full range of colors available.
3. Cured samples of elastomeric join sealants in the color(s) selected.

F. Design Data

1. Mix Design data for each class of Ready-Mix Concrete shall be submitted at least 15 calendar days prior to start of specified work.
2. Mix Design data for each type of integrally-colored concrete mix called-for shall be submitted at least 15 calendar days prior to start of specified work.

G. Test Reports

1. Submit test reports for all testing conducted under this Section.

H. Certificates

1. Submit certificates for the following:
   a. Concrete Design Mixes.
   b. Concrete Aggregates.

c. Welding Procedures. Welding Procedures shall be in accordance with AWS D1.4/D1.4M. Certificates for Welder Qualifications shall be in accordance with the paragraph entitled, "Qualifications for Welding Work," of this section.

d. Mill certificates for Steel Bar.

2. Certificates for concrete shall contain project name, title/number, date, name of Contractor, name of concrete testing service, source of concrete aggregates, material manufacturer, brand name of manufactured materials, material name, values as specified for each material, and test results.

I. Manufacturer's Instructions

1. Installation instructions shall indicate the manufacturer's recommended method and sequence of installation for the following items:

a. Admixtures

b. Bonding Materials

c. Waterstops

d. Liquid Chemical Hardener

J. Joint Plan

1. Prior to initiation of concrete flatwork, submit proposed Construction Joint plan to Engineer for review and approval. Coordinate such plan with the joint patterns depicted on the Drawings.

K. Delivery Tickets: Ready-mixed concrete manufacturer shall provide delivery tickets with each load of concrete delivered to the Project Site. Delivery tickets shall provide the following information:

1. Project name printed on ticket.

2. Name of producer, identification of plant.

3. Date and time of day.

4. Type of material.

5. Cubic yards of material loaded into truck.

6. Project number, purchase order number, name of Contractor (if Contractor other than producer).

7. Truck number for specific identification of truck.

8. Individual aggregate, cement, water weights (masses) and any admixtures shall be printed on plant tickets.

9. Water/cement ratio.

10. Additional water allowance in gallons based on water/cement ratio for mix.

1.4 QUALITY ASSURANCE

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

B. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

C. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

D. Welder qualifications: Welder qualifications shall be verified in accordance with AWS D1.4/D1.4M or under an equivalent qualification test approved in advance. Welders shall be permitted to do only the type of welding for which each is specifically qualified.

E. Concrete testing: Concrete testing shall be performed by an approved Testing Agency/Testing Laboratory experienced in sampling and testing of concrete. Testing Agency/Testing Laboratory shall meet the requirements of ASTM E329.

1.5 MOCKUPS

A. Where mockups are called-for, comply with the following:

1. At location on the Project Site selected by Engineer, place and finish 100 square foot mockup section for examination. Mockup to be constructed by the installer who will actually perform the work for the Project.

2. For accurate color, the quantity of concrete mixed to produce the sample should not be less than 3 cubic yards (or not less than 1/3 the capacity of the mixing drum on the ready-mix truck) and should always be in full cubic yard increments. Excess material shall be discarded according to local regulations.

3. For colored concrete, record the amount of integral colorant, dray colorant, or chemical stain needed per square foot of application to establish coverage rates for the work.

4. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control construction, and expansion joints in sample panels.

5. Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.

6. Accepted mockup provides visual standard for all work.

7. Mockup shall remain through completion of work for use as a quality standard for finished work.

8. Provide suitable protections to preclude damage to mockup.

9. Remove mockup when directed.

1.6 TESTING

A. Quality control testing during construction shall be the responsibility of Contractor via Testing Agency and Testing Laboratory as applicable. Contractor shall retain and pay for the services of such Testing Agency/Testing Laboratory to perform all testing in accordance with applicable standards.

B. Testing shall include sampling and testing concrete materials proposed for use in the work and testing the design mix for each class of concrete.

C. Tests will be required to determine whether the concrete being produced complies with the standard of quality and strength as specified.

D. Additional Tests: Additional testing of in-place concrete shall be conducted when test results indicate that specified concrete strengths and other characteristics have not been attained. Additional testing shall consist of cored cylinders to determine adequacy of concrete or other non-destructive testing methods that may be approved by Engineer. Contractor shall pay for all such additional testing. Any holes made shall be patched by the Contractor at their expense.

E. Testing Standards

1. Sampling: ASTM C172. Collect samples of fresh concrete to perform tests specified.

2. Concrete aggregate materials proposed for use in the work shall be sampled and tested in accordance with ASTM C33.

3. Portland Cement shall be sampled and tested in accordance with ASTM C150.

4. Slump Tests: ASTM C143. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded.

    a. Frequency: Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete unless otherwise specified or called-for.

5. Air Content: ASTM C231 (primary method) or ASTM C173 (secondary method).

    a. Frequency: Test air-entrained concrete for air content at the same frequency as specified for slump tests.

6. Temperature Tests: ASTM C1064.

    a. Frequency: Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, unless otherwise specified or called-for, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

7. Compressive Strength Tests: ASTM C39. Make five test cylinders for each set of tests in accordance with ASTM C31. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve.

a. Frequency: Samples for strength tests of each mix design (class) of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cubic yards of concrete, nor less than once for each 5,000 square feet of surface area for slabs (including walks and sidewalks) or walls.

b. Standard: Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 450 psi, take a minimum of three cored cylinder samples from the in-place work represented by the low-test cylinder results and test. Concrete represented by core test is considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Retest locations represented by erratic core strengths. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete

8. Cored cylinders: ASTM C42.

9. Penetration: ASTM C803.

F. Concrete Replacement: Failure of any test or to follow proper installation procedures will require that the concrete be removed and properly replaced at the Contractor's expense.

1.7 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturers' written recommendations.

B. Packaged materials shall be delivered to the project site in their original, unopened package or container bearing label clearly identifying manufacturer's name, brand name, material, weight or volume, and other pertinent information. Packaged materials shall be stored in their original, unbroken package or container in a weather-tight and dry place until ready for use in the work.

C. Unpackaged aggregates shall be stored to avoid excessive segregation, contamination with other materials or other size aggregates, or freezing.

D. Reinforcement and other metal items shall be protected from corrosion and shall be kept free from ice, grease, and other coatings that would destroy or reduce bond.

E. Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry condition.

1.8 PROJECT CONDITIONS

A. Pre-Job Conference

1. One week prior to placement of concrete, Contractor shall coordinate and host a coordination meeting to discuss concrete application schedule, materials, and methods.

B. Environmental Requirements

1. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours.

2. Protect fresh concrete from rain, moisture, and freezing.

3. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT

A. Cement: ASTM C150. One brand and type of cement shall be used for formed concrete having exposed-to-view finished surfaces.

B. Unless otherwise specified, cement shall be Type IA.

2.2 READY-MIX CONCRETE

A. Ready Mix Concrete: Portland Cement Concrete, air-entrained, ASTM C94.

1. Compressive Strength:

a. Unless otherwise indicated, minimum compressive strength at 28 days shall be 4,000 psi minimum.

b. Sidewalks, stairs and landings, pedestrian and vehicle ramps, and curbing: Minimum compressive strength at 28 days shall be 4,400 psi minimum.

2. Water/cement ratio: Maximum 0.45.

3. Air content by volume: 6 percent ± 1 percent, ASTM C231 (primary method) or ASTM C173 (secondary method).

4. Slump: no less than 2 inches, not greater than 4 inches, ASTM C143.

5. Standard Color: Natural light grey.

B. Aggregate

1. Coarse aggregate: ASTM C33. Broken stone or gravel consisting of clean durable fragments of uniform quality throughout. It shall be free from soft, disintegrated pieces, mud, dirt, organic or other injurious material. Coarse aggregate of a size retained on a 1-inch square opening sieve shall not contain more than 8% of flat or elongated pieces, whose longest dimension exceeds five times their maximum thickness.

2. Fine aggregate: ASTM C33. Sand consisting of clean, hard, durable, uncoated particles of quartz or other rock, free from lumps of clay, soft or flaky material, loam, organic or other injurious material. Fine aggregate shall contain not more than 3% of material finer than a #200 sieve, ASTM C117.

C. Water: Potable quality.

D. Admixtures

1. Concrete shall contain a water reducing agent, ASTM C494, to minimize cement and water content of the concrete mix at the specified slump.

2. Air-Entraining Admixtures: ASTM C260.

3. Pozzolan: Fly ash or other pozzolans used as admixtures shall conform to ASTM C618, Class C or Class F with 4 percent maximum loss on ignition. Pozzolan may be used to replace a maximum of 15 percent (15 %) of cement by weight.

4. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixtures other than those specified shall be used in the concrete without the specific written permission of Engineer in each case.

2.3 FORMS

A. Forms shall be substantially built and adequately braced so as to withstand the liquid weight of concrete without deforming. All linings, studding, walling and bracing shall be such as to prevent bulging, spreading, or loss of true alignment while pouring and displacement of concrete while setting.

B. All edge forms for sidewalk pavements, curbs and gutters shall be of sufficient rigidity and adequately braced to accurately maintain line and grade. Form work shall be designed so that sections may be fastened together to prevent vertical or horizontal movement of ends.

C. Forms for curved sections shall be so constructed and placed that the finish surface of walls and edge of sidewalks, curbs and gutters will not deviated appreciably from the arc of the curve.

D. Exposed vertical and horizontal edges of the concrete in structures shall be chamfered as indicated on the Drawings by the placing of moldings in the forms.

E. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Form work materials shall produce a smooth, continuous, straight, and level surface.

1. Plywood shall be APA A-A, A-B or A-C, Class 1, Exterior Grade. Thickness shall be as required to prevent movement or deformation but shall not be less than 5/8″ thick.

F. Forms for Non-Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Form work materials shall produce a generally smooth, continuous, straight, and level surface. Grain patterns or similar imperfections are acceptable. Lumber shall be dressed on at least two edges and one side.

1. Plywood shall be at least B-B, Class 1, Exterior Grade. Thickness shall be as required to prevent movement or deformation but shall not be less than 5/8″ thick.

G. Cylindrical Forms: Wax-impregnated strippable fiber forms or plastic, ABS or PVC, forms.

H. Form Ties: Provide prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, corner locks and other accessories as necessary.

I. Form Release Agent: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.

2.4 REINFORCEMENT MATERIALS

A. Reinforcing Bars: ASTM A615, Grade 60 unless otherwise indicated.

B. Galvanized Reinforcing Bars: ASTM A767, Class II with galvanizing before fabrication.

C. Weldable Reinforcing Bars: ASTM A706, Grade 60 unless otherwise indicated. Maximum carbon content shall be 0.55 percent.

D. Epoxy-Coated Reinforcing Bars: ASTM A775, Grade 60 unless otherwise indicated.

E. Steel Wire: ASTM A82, 16 gauge or heavier black annealed wire.

1. Ties for epoxy-coated bars shall be vinyl-coated or epoxy-coated.

2. Ties for zinc-coated bars shall be zinc-coated.

F. Welded Wire Reinforcement (WWR)

1. Sidewalks: Plain wire, ASTM A1064 as indicated on the Drawings.

2. Concrete Pavement: Plain wire, ASTM A1064 as indicated on the Drawings.

G. Supports for Reinforcement

1. Supports shall include bolsters, chairs, spacers, and other devices necessary for proper spacing, supporting, and fastening reinforcing bars and wire reinforcement in-place. Conform with CRSI Manual of Standard Practice for corrosion-resistant, plastic-protected wire, epoxy-coated, or stainless-steel supports.

2. For exposed-to-view concrete surfaces and where support legs are in contact with forms, provide supports with plastic protection (CRSI, Class1) or stainless steel protection (CRSI, Class 2).

H. Dowel Bars: Plain (smooth) high-chrome steel bar, ASTM A615 Grade 60 with full-length plastic sleeve as a combined unit, dimensions as indicated on the Drawings.

1. Where epoxy-coated dowels are called for: ASTM A1078.

I. Bar/Dowel Adhesive: Two component (1:1 ratio), 100% solids, high modulus, moisture-insensitive structural epoxy gel designed specifically for bonding bars, dowels, and bolts in concrete.

2.5 JOINT MATERIALS

A. Preformed Joint Filler Strips, Sidewalks and Concrete Paving.

1. Where no joint sealant is called-for: Nonextruding and resilient bituminous type conforming to ASTM D1751, 1/2-inch-thick, one piece for the full depth and width of the joint.

2. Where joint sealant is called-for: Nonextruding and resilient nonbituminous type conforming to ASTM D1752, Type I (sponge rubber) or Type II (cork), 1/2 inch thick, allowance for sealant at top and extending for the full depth and width of the joint.

B. Preformed Joint Filler Strips, General Use/Isolation Joints

1. Polyethylene, closed-cell expansion joint filler, ASTM D4819, Type II.

C. Joint Sealant Compound, ASTM C920

1. Self-Leveling (Type SL; Grade “P”)

    a. Cold-applied and self-leveling, Type S or Type M elastomeric polymer sealant.

2. Gun-Grade (Non-Sage; Grade “NS”)

    a. One-component (Type S) high-performance moisture-curing polyurethane sealant specifically formulated for bonding to masonry and concrete.

3. Traffic Bound areas: T sealant.

4. Non-Traffic Bound areas: NT sealant.

5. Color: As approved by Engineer.

6. Backer material: ASTM D5249, closed cell.

2.6 DETECTABLE WARNING PANEL

A. Surface-mount, UV-stabilized, polymer composite panel as indicated on the Drawings. Fasteners, adhesives, and sealants per manufacturer’s requirements. Panel shall comply with Connecticut Building Code/ADA Guidelines.

1. Color: As approved by Engineer.

2.7 CONCRETE BONDING MATERIALS

A. Aqueous-phase, film-forming, nonoxidizing, freeze and thaw-resistant compound suitable for brush or spray application conforming to ASTM C932.

B. Epoxy-Resin Adhesive Binder: Two-component, penetrating high solids, epoxy-based primer/bond coat, 100% solids, moisture-tolerant, ASTM C881, Types I, II, and V, Grade-2, Class C and AASHTO M-235.

2.8 CONCRETE CURING MATERIALS

A. Curing shall be by moist curing (preferred) or by use of curing compound. Sodium Silicate curing compounds shall be used where required by the weather, approved construction schedules and construction that is not adaptable to damp curing.

B. Curing compound shall be a resin-base, white pigmented compound, ASTM C309, Type 2.

C. Curing compounds shall contain a fugitive dye or when hot weather conditions dictate, a fugitive heat reflecting pigment.

D. Moisture-Retaining Cover:

1. Waterproof paper, ASTM C171, regular or white.

2. Polyethylene sheeting, ASTM C171.

3. Polyethylene-coated burlap consisting of a laminate of burlap and a white opaque polyethylene film permanently bonded to the burlap. Burlap: ASTM C171, Class 3. Polyethylene film: ASTM C171.

4. When tested for water retention in accordance with ASTM C156, weight of water lost 72 hours after application of moisture retaining covering material shall not exceed 0.039 gram per square centimeter of the mortar specimen surface.

E. Water: Potable Quality.

F. Membrane-Forming Curing Compound

1. Liquid type, ASTM C309, Type 1, clear, Type 2, white, pigmented.

2.9 BOND BREAKER

A. Asphalt felt conforming to ASTM D2626, Type I or 6-mil polyethylene sheeting, ASTM D4397.

2.10 SEALER

A. Consolideck® Saltguard® silane/siloxane water repellent and chloride screen as manufactured by Prosoco, Inc., 3741 Greenway Circle, Lawrence, KS 66046, or approved equal. Gloss or flat sealer type as selected by Owner.

PART 3 EXECUTION

3.1 GENERAL

A. Verify site conditions before proceeding with the work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any hazardous conditions and/or discrepancies.

B. Provide construction techniques in accordance with applicable provisions of ACI 224R, ACI 224.3R, and ACI 302.1R-04.

C. Engineer shall be notified of concrete placement sufficiently in advance of start of operation to allow their representative to complete preliminary inspection of the Work, including subgrade, forms, and reinforcing steel, if used.

D. Adjacent work, etc., shall be protected from stain and damage during entire operation. Damaged and stained areas shall be replaced or repaired to equal their original conditions at the contractor’s expense. No concrete walks shall be poured after 12 noon unless a guard is visibly stationed nearby to prevent graffiti. Contractor shall be responsible for replacing any graffiti if he fails to provide adequate protection.

E. Concrete surface shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect exposed surfaces.

F. Retempering of concrete is not permitted.

G. Contractor is responsible for the protection and resetting of all existing utility covers/castings to finish grade; as well as, setting all new utility covers/castings to finish grade prior to placement of concrete. The repair of any settlement, or protrusion above finish grade, shall be the responsibility of Contractor at no additional cost to Owner.

3.2 PREPARATION OF SUBGRADE

A. Compact and bring area to required subgrade elevation in accordance with Section 31 2310 – Earthwork. Provide for final fine grading, and compaction of areas as required to form a firm, uniform, accurate and unyielding subgrade at required elevations and to required lines.

B. Existing subgrade material, which will not readily compact as required, shall be removed and replaced with satisfactory materials in accordance with Section 31 2310 – Earthwork.

C. Subgrade of areas to receive concrete shall be recompacted as required to bring the top 8 inches of material, immediately below the base course, to a compaction at optimum moisture content of at least 95 percent (95%) of maximum density, as determined by ASTM D1557. Subgrade compaction shall extend for a distance of at least 1 foot beyond pavement edge.

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

E. Disposal of debris and other material excavated under this section, and material unsuitable for, or in excess of requirements for, completing work of this section shall be disposed of off-site.

F. Prepared subgrade shall be inspected and approved by Engineer Representative before installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the Specification.

3.3 AGGREGATE BASE COURSE

A. Prepare aggregate base course for concrete in accordance with Section 31 2310 – Earthwork and as shown on the Drawings.

B. Width of base course shall be greater than or equal to the width of concrete surface, if continuous lateral support is provided during rolling. The width of base course shall extend at least 2 x base thickness beyond the edge of the course above, if it is not so supported.

C. Aggregate shall be applied in lifts less than or equal to 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.

1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.

2. The base shall be wetted and rolled or tamped after the spreading of each lift.

3. Rolling shall begin at the sides and progress to the center of crowned areas, and shall begin on the low side and progress toward the high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.

4. Surface irregularities, which exceed 1/2-inch, as measured by means of a 10-foot long straightedge, shall be replaced and properly re-compacted.

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

E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and the area repaired.

F. Portions of subgrade, or of construction above, which become contaminated, softened, or dislodged by the passing of traffic, or otherwise injured, shall be cleaned, replaced, or otherwise repaired to conform to the requirements of this specification before proceeding with the next operation.

3.4 FORMS

A. Forms shall be securely staked, braced and held firmly to the required line and grade and shall be sufficiently tight to prevent leakage of mortar. All forms shall be cleaned and oiled or wetted before concrete is placed against them.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Complete and approve formwork. Remove debris and foreign material from interior of forms before start of concrete placing.

D. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

E. The maximum cross slope for sidewalks shall be 2.0 percent, sloped towards the gutter. Verify formwork prior to concrete placement. Make corrections as required and bring discrepancies to attention of Engineer.

3.5 JOINTS

A. Locate joints as located on the Drawings, as shown on Engineer-approved joint plan. Conform with applicable sections of ACI 224.3R.

B. Construction Joints: Effected at the end of a pour, lift, or at the end of a day's concrete placement. This type of joint is a plane surface between two distinct sections of concrete.

1. Construction Joints shall be ½ inch wide and full-depth of slab.

2. Joint filler: Unless otherwise specified, Construction Joints shall be constructed with joint filler. Joint filler shall extend the full depth of the slab and shall extend the full length of the joint. Use of multiple pieces of joint material of lesser dimensions to make up required depth and width of joint will not be permitted.

3. Where joints are to receive filler, recess joint filler 1/4-inch below finish surface or as otherwise indicated on the Drawings.

4. Where called-for on the Drawings, install dowels at Construction Joints.

C. Isolation Joints: Installed at intersections of structures on any type including but not limited to buildings, walks with steps, pre-cast concrete curb, light foundations, walls, pads, slabs at footings, or other structures. Isolation Joints shall not be required where concrete flatwork abuts granite curbing.

1. Isolation Joints shall be ½ inch wide.

2. Joint Filler: All Isolation Joints shall be constructed with joint filler. Joint filler shall extend the full depth of the slab and shall extend the full length of the joint. Use of multiple pieces of joint material of lesser dimensions to make up required depth and width of joint will not be permitted.

3. Where joints are to receive filler, recess joint filler 1/4-inch below finish surface or as otherwise indicated on the Drawings.

D. Control/Contraction Joints: Installed to form a weakened plane in a concrete member to provide a reduction in member thickness for the purpose of controlling shrinkage stresses to that specific area. Control/Contraction Joints shall be synonymous with "Dummy Joints."

1. Control/Contraction Joints shall be tooled or saw-cut.

a. Tooled joints: Tool-form joint into the concrete 1 inch in depth, but in no case less than 25 percent of slab depth. Joint width shall be 1/4-inch. Each side of tooled joint shall be dressed to match final overall slab finish. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab, but before the slab has achieved its final set.

1) Where tooled joints are to receive joint sealant, provide 1/2-inch wide tooled joint and install backer rod material to create 1/4-inch recess below finished surface.

b. Saw-cut joints: Saw-cut joint into concrete 1 inch in depth, but in no case less than 25 percent of slab depth. Joint width shall be 1/8-inch. Cut joint using rotary saw within 4 to 12 hours after the concrete has been finished.

3.6 STEEL REINFORCEMENT

A. Install steel reinforcement as shown on the Drawings in accordance with ACI 318.

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

C. Welded Wire Reinforcement

1. Where WWR is called-for, install material in the upper 30 to 40 percent (30%–40%) of the overall slab thickness, or at the nearest depth below top of slab as required to achieve a minimum of 2-inches of cover.

2. Adjacent sheets of welded wire reinforcement shall lap 6 inches.

D. Reinforcing bar

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

2. Minimum Cover: 2 inches, except where concrete is cast against and permanently exposed to earth minimum cover shall be 3 inches.

3. For slab-type construction, reinforcing bars shall be elevated off the base material by use of supports as specified herein.

4. Adjacent reinforcement bars shall lap a distance equivalent to 40 bar diameters. All laps shall be tied.

E. Joints

1. Construction Joints: Reinforcement shall not continue through construction joints. Allow for 2-inches of cover at end of slab. Where called-for on the Drawings, install pins at Construction Joints per detail.

2. Isolation Joints/Expansion Joints: Allow for 2-inches of cover at end of slab.

3. Control/Contraction Joints: Cut at least one-half of reinforcement at joints.

F. Reinforcing shall be securely wired in the position called for, and shall be maintained in that position until concrete is placed and compacted.

3.7 PLACEMENT

A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint, and other material which might tend to reduce bond.

B. Existing concrete, earth, forms, and other water-permeable material against which new concrete is to be placed and shall be thoroughly damp when concrete is placed. There shall be no free water on the surface.

C. Concrete shall arrive at the job site in a timely manner so that no additional water will be required to produce the desired slump. When conditions develop that require the addition of water to produce the desired slump, permission of the Engineer must be obtained. The concrete shall be transported from the mixer to its place of deposit by a method that will prevent segregation or loss of material.

D. Concrete, which has set, or partially set, before placement shall not be employed.

E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.

F. Concrete shall be thoroughly spaded and tamped to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

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

3.8 FINISHING

A. Concrete flatwork surfaces shall be screened off and finished true to line and grade, and free of hollows and bumps. Surface shall be dense, smooth, and at exact level and slope required.

1. Finished concrete surface for concrete subbase shall be woodfloated to a slightly rough surface. Surface shall not deviate more than 1/4-inch in 10 feet.

2. Finished concrete surface for concrete pavement, walks, and pads shall be wood-floated and steel troweled to a smooth surface. Surface shall not deviate more than 1/8-inch in 10 feet.

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

C. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a ¼ inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall be same time be finished to a ¼ inch radius.

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

3.9 CURING

A. Cure in accordance with ACI 308R.

B. Concrete shall be kept damp from time of placement until the end of the specified curing period.

C. Water shall not be applied to curing concrete within 24 hours after initial placement. Any water shall be applied only to maintain damp conditions. Do not add water during floating and troweling operations.

D. Between finishing operations, the surface shall be protected from rapid drying by covering with a material specified herein. Surface shall be damp when the covering is placed over it, and shall be kept damp by means of fine-spray of water, applied as often as necessary to prevent drying after the initial 24-hour cure period.

E. Concrete surfaces shall be cured by completely covering them with curing paper or an application of a curing compound.

1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period surface shall be checked frequently and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.

2. If concrete is cured with a curing compound, the compound shall be applied at a rate of 200 square feet per gallon, in two applications perpendicular to each other.

3. Concrete curing period shall be seven days minimum and considered full-strength after 28 days.

F. Only if additional protection is required, the surface should remain uncovered for at least four days, after which time new, unwrinkled, non-staining, reinforced, waterproof Kraft curing paper may be used.

3.10 COLD WEATHER CONCRETING

A. Comply with ACI 306R Guide to Cold Weather Concreting.

B. Materials for concrete shall be heated for concrete, which is mixed, placed or cured when the mean daily temperature is below 40 degrees F or is expected to fall below 40 degrees F within 72 hours. The concrete, after placement, shall be protected by covering, heat, or both.

C. Details of handling and protecting concrete during freezing weather shall be subject to the approval of Engineer.

3.11 HOT WEATHER CONCRETING

A. Comply with ACI 305R: Guide to Hot Weather Concreting.

B. Concrete just placed shall be protected from the direct rays of the sun. Just prior to placement, forms and reinforcement shall be sprinkled with cold water. Every effort shall be made to minimize delays that will result in excessive mixing of the concrete after arrival on the job.

C. During periods of excessively hot weather (95□F, or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305R. Any concrete with a temperature below 95□F, when ready for placement, will not be acceptable, and will be rejected.

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

3.12 PROTECTION

A. Concrete surface shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, ½ inch thick plywood sheets shall be used to protect the exposed surface.

3.13 CLEAN UP

A. Remove all debris, residuals, and materials at the conclusion of the work. Dispose of all materials in accordance with applicable waste management regulations.

3.14 SEALANT

A. Apply concrete sealer to sidewalks, steps, and pads after cure period in accordance with manufacture's guidelines.

END OF SECTION

DIVISION 11
EQUIPMENT

SECTION 11 6800

PLAYGROUND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. This section consists of installation of Owner supplied playground equipment. Contractor shall be responsible for site installation of these items and for furnishing and installing footings, anchors, fasteners, touch-up, repair and other accessory items as required.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Safety Standards & Guidelines: All public playground equipment supplied shall meet all applicable provisions of the following:

C. "Handbook for Public Playground Safety" published by the Consumer Product Safety Commission (CPSC)

D. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

E. ASTM International (ASTM).

1. ASTM F1487-01 - Standard Consumer Safety Performance Specification for Playground Equipment for Public Use

2. ASTM F1951 - Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.

3. ASTM F2049 - Standard Guide for Fences/Barriers for Public, Commercial, and Multi-Family Residential Use Outdoor Play Areas.

4. ASTM C94- Standard Specification for Ready-Mixed Concrete.

F. Americans with Disabilities Act (ADA).

G. Quality Certification: All public playground equipment supplied shall be certified to ISO 9001 and IPEMA standards.

1.3 QUALIFICATIONS

A. Equipment Installer Qualifications: An experienced and certified installer who has completed work with similar equipment, materials, and design, and to the extent similar with this project and whose work has resulted in construction with a record of successful in-service performance. Contractor to provide a list of all subcontractors and their appropriate qualification. Installer shall follow manufacturer's instructions and installation documentation for all equipment.

1.4 DELIVERY, STORAGE AND HANDLING

A. The Owner will deliver equipment to the project site. Equipment shall be stored in original, unopened containers with labels intact when not being installed and protect during construction operations to prevent damage, theft, or vandalism.

B. Inspect parts within 24 hours of delivery, compare with manufacturers bill of material, and report any missing or non-conforming parts to manufacturer.

C. Damaged equipment shall not be installed. Contractor shall bear responsibility for damage to equipment once received from the Owner until final acceptance by Owner. Any installed equipment exhibiting damage shall be replaced or repaired to the satisfaction of Engineer, and Contractor shall assume all costs related thereto.

PART 2 PRODUCTS

2.1 FREESTANDING PLAY (2-5 YEARS)

A. Owner Supplied.

2.2 FREESTANDING PLAY (5-12 YEARS)

A. Owner supplied.

2.3 SWINGS (ALTERNATE 1)

A. Basis of Design: PowerScape Swing Model #81598 and Add-A-Bay Model #81599 as manufactured by GameTime or approved equal.

1. Eight foot tall structure with five inch diameter posts. Structure shall be powder coated steel. Color shall be selected from manufacturer’s standard colors.

B. Belt Swing Seat: Model #1481 as manufactured by GameTime or approved equal. Color shall be black.

1. Include anti-wrap and clevis swing seat package.

C. 5-12 Accessible Swing Seat: Model #8556 as manufactured by GameTime or approved equal. Color shall be selected from manufacturer’s standard colors.

D. Enclosed Tot Swing Seat: Model #1469 as manufactured by GameTime or approved equal. Color shall be black.

1. Include anti-wrap and clevis swing seat package.

PART 3 EXECUTION

3.1 INSPECTION

A. Prior to equipment installation, installer shall examine the substrates and conditions under which all equipment is to be installed and notify the owner's representative in writing of conditions detrimental to the proper, complete, and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Assemble all equipment that requires pre-assembly before installation begins.

B. Install equipment at the locations agreed upon. Install level, plumb, secure and in accordance with manufacturer's recommendations, directions, and detail drawings. Cooperate with other trades. Repair and replace damaged units as directed by the owner's representative.

C. Protect installed equipment from damage, blemishes, or indication of use until completion and acceptance of the project.

END OF SECTION

DIVISION 31
EARTHWORK

SECTION 31 2310

EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Preparation and grading subgrades for slabs-on-grade, walks, pavements, and landscaping.

2. Excavating and backfilling for structures.

3. Excavation and backfilling for underground utilities and associated appurtenances.

4. Excavation, backfill and compaction for the demolition/removal of subsurface utilities and improvements.

5. Earth retention systems.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 GENERAL

A. Contractor is advised that lines and grades, as shown on the Drawings, are subject to change. Although it is intended to adhere to what is shown on Drawings, Engineer reserves the right to make changes in lines and grades of utilities or other subsurface construction when such changes may be necessary or advantageous.

B. In open trenching on public roadways, Contractor shall be governed by the conditions, restrictions and regulations made by the local or state authority as applicable. All such regulations shall be in addition to those set down in the Specifications.

1.3 EXCAVATION CLASSIFICATIONS

A. Excavation - Excavation shall be unclassified and no consideration will be given to the nature of the materials. Excavation shall comprise and include the satisfactory removal and disposal of all materials encountered regardless of the nature of the materials and shall be understood to include but not limited to earth, fill, boulders, foundations, pavements, curbs, piping, cobbles, stones, footings, bricks, concrete, previously abandoned drainage structures and utility structures abandoned and not removed by the utility and debris.

B. Common Excavation - Excavation of all materials that can be excavated, moved, loaded, transported, and unloaded using heavy equipment or that can be excavated and dumped into place or loaded onto hauling equipment by excavation equipment (shovel, bucket, backhoe, dragline, or clam shell) or moved with dozer-type equipment, appropriate to the material type, character, and nature of the materials. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material. All Common Excavation shall be included in the Base Bid.

C. Rock Excavation - Rock Excavation as defined herein. The excavation and removal of isolated boulders or rock fragments larger than 1 cubic yard encountered in materials otherwise conforming to the definition of Common Excavation shall be classified as rock excavation. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

1.4 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020 and any supplements.

C. Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction

D. American Concrete Institute (ACI)

1. ACI 229R-99 - Controlled Low-Strength Materials (CLSM).

E. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO Method T 90 - Determining the Plastic Limit and Plasticity Index of Soils.

2. AASHTO T104 - Standard Method of Test for Soundess of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

3. AASHTO Method T146 - Standard Method of Test for Wet Preparation of Disturbed Soil Samples for Test.

F. ASTM International (ASTM).

1. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.

2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN-m/m3)).

4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

5. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

7. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.5 DEFINITIONS

A. Backfill: Soil material or flowable concrete used to fill an excavation.

B. Bedding Course: Layer placed over the excavated sub-grade in a trench before laying pipe.

C. Benching: A method of limiting cave-in potential by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Clearing: Clearing shall consist in the felling, cutting up, and satisfactory disposal of trees and other vegetation designated for removal in accordance with these specifications.

F. Drainage Course: Layer supporting basement grade used to minimize capillary flow of pore water.

G. Earth Retention Systems: Any structural system, such as sheeting and bracing or cofferdams, designed to retain in-situ soils in place and prevent the collapse of the sides of an excavation in order to protect employees and adjacent structures.

H. Excavation: Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

1. Additional Excavation: Excavation beyond required dimensions or below subgrade elevations that is requested and/or directed by Engineer. Additional Excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.

3. Unauthorized Excavation: Excavation below the elevations specified on the plans, beyond the limits indicated on the plans, or where no dimensions are indicated, beyond depths, elevations, and dimensions reasonably necessary for construction of the work without the request and/or direction of the Engineer. Unauthorized excavation, as well as any remedial work directed by Engineer, or if applicable Geotechnical Engineer, shall be without additional compensation.

I. Fill: Soil materials used to raise existing grades.

J. Finished Grade: The proposed final elevations shown on the Drawings or called for in the Specifications.

K. Geotechnical Engineer: A qualified and licensed entity designated for the project as the authority on the assessment, design, and oversight of soil and/or rock conditions and construction affected by such conditions.

L. Geotechnical Testing Agency: An independent testing agency employed by Owner, or by Contractor is called-for, and qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

M. Grubbing: Grubbing shall consist of the removal of roots 1 ½ inch and larger, organic matter and debris, and stumps having a diameter of three inches or larger, to a depth of at least 18 inches below the surface and or subgrade; whichever is lower, and the disposal thereof.

N. Protective System: A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include earth retention systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

O. Regular Excavation: Removal and disposal of any and all material above subgrade elevation, except solid rock and undercut excavation, located within the limits of construction.

P. Rock: Solid ledges, bedded deposits, unstratified masses and conglomerations of material so firmly cemented as to possess the characteristics of solid rock which cannot be removed without systematic drilling or hoe ramming. All boulders containing a volume of more than one (1) cubic yard shall be considered rock.

Q. Rock Excavation: Removal and satisfactory disposal of Rock, which, in the opinion of Engineer, cannot be excavated except by drilling, wedging, jack hammering or hoe ramming or the excavation of boulders or rock fragments containing a volume of more than one (1) cubic yard. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

R. Licensed Professional Engineer: A person who is licensed as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

S. Satisfactory Materials: Earth material that meets the classification, use, and/or gradation requirements herein that does not contain limestone, shale, clay, ash, slag, friable material, organic or vegetative materials, topsoil, wood, trash, broken concrete, masonry rubble, trash, refuse, or frozen materials.

T. Shield System: A structure that is designed to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

U. Sloping: A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

V. 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.

W. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below drainage fill.

X. Surplus Material: Excavated acceptable material that cannot be utilized elsewhere on the site as backfill or embankment fill, or as otherwise directed by the Engineer.

Y. Temporary Dewatering System: A system to lower and control water to maintain stable, undisturbed subgrades at the lowest excavation levels. Dewatering shall be provided for all pipelines, structures and for all other miscellaneous excavations.

Z. Testing Laboratory: A qualified entity engaged to perform specific laboratory tests.

AA. Testing Agency: A qualified entity engaged to collect samples, perform specific in-field tests, and/or inspections. The Testing Laboratory may provide the services of the Testing Agency.

BB. Trench: A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.

CC. Unsatisfactory Material: Soil material that contains organic silt, peat, vegetation, wood or roots, stones or rock fragments over six (6) inches in diameter or exceeding 40 percent by weight of the backfill material, porous biodegradable matter, loose or soft fill, construction debris, or refuse, or material which cannot be compacted to the specified or indicated density.

1.6 SUBMITTALS

A. Testing Laboratory - Submit name and qualifications of commercial testing laboratory for Engineer's approval. Submit applicable documentation of credentials, licenses, etc.

B. Testing Agency - Submit name and qualifications of third-party in-field quality control Testing Agency for Engineer's approval. Submit applicable documentation of credentials, licenses, etc.

C. Site Characterization of Off-Site Borrow Sources: The following information shall be submitted to Engineer for review at least two weeks prior to use of an off-site borrow source:

1. Location and name of the borrow source site.

2. Owner and contact information for the borrow source site.

3. Present and past usage of the source site and materials.

4. Any previously existing report(s) associated with an assessment of the source site as relates to the presence of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

5. Location within the site from which the material will be obtained.

D. Chemical Testing Data: For each type/classification of earth material proposed and each source of earth material proposed: Submit a letter signed by an authorized representative of material supplier stating that such proposed material is free of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

E. Material Testing Data: Provide results for all proposed bedding, fill, aggregates, and backfill. Submit complete laboratory reports.

1. Gradation analysis.

2. Soil classification and Moisture-Dry Density Curve.

3. Loss on Abrasion.

4. Soundness.

F. Samples: 50-pound sample of each type of off-site bedding, fill, aggregates, and backfill that are proposed for use at the Project Site in an air-tight container for the testing laboratory, a minimum of two weeks prior to delivery of such material to the site. Use of these proposed materials by Contractor prior to testing and approval or rejection shall be at Contractor's risk.

G. Product Data

1. Plastic warning tape.

2. Separation fabric, filter fabric, geogrids, or similar geotextiles.

H. Field Testing Results

1. Compaction test results keyed to date and specific location of testing. Provide Engineer with copies of testing reports within 24 hours of field test.

1.7 SAFETY

A. Contractor shall conduct all excavation activities in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Contractor shall provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.8 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out

1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).

2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.

3. Not all subsurface facilities or structures will be identified through the Call-Before-You-Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Codes and Standards: Perform the work of this Section in accordance with all applicable codes, standards, and the requirements of authorities having jurisdiction.

D. Engineer reserves the right to perform all in-field testing specified in this Section and reserves the right to determine the suitability of all materials to be used for fills and reject any fill not meeting the specifications.

E. Field Density testing and subgrade observation shall be performed by the designated entity.

F. Weather Limitations:

1. Material excavated when frozen or when air temperature is less than 32 degrees Fahrenheit (32 F) shall not be used as fill or backfill until material completely thaws.

2. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

G. Vibration

1. Vibration producing activities such as operation of heavy construction equipment, vibratory compaction, etc. may be required. Contractor is advised that structures are located close to the proposed work and that construction activities shall be conducted so as to preclude damage to these structures and undue annoyance to occupants.

2. Contractor has liability for, and shall bear all costs associated with, any damage caused to existing structures, buildings and/or services as a result of any construction activity. This extends to responding to any claims of vibration-induced damage. It is Contractor’s sole decision how to manage the risk of vibration-induced damage, and what, if any, surveys, monitoring, or other activities are undertaken.

1.9 TESTING

A. All sampling and testing shall be the responsibility of Contractor via Testing Agency and Testing Laboratory as applicable. Contractor shall retain and pay for the services of such Testing Agency/Testing Laboratory to perform all pre-construction testing and field testing in accordance with applicable standards.

B. Borrow and Fill: Contractor shall provide testing as defined below.

1. Gradation analysis for each type of borrow and on-site fill materials by ASTM D422.

2. Soil classification (ASTM D2487) and Moisture-Dry Density Curve (Proctor Test-Modified) by ASTM D1557 for all proposed fill and backfill materials at the frequency specified below:

a. For suitable soil materials removed during Trench Excavation, perform one test for every 1,000 cubic yards of similar soil type. Similarity of soil types will be as determined by the Engineer.

b. For borrow materials, perform tests from each proposed source, at a rate of one test for every 1,000 cubic yards of soil type. Similarity of soil types will be as determined by the Engineer.

3. Loss on Abrasion: Where called-for, AASHTO Method T 96.

4. Soundness: Where called-for, AASHTO Method T 104.

C. Compaction Testing: Contractor shall conduct compaction testing (i.e. ASTM D2922 and ASTM D3017 or ASTM D1556) at the frequency indicated below.

1. Trench: 1 test per lift, every 1,000 square feet or 200 feet of trench.

2. Embankment: 1 test per lift, every 1,000 square feet.

3. Additional compaction testing may be required when there is evidence of a change in the quality of moisture control or the effectiveness of compaction.

4. If testing indicates that compacted fills are below specified density, additional compaction and/or replacement of material shall be provided at no expense to Owner.

D. Chemical Testing: Prior to delivery of any earth material to the Project Site, Contractor shall conduct chemical testing to demonstrate that such material is free of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

1.10 EXCAVATED MATERIAL

A. Placement

1. Excavated material shall be so placed as not to interfere with travel or movement on existing streets, driveways, sidewalks or other areas designated to remain undisturbed. Excavated material shall not be deposited on private property without the written consent of the property owner(s) and approval of Engineer.

2. No excavated material shall be stored on top of installed pipe, other subsurface construction, or within the drip-line of trees.

3. Contractor shall consider surcharge loads when stockpiling excavated material adjacent to excavations, and take any measure required to prevent cave-in, including but not limited to, excavation support systems and/or alternative stockpiling locations.

B. Satisfactory Material excavated at the Project Site may be used for Common Fill or Backfill on other parts of the Work, if specifically approved by Engineer. Engineer or Geotechnical Engineer shall determine what is Satisfactory Material or Unsatisfactory Material where questions arise.

C. Contractor shall be responsible for the proper disposal of all Unsatisfactory Material. Engineer or Geotechnical Engineer shall determine what is Satisfactory Material or Unsatisfactory Material where questions arise.

1.11 SHEETING, SHORING AND BRACING

A. Provide earth retention systems as required by federal, state and local regulations. Shoring and bracing of trenches and other excavations shall be in accordance with the latest OSHA Standards and interpretations, and all other applicable codes, rules and regulations of federal, state and local authorities.

1.12 DRAINAGE

A. At all times during construction, Contractor shall temporarily provide, place and maintain ample means and devices with which to remove promptly, and dispose of properly, all water entering trenches and other excavations, or water that may flow along or across the site of the Work, and keep said excavations dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be damaged. At the conclusion of the work, Contractor shall remove such temporary means and devices.

B. All groundwater which may be found in the trenches and foundation excavations, and any water which may get into them from any cause whatsoever, shall be pumped or bailed out, so that the trench shall be dry during pipe laying and backfilling and during the placement of concrete.

C. All water pumped or drained from the Work shall be managed in accordance with applicable discharge permits, without undue interference with other work or damage to pavements, other surfaces, or property.

1.13 COORDINATION

A. Prior to commencing earthwork operations, meet with representatives of governing authorities, Engineer, testing entity, and other pertinent entities.

1. Review earthwork procedures and responsibilities including Contractor's schedule of operations, scheduling observation and testing procedures and requirements.

2. Notify participants at least three (3) working days prior to convening conference. Record discussions and agreements and furnish copies to each participant.

3. Contractor shall at all times so conduct his work as to insure the least possible inconvenience to the general public and the residents in the vicinity of the work. Fire hydrants on or adjacent to the work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by Contractor to ensure the proper functioning of all gutters, sewer inlets, and drainage ditches, which shall not be obstructed except as approved by Engineer.

B. Benchmark/Monument Protection: Protect and maintain benchmarks, monuments or other established reference points and property corners. If disturbed or destroyed, replace at no cost to Owner.

C. Provide five (5) days advance notice to Engineer and testing entity for any proposed earthwork operation requiring observation and/or testing.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. All materials used in the work of this Section shall be Satisfactory Material, and any material that does not meet this classification shall be considered an Unsatisfactory Material and shall not be used.

B. Unsatisfactory Soils: Soil materials not meeting the requirements for Satisfactory Soils.

1. Unsatisfactory soils also include satisfactory soils not maintained within two (2) percent of optimum moisture content at time of compaction.

2.2 COMMON FILL/ORDINARY BORROW

A. Earth materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GP-GC, SW, SP, and SM that are free of clay and with less than twenty (20) percent of material by weight that passes the No. 4 sieve passing the No. 200 sieve.

B. Common Fill material is subject to the approval of Engineer and may be either material removed from excavations or borrow from off site. It shall have physical properties such that it can be readily spread and after it has been placed and properly compacted, it will form a dense, stable fill.

C. Common Fill shall not be used at locations where use of a specific earth material is called-for.

2.3 BANK RUN GRAVEL

A. Granular material, well graded from fine to coarse, obtained from approved natural deposits and unprocessed, except for the removal of unacceptable material and stones larger than the maximum size permitted.

B. Bank Run Gravel shall be graded as follows:

Gradation of Bank Run Gravel (ConnDOT Grading "C")

Sieve	Percent Passing by Weight
1 ½"	100
¾"	45-80
¼	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

2.4 GRANULAR FILL

A. Broken or crushed stone, gravel, or a mixture thereof.

B. Broken or crushed stone

1. The product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation. Broken or crushed stone shall consist of sound, tough, durable stone, reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces.

C. Bank or crushed gravel

1. Sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces and vegetable or other deleterious substances. Crushed gravel shall be the manufactured product resulting from the deliberate mechanical crushing of gravel with at least 50% of the gravel retained on the No. 4 sieve having at least one fractured face.

D. Granular Fill shall be graded as follows:

Gradation of Granular Fill (ConnDOT Grading "A")

Sieve	Percent Passing by Weight
3 ½"	100
1 ½"	55-100
1/4"	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

E. Reclaimed material shall not be considered acceptable for use as granular fill.

2.5 SCREENED GRAVEL AND CRUSHED STONE

A. Screened gravel, well graded in size from 3/8 inch to 3/4 inch. The gravel shall consist of clean, hard, and durable particles or fragments. Crushed rock of suitable size and grading may be used instead of screened gravel.

B. Screened Gravel shall be graded as follows:

Gradation of Screened Gravel (ConnDOT Gradation No. 6)

Sieve	Percent Passing by Weight
1”	100
3/4”	90-100
1/2”	20-55
3/8”	0-15
No. 4	0-5

2.6 SUBBASE

A. Bank or Crushed Gravel

1. Sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces. It shall be hard and durable enough to resist weathering, traffic abrasion and crushing.

2. Bank or crushed gravel for subbase shall be graded as follows:

Gradation of Bank or Crushed Gravel Subbase (ConnDOT Gradation “B”)

Sieve	Percent Passing by Weight
5”	100
3 1/2”	90-100
1 1/2”	55-95
1/4”	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

B. Crusher-Run Stone

1. Sound, tough, durable broken stone. It shall be reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces.

2. Loss on Abrasion: The crusher-run stone shall show a loss on abrasion of not more than fifty percent using AASHTO Method T 96.

3. Crusher-run stone shall for subbase shall be graded as follows:

Gradation of Crusher Run Stone Subbase (ConnDOT Gradation "A")

Sieve	Percent Passing by Weight
3 1/2"	100
1 1/2"	55-100
1/4"	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

2.7 PROCESSED AGGREGATE BASE

A. Coarse aggregates and fine aggregates shall be combined and mixed by approved methods so that the resulting material shall conform to the following gradation:

Gradation of Processed Aggregate Base

Sieve	Percent Passing by Weight
2 1/2"	100
2"	95-100
3/4"	50-75
1/4"	25-45
No. 40	5-20
No. 100	2-12

B. Coarse Aggregate: Either gravel, broken stone or a combination thereof. When tested by means of the Los Angeles Machine, using AASHTO Method T 96, the coarse aggregate shall not have a loss of more than 50%.

1. If gravel is used for the coarse aggregate, it shall consist of sound, tough, durable particles of crushed or uncrushed gravel or a mixture thereof, free from soft, thin, elongated or laminated pieces, lumps of clay, loam and vegetable or other deleterious substances.

2. If broken stone is used for the coarse aggregate, it shall consist of sound, tough, durable fragments of rock of uniform quality throughout. It shall be free from soft disintegrated pieces, mud, dirt, organic or other injurious material.

3. Soundness for Gravel and Broken Stone: When tested by magnesium sulfate solution for soundness using AASHTO Method T 104, the coarse aggregate shall show a loss of not more than 15% at the end of 5 cycles.

C. Fine Aggregate: Natural sand, stone sand, screenings or any combination thereof. The fine aggregate shall be limited to material 95% of which passes a No. 4 (4.75-mm) sieve having square openings and not more than 8% of which passes a No. 200 (75-μm) sieve. The material shall be free from clay, loam and deleterious materials.

1. Plasticity: When natural sand is used, the fine aggregate shall conform to the following:

    a. When the fraction of the dry sample passing the No. 100 mesh sieve is 4% or less by weight (mass), no plastic limit test will be made.

    b. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 4% and not greater than 8% by weight (mass), that fraction shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

    c. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 8% by weight (mass), the sample will be washed; and the additional material passing the No. 100 mesh sieve shall be determined by AASHTO Method T 146, except that the No. 100 mesh sieve will be substituted for the No. 40 mesh sieve where the latter is specified in AASHTO Method T 146. The combined materials that passed the No. 100 mesh sieve shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

2. Plasticity: When screenings or any combination of screenings and natural sand or any combination of stone sand and natural sand are used, the following requirements shall apply:

    a. When the fraction of the dry sample passing the No. 100 mesh sieve is 6% or less by weight (mass), no plastic limit test will be made.

    b. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 6% and not greater than 10% by mass, that fraction shall not have sufficient plasticity to permit the performing of the plastic limit test, using AASHTO Method T 90.

    c. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 10% by weight (mass), the sample shall be washed; and additional material passing the No. 100 mesh sieve shall be determined by AASHTO Method T 146, except that the No. 100 mesh sieve shall be substituted for the No. 40 mesh sieve where the latter is specified in AASHTO Method T 146. The combined materials that have passed the No. 100 mesh sieve shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

2.8 BEDDING

A. Slabs on grade

1. Granular Fill unless otherwise indicated.

B. Utilities

1. Unless otherwise indicated, bedding shall consist of screened gravel, maximum size 3/4 inches and minimum size 3/8 inches.

2. Unless otherwise indicated, naturally or artificially graded mixture of natural or crushed gravel, crushed stone and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

3. When clay, wet, soft or silty soil conditions prevail, 3/4-inch crushed stone shall be used for bedding of pipe.

2.9 SAND

A. Sand shall consist of clean, hard, durable, uncoated particles of quartz or other rock. It shall not contain more than 3% of material finer than a #200 sieve.

B. Organic Impurities: Fine aggregate subjected to the colorimetric test shall not produce a color darker than Gardner Color Standard No. 11, using AASHTO T 21. If the fine aggregate fails to meet this requirement, the provisions of AASHTO M 6, Section 5.2, will govern.

C. Sand shall be uniformly graded as follows:

Gradation of Sand

Sieve	Percent Passing by Weight
3/8”	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

D. The above gradation represents the extreme limits which shall determine suitability for use from all sources of supply. The gradation from any one source shall be reasonably uniform and not subject to the extreme percentages of gradation specified above. For the purpose of determining the degree of uniformity, a fineness modulus determination will be made upon representative samples from any source. Fine aggregate from any one source having a variation in fineness modulus greater than 0.20 either way from the fineness modulus of the representative sample will be rejected.

2.10 FLOWABLE CONCRETE FILL/BACKFILL (FLOWFILL)

A. Cementitious material, ACI 229R, comprised of cement, aggregates, fly ash, water, and admixtures, capable of being poured or pumped, self-leveling, self-curing to specified strengths.

B. Excavatable flowfill: Concrete strength shall be liquid enough to flow, be self-leveling and excavatable by hand methods. Unless otherwise specified, excavatable flowfill shall have a minimum 28 day compressive strength of 30 psi, and shall not exceed 100 psi.

C. Non-excavatable flowable: Concrete strength shall be liquid enough to flow and be self-leveling and excavatable by machine equipment. Unless otherwise specified, non-excavatable flowfill shall have a minimum 28-day compressive strength of 125 psi, and shall not exceed 200 psi.

2.11 DETECTABLE WARNING TAPE

A. Acid and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric power lines, electric power conduits and other electric power facilities.

2. Yellow: Gas, oil petroleum products, steam, compressed air, compressed gas and all other hazardous materials.

3. Blue: Water.

4. Orange: Communication lines or cables, including but not limited to telephone, fire signals, cable television, and electronic controls.

5. Green: Storm drainage and sanitary sewer systems, including force mains and other non-hazardous materials.

6. Brown: Chilled Water and Other.

PART 3 EXECUTION

3.1 PREPARATION

A. Notify “Call-Before-You-Dig” to request a utility mark-out for the Project Site prior to any earth disturbance. Provide written confirmation to Engineer that such mark-out has been completed.

B. Verify site conditions before proceeding with demolition work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any discrepancies or hazardous conditions.

C. Take precautions for preventing injuries to persons or damage to property in or about the work. Protect structures, utilities, sidewalks, pavements and other improvements from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

D. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

E. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

F. When excavations are to be made in paved surfaces, the pavement shall be removed so as to provide a clean uniform edge with a minimum disturbance of remaining pavement. Saw cutting the pavement to provide a clean, uniform edge shall unless otherwise indicated.

G. If pavement is removed in large pieces, it shall not be mixed with other excavated material, but shall be disposed of away from the site of the Work before the remainder of the excavation is made.

3.2 CLEARING AND GRUBBING

A. Clear, grub, remove, and dispose of all vegetation and debris within the limits of construction, as designated on the plans or as required by Engineer. Contractor shall remove only those trees and shrubs absolutely necessary to allow for the construction. The work shall also include the preservation from injury of defacement of all vegetation or object designated to remain.

3.3 PROTECTION OF EXISTING FEATURES

A. General

1. Protect all existing improvements from damage unless those improvements are specifically designated for permeant removal, relocation, or temporary removal and replacement.

2. As excavation approaches underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools.

3. Pavements: On paved surfaces to remain, do not use or operate tractors, bulldozers, or other power operated equipment, the treads or wheels of which are so shaped as to cut or otherwise damage such surfaces. All surfaces, which have been damaged by Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration.

B. Utilities

1. Existing utilities remaining in service, including those remaining in service until after relocation, and relocated utilities shall be protected from damage. Before excavating near any existing utilities, notify the utility owner, coordinate protective work and comply with the utility owners' requirements. Coordinate with respective utility owners/operators as required.

2. Safeguard and protect from damage or movement any existing services, utilities, and utility structures uncovered or encountered which are to remain in service.

3. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs.

4. Where known utilities are encountered, notify Engineer and document location and type of utility before proceeding with work in such area.

5. When uncharted or incorrectly charted piping or utilities are encountered during excavation, stop work and notify Engineer immediately. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

C. Retaining Structures: Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utility systems, paving, or other improvements. Assume responsibility for the strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto. Retain the services of a licensed engineer as required to design bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures.

D. Replacement and Relocation

1. In case of damage, Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. When the Owner does not wish to make the repairs themselves, all damage shall be repaired by Contractor, or, if not promptly done by him, Engineer may have the repairs made at the expense of Contractor.

2. If certain existing structures are encountered that in the opinion of Engineer require temporary or permanent relocation or removal, Engineer may order in writing that Contractor undertake all or part of such work or to assist the Owner in performing such work. For such occurrences, Contractor shall be compensated as applicable, as extra work.

3. In removing existing structures, Contractor shall use care to avoid damage to the material, and Engineer shall include for payment only those new materials, which, in his judgment, are necessary to replace those unavoidably damaged.

4. The structures to which the provisions of the preceding two paragraphs shall apply include structures which (1) are not indicated on the Drawings or otherwise provided for, (2) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (3) in the opinion of Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced. (See Item 3.19, "Sub Surface Obstructions" also).

3.4 DEWATERING

A. Comply with all applicable permit requirements.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrade and from flooding Project site and surrounding area.

C. Protect sub-grades from softening, undermining, washout and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Install de-watering system to keep subgrades dry and convey ground water away from excavations.

3.5 EXCAVATION

A. Dust Control: During the progress of the Work, Contractor shall conduct his operations and maintain the area of his activities in order to minimize the creation and dispersion of dust. Refer to Section 01 5714- Temporary Dust Control.

B. Excavate to the exact elevations shown on the plans, or as directed by Engineer. Where no dimensions are indicated, make excavations in such manner, and to such depths, elevations, and dimensions, that will give suitable room for construction of the work indicated on the Drawings. As applicable for utility installations, comply with trench limits shown on the Drawings.

C. Furnish and place all sheeting, bracing, and supports, and render the bottom of the excavation firm and dry, and in all respects, acceptable for construction of the work.

D. If Contractor excavates below the elevations specified on the plans, beyond the limits indicated on the plans, or where no dimensions are indicated, beyond depths, elevations, and dimensions reasonably necessary for construction of the work, Contractor shall bring the excavation back to the proper elevation and/or dimension by backfilling with Suitable Material that is approved by Engineer in accordance with the backfilling provisions specified herein. Engineer, or if applicable Geotechnical Engineer, shall have sole authority in determining the specific composition of such Suitable Material.

1. Any increase in cost resulting from Unauthorized Excavation, including but not necessarily limited to backfilling, haul-off, increasing the size of footings or foundations, testing, schedule impact, or administrative impact shall be at Contractor's sole expense.

E. If utilities are to be laid in new embankments, or other new fill areas which are more than 12 inches deep below the invert of the pipe, the fill material shall be placed and properly compacted to final grade or to a height of at least 3 feet above the top elevation of the pipe, whichever is the lesser, before laying pipe. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.

3.6 TRENCH EXCAVATION

A. In general, trenches shall be excavated to such depth as will provide a cover depth as indicated on the Drawings from finished grade to the top of the pipe barrel. Deeper trenches shall be provided where necessary on account of the conformation of the ground and to permit the alignment of the pipe without undue deflection of joints.

B. Trenches shall be excavated by hand or machinery to the width and depth indicated on the Drawings and specified herein. Depth shall account for thickness of the pipe and thickness of bedding. All loose materials shall be removed from the bottom of the trench so that the bottom of the trench will be in an undisturbed condition.

C. If in the opinion of Engineer, the material at or below the depth to which excavation for structures and pipes would normally be carried is unsuitable for foundation, it shall be removed to such widths and depths as directed and replaced with suitable material.

D. Trench widths shall be 3 feet greater than the nominal inside diameter of pipe for such diameters of 36 inches or less. For diameters greater than 36 inches, the width shall be 4 feet greater than nominal inside diameter. Trench excavation for manholes, catch basins, drop inlets, etc. shall be two (2) feet outside the neat lines of the foundations. These limits may be adjusted for field conditions at the direction of Engineer.

E. Bedding for pipe and utility structures will be as detailed on the Drawings.

3.7 APPROVAL OF SUBGRADE

A. Notify Engineer, and Geotechnical Engineer if applicable, when excavations have reached required subgrade elevation.

B. If Engineer and, if applicable, Geotechnical Engineer determines that Unacceptable Material is present, continue excavation of such Unacceptable Material and replace with approved Satisfactory Materials as directed. The replacement of Unacceptable Material with Satisfactory Materials will be paid for as a change in the work according to applicable provisions of the contract.

C. Protect subgrade from disturbance at all times. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water or construction activities, as directed by Engineer. Excavation and replacement with structural fill of any disturbed or softened materials resulting from inadequate preparation, inadequate dewatering, or inadequate protection, shall be at Contractor's sole expense.

3.8 TUNNELING

A. In general, excavation shall be made in open cut from the surface and Contractor shall not be allowed to do any tunneling without obtaining permission from Engineer, and then only according to methods approved by him, and at no additional cost to the Owner. This permission will only be given where a line is to be laid to a point behind the curb, across a paved street, or where, in the opinion of the Engineer, it is necessary to tunnel short sections on account of proximity of adjacent walls, utilities, structures, to avoid important roots of trees or large masses of roots, or to ensure against root damage endangering the life of trees near the pipeline location. Such excavations then can be made in alternate sections of open cut and tunnel, the length of the tunnel sections to be specified by Engineer. These tunnel sections shall be cut underneath to a wedge with its edge horizontally across the pipe, and backfilled tightly by ramming and tamping from each end.

3.9 FILL AND BACKFILL

A. Fill: Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas upon which embankments will be built or material will be placed as fill to adjust subgrade prior to final grading. The subgrade shall be prepared by forking, furrowing, or plowing such that the first layer of the new material placed thereon, will be well bonded to it.

B. Backfill: Common Fill material may be used as backfill when indicated on the Drawings or when authorized by Engineer (or as applicable Geotechnical Engineer) if Contractor can achieve required minimum dry density after compaction. Backfilling shall be done as promptly as is consistent with non-injury to pipe or structures, but no backfilling shall be done before Engineer (or as applicable Geotechnical Engineer) gives permission.

C. Frozen material shall not be placed in any fill or backfill, nor shall any fill or backfill be placed upon frozen material. Previously frozen material shall be removed, or shall be otherwise treated as required, before new fill or backfill is placed.

D. After the subgrade has been prepared, fill material shall be placed thereon and built up in successive layers not exceeding twelve (12) inches before compaction until it has reached the required elevation.

1. When gravel fill or other material is used for foundation of structures, it shall be spread in layers of uniform thickness not exceeding six (6) inches before compaction.

E. Upon completion of filling and backfilling, all surplus material shall be removed and surfaces to remain which are affected in any way by the work restored to the condition in which they were before ground was broken. All surplus materials shall become the property of Contractor. If Contractor fails to promptly remove such surplus materials, Engineer may have the same done and charge all associated costs to Contractor, including deduction from payments due.

3.10 BACKFILLING UTILITIES

A. As soon as practical after utility has been placed into bedding and joints properly made, backfilling shall begin, and shall continue without delay.

B. Placement of bedding over pipe prior to placement of backfill shall be as indicated on the Drawings. Hand-place bedding at the sides of the pipe and to the limits indicated on the Drawings over the pipe. Bedding placed over pipe shall be in 6-inch layers, leveled along the length and width of the trench and thoroughly compacted with approved tampers.

C. Install warning tape as indicated o the Drawings unless otherwise specified by the utility owner/operator.

3.11 BACKFILLING AT STRUCTURES

A. No backfill shall be deposited against concrete until the concrete has obtained sufficient strength to withstand the earth pressure placed upon it and in no case less than seven days, nor before carrying out and satisfactorily completing the tests for watertight structures specified elsewhere.

B. Prior to placing backfill, subgrade shall be thoroughly compacted. Soft or loose material evident during compaction shall be removed and replaced with Granular Fill or other approved fill material.

C. Fill placed around arches, rigid frames, box culverts and piers shall be deposited on both sides of the structure to approximately the same elevation at the same time. Each layer of backfill shall be spread to a thickness not exceeding 6 inches deep after compaction and shall be thoroughly compacted by the use of power rollers or other motorized vehicular equipment, by tamping with mechanical rammers or vibrators, or by pneumatic tampers. Any equipment not principally manufactured for compaction purposes or which is not in proper working order in all respects shall not be used within the area described above.

D. Bring backfill to sub-grade elevations. Slope backfill at exterior of building to drain water away from building.

3.12 COMPACTION

A. Each layer of fill or backfill material shall be compacted by the use of compaction equipment consisting of rollers, compactors or a combination thereof. Earth-moving and other equipment not specifically manufactured for compaction purposes will not be considered as compaction equipment. At such points as cannot be reached by mobile mechanical equipment, or where such equipment is not permitted, the materials shall be thoroughly compacted by the use of suitable power- driven tampers.

B. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or application of water, to compact it properly. At such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.

C. Special attention shall be given to compaction in places close to walls where motorized vehicular compaction equipment cannot reach. Within 3 feet of the back face of walls and within a greater distance at angle points of walls, each layer of backfill shall be compacted by mechanical rammers, vibrators or pneumatic tampers.

D. Each layer of fill or backfill shall be compacted at optimum moisture content. No subsequent layer shall be placed until the specified compaction is obtained for the previous layer.

E. Compaction Density: Compaction density shall be expressed as a percentage of maximum dry density at optimum moisture content according to ASTM D 1557 Method C. Density indicated is minimum required.

1. Under structures, building slabs, and steps: 95 %

2. At building foundations: 95 %

3. Utilities, below pipe centerline: 95%

4. Utilities below unpaved surface, above pipe centerline: 92%

5. Utilities below paved surface, above pipe centerline: 95%

6. Embankments: 92%

7. Landscaped areas: 85 %.

8. Natural grass athletic fields and similar recreational fields: 93%

3.13 SUBSURFACE OBSTRUCTIONS

A. As a general rule, sub-surface obstructions encountered along the route of the pipeline shall be considered as follows:

1. Crossing Obstruction: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of 20 degrees or greater to the centerline of the pipe being installed shall be considered as crossing obstructions and shall be protected, or repaired or replaced if damaged, or relocated, all at no additional cost to the Owner.

2. Interfering Obstructions: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of less than 20 degrees, but more than 5 degrees to the centerline of the pipe being installed, shall be considered as interfering obstructions. Costs for supporting such obstructions in place during installation of the new pipe shall be paid for by the Owner. Costs for supporting interfering obstructions shall not be construed to include any costs for excavation. Repairing or replacing damaged interfering obstructions, or relocation shall be accomplished at no additional cost to the Owner.

3. Parallel Obstructions: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of 5 degrees or less, or is truly parallel and less than 0.5 feet offset from outside the normal trench limits, as specified in Subarticle 3.5 B. of this Section, of the pipe being installed, shall be considered parallel obstructions. Costs for supporting such obstructions in place during installation of the new pipe, including excavation, may be paid for by the Owner, or Owner may elect to pay for the cost of replacing such obstructions. Should Owner first elect to pay the cost of supporting the obstruction and then elect to pay the cost of replacing the obstruction, approved costs for supporting the obstruction, including excavation, incurred prior to electing replacement costs shall also be paid. After Owner elects to pay replacement costs, only replacement costs will be paid for all additional work in the vicinity of the parallel obstruction.

4. Angle measurement between centerline of obstructing pipe, conduit, wire, etc. and centerline of the pipe being installed shall be taken from between the horizontal projection of the centerlines at ground surface. Parallel offset distance between centerline of obstructing pipe, conduit, wire, etc. and the outside of normal trench limits of the pipe being installed shall be taken from between the horizontal projection of the centerlines and outside trench limit at ground surface.

END OF SECTION

SECTION 31 2543

GEOTEXTILES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnishing and installation geotextile materials for the separation of earth materials.

2. Furnishing and installation geotextile materials for the stabilization of earth materials.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020 and any supplements.

B. ASTM International (ASTM).

1. ASTM D4355 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.

2. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

3. ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

4. ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

5. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.

6. ASTM D4873 – Guide for Identification, Storage, and Handling of Geotextiles.

7. ASTM D6241 – Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

8. ASTM D6706 – Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil.

C. Code of Federal Regulations (CFR)

1. 29 CFR Part 1926 Subpart P – OSHA Excavation Regulations 1926.560 through 1926.562 including Appendices A through F.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section.

1.4 SUBMITTALS

A. Submit to Engineer for approval material specifications, manufacturer's product data, manufacturer's installation guidelines, and shop drawings for all materials furnished under this Section.

B. Connection details for geotextile.

C. Proposed mechanical connection devices.

1.5 DELIVERY, STORAGE AND HANDLING

A. Geotextile labeling, shipment, and storage shall follow ASTM D4873. Product labels shall be clearly labeled and/or marked to specifically identify each product and clearly show the manufacturer's name, style name, and roll number.

B. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants. Protect rolls from crushing or abrasion during shipping and hauling.

C. Geotextile shall be stored on a prepared surface (not wooden pallets) and should not be stacked more than two rolls high. Storage shall be such that the geotextile is protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, excessive heat or cold, or other damaging circumstances. Temporary storage at the Project Site shall be away from standing water such that crushing or flattening of roll goods does not occur.

PART 2 PRODUCTS

2.1 SEPARATION GEOTEXTILE

A. Separation Geotextile shall be utilized to separate layers of earth materials in utility trenches, drains, layered systems and similar installations in a non-structural configuration.

1. Composition: Woven geotextile made of 100% polypropylene slit film yarns.

2. Physical properties:

Mechanical and Physical Properties of Separation Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength, Ultimate	ASTM D4632	Pounds	120
Grab Tensile Strength, Elongation at Ultimate	ASTM D4632	Percent (%)	50
Trapezoid Tear Strength	ASTM D4533	Pounds	50
CBR Puncture Strength	ASTM D6241	Pounds	310
Apparent Opening Size (AOS)	ASTM D4751	(U.S. Sieve)	70
Permittivity	ASTM D4491	sec^{-1}	1.7
Flow Rate	ASTM D4491	$gal/min/ft^2$	135
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70

2.2 LIGHT-DUTY STABILIZATION GEOTEXTILE

A. Light-Duty Stabilization Geotextile shall be utilized under temporary sidewalks and unit pavers when called-for.

1. Composition: Woven geotextile made of 100% polypropylene slit film yarns.

2. Physical properties:

Mechanical and Physical Properties of Light-Duty Stabilization Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Tensile Strength @2% Strain (MD/CD)	ASTM D4595	Pounds/foot	600/600
Tensile Strength @5% Strain (MD/CD)	ASTM D4595	Pounds/foot	1620/1620
Flow Rate	ASTM D4491	$Gal/min/ ft^2$	70
Permittivity	ASTM D4491	sec^{-1}	90
Apparent Opening Size (AOS)	ASTM D4751	(U.S. Sieve)	40
Interaction Coefficient	ASTM D6706	-	0.89
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	90

MD – Machine Direction
CD – Transverse (Crosswise) Direction

2.3 STABILIZATION GEOTEXTILE

A. Stabilization Geotextile shall be utilized for stabilization of subgrades where unsuitable subsurface soil conditions are present. Stabilization geotextile shall only be utilized with the approval of Engineer.

1. Composition: Woven geotextile made of 100% polypropylene slit film yarns.

2. Physical properties:

Mechanical and Physical Properties of Stabilization Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength, Ultimate (MD/CD)	ASTM D4595	Pounds/foot	7200/5760
Tensile Strength at 2% Strain	ASTM D4595	Pounds/foot	1370/1560
Tensile Strength at 5% Strain	ASTM D4595	Pounds/foot	3600/3600
Tensile Strength at 10% Strain	ASTM D4595	Pounds/foot	6600/5760
Flow Rate	ASTM D4491	Gal/min/ ft^2	15
Permittivity	ASTM D4491	sec^{-1}	0.23
Apparent Opening Size (AOS)	ASTM D4751	(U.S. Sieve)	20
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	80

MD – Machine Direction
CD – Transverse (Crosswise) Direction

PART 3 EXECUTION

3.1 GENERAL

A. Install geotextile as shown on the Drawings or as called-for in the Specifications. Follow manufacture's guidelines.

B. Ensure that geotextile is protected during installation from clogging, tears, and other damage.

3.2 PIPE OR DRAINAGE SYSTEMS

A. Provide smooth side and bottom trench surfaces so the fabric does not bridge depressions in the soil and is not damaged by rock projections.

B. Use fabric of a width to permit a minimum trench-width overlap across the backfill at the trench top.

C. Lay the fabric flat in the prepared trench without stretching. Lay the top of the fabric back on the sides to allow for the placement of the aggregate backfill and pipe.

D. Overlap ends of rolls an amount equal to the trench width prior to fabric placement. Where pockets or cavities occur in the trench bottom or sides, fill them with acceptable granular material to prevent distortion or damage to the fabric.

E. Backfill aggregate and install pipe in a manner to prevent damage to the fabric. Compact aggregate backfill and overlap the fabric across the trench top. Do not allow the fabric to be exposed for more than 2 weeks without covering with backfill.

3.3 LAYER SEPARATION AND/OR STABILIZATION

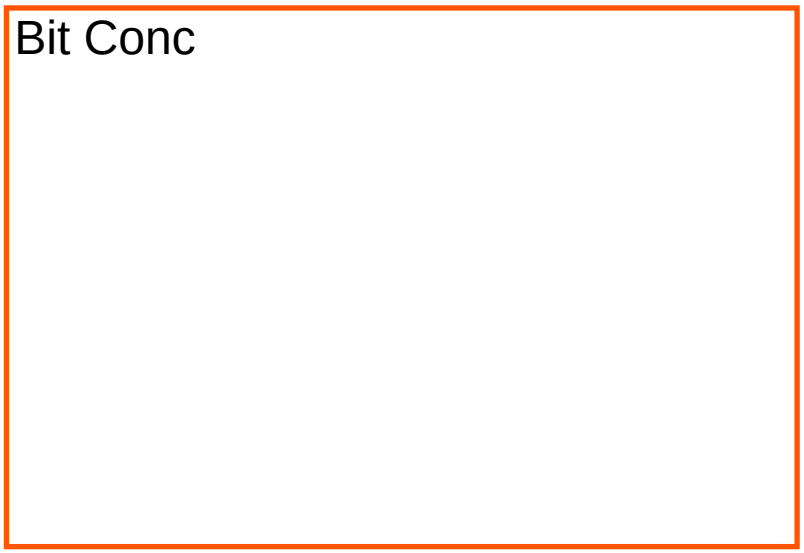
A. Place fabric on a normally prepared subgrade area attending the full width of the sub-base layer being protected.

B. Place fabric in a loose and unstretched condition to minimize shifting, puncture, and/or tearing. Overlap fabric roll-ends and edges a minimum of 12 inches with adjacent material.

C. Place subbase material within 2 weeks after placement of fabric to minimize exposure. Place sub-base material in a manner to minimize slippage of the fabric. If excessive slippage occurs, use steel securing pins per manufacturer's guidelines.

END OF SECTION

DIVISION 32
EXTERIOR IMPROVEMENTS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SECTION 32 1313

CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide all labor, equipment, materials and perform all operations necessary to complete the work of this section as indicated within the drawings and specified herein which shall include but is not limited to the following:

1. Concrete sidewalks

2. Concrete pads

B. Contractor is responsible for all health and safety.

1.2 RELATED SECTIONS

A. Section 31 2313 Subgrade Preparation: for preparation of the sub base.

B. Section 03 3200 Cast-in-place Concrete: for related specifications.

1.3 SUBMITTALS

A. Submit the following under provisions of Section 01 3300—Submittal Procedures:

1. Provide samples, manufacturer's product data, test reports, and material certifications as specified Section 03 3200 Cast-in-place Concrete.

2. Provide "Material Certificates" signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

1.4 CONSTRUCTION OF A SAMPLE PANEL

A. Construct a sample panel for the following in areas designated by the Engineer.

1. Concrete sidewalk: Full width and a length not less than ten (10) feet demonstrating jointing and finish.

2. All sample panels shall be complete and in place. If the original sample panel is not approved, the Contractor shall provide additional sample panels as required, at no additional cost to the Owner, until an approved sample panel is obtained.

a. The approved sample panel shall become the standard for the entire job.

b. The sample panel may be constructed at a location that will become part of the work.

c. Demolish and remove, from site, any and all rejected sample panels at no additional cost to the owner.

3. The quality of workmanship must be approved by the Engineer before permanent construction is started. Obtain Engineer's acceptance of sample panel before proceeding with the final work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with the requirements of the applicable Section 03 3200 Cast-in-place Concrete for concrete materials, admixtures, bonding materials, curing materials, and other specified items.

B. Single Source: All work of this Section shall be produced by a single manufacturer, unless otherwise approved by the Architect. Concrete shall be batched from the same facility.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing Bars: Deformed epoxy coated steel bars, ASTM A615, Grade 60.

B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A185.

1. 6″ x 6″ x 10/10 W.W.M. in flat sheets only, no rolls will be allowed.

C. Bar supports, metal accessories and other devices necessary for proper assembly of concrete reinforcing shall be of standardized factory-made wire bar supports. Wire for tying shall be 18-gauge black annealed wire conforming to ASTM Specification A82.

2.3 EXPANSION JOINT MATERIAL

A. Compressible filler: Provide asphalt impregnated preformed expansion joint filler which shall be non-extruding, resilient and shall conform to AASHTO M213 requirements for premolded rigid cane fiber board impregnated throughout with asphaltic compound.

1. The Contractor shall provide certificate that the asphalt cement content is at least 35% by weight of the filler.

2. All expansion joints shall be a minimum of ½″ thick and full depth of slab thickness.

B. Joint sealer: For use at expansion joints shall meet Federal Specification TT-S-00230C, Type II, Class A, and shall be a sealing compound, synthetic, rubber case, single component, chemically curing material.

2.4 FORM MATERIALS

A. The contractor shall utilize steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

1. Use straight forms, free of distortion and defects.

2. Use flexible spring steel forms or laminated boards to form radius bends as required.

B. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

2.5 ADMIXTURES

A. Liquid-Membrane forming and Sealing Curing Compound: Comply with ASTM C309, Type I, Class A unless other type acceptable to the Engineer.

2.6 CONCRETE MIX, DESIGN AND TESTING

A. Comply with requirements of applicable Section 03 3200 Cast-in-place Concrete for concrete mix design, sampling and testing, and quality control and as herein specified.

1. Obtain strength of 4,000 psi at twenty-eight (28) days.

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Beginning of installation means acceptance of existing project conditions.

3.2 SURFACE PREPARATION

A. Remove loose material from compacted sub-base surface immediately before placing concrete.

B. Proof-roll prepared sub-base surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.3 FORM CONSTRUCTION

A. Set forms to required grades and lines braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least twenty-four (24) hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

1. Top of forms not more than ⅛ inch in ten (10) feet.

2. Vertical face on longitudinal axis, not more than ¼ inch in ten (10) feet.

C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.4 REINFORCEMENT

A. Locate, place and support reinforcement as specified in the applicable Section 03 3200 Cast-in-place Concrete and as indicated within the drawings.

B. Provide number four (4) rebar perpendicular to support bars two (2) inches from expansion joint or slab edge at each end.

C. Keep welded wire fabric clean and free from rust. Place individual sheet or strips flat and free from distortion. Remove bends or kinks in individual wires before the sheet is laid in the pavement.

D. Place welded wire fabric in sheets or strips at depth shown. Lap sheet six (6) inches and tie firmly together by wire or clips spaced not more than four (4) feet apart.

E. Provide sand plates at twenty-four (24) inches on-center to support welded wire mesh. Locate one (1) bar two (2) inches from expansion joint or slab edge at each end.

3.5 EXPANSION JOINTS

A. General: Construct expansion joints true to line with face perpendicular to surface of concrete. If joints are not installed and constructed as indicated within the drawings and specified herein the Engineer shall instruct the Contractor to remove and dispose those areas identified as non-compliant. The Contractor shall repair, replace or install new concrete in those areas identified at no additional cost to the owner.

B. Verify location of expansion joints as indicated within the drawings and their relationship to other work.

C. Where expansion joints are not shown, the Contractor shall provide expansion joints a minimum twenty (20) feet on center in any direction and where concrete abuts all vertical surfaces and/or fixed construction including but not limited to; buildings, structures, walls, stairs, light poles and curbs.

D. Provide premolded joint filler for expansion joints abutting curbs, catch basins, manholes, inlets, structures, walks, and all other fixed objects, unless otherwise indicated.

1. Deliver materials in manufacturer’s original containers, clearly labeled with manufacturer’s name and address and product identification.

2. Store materials in original containers protected from direct contact with the ground and from the elements.

3. Store materials above ground on framework or blocking and cover with protective waterproofing covering. Provide for adequate air circulation throughout material stacks.

4. Extend joint fillers full width and depth of joint, top of joint filler flush with finished concrete surface.

5. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one (1) length is required, lace or clip joint filler sections together.

6. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

3.6 CONTRACTION AND CONSTRUCTION JOINTS

A. General: Construct contraction and construction joints true to line with face perpendicular to surface of concrete. If joints are not installed and constructed as indicated within the drawings and specified herein the Engineer shall instruct the Contractor to remove and dispose those areas identified as non-compliant. The Contractor shall repair, replace or install new concrete in those areas identified at no additional cost to the owner.

B. Contraction Joints: Provide contraction joints, sectioning concrete into areas as shown on drawings to a depth equal to at least ⅓ concrete thickness and as follows:

1. Form joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a joiner.

C. Construction Joints: Place construction joints at end of placements and at expansion joints.

3.7 CONCRETE PLACEMENT

A. General: Comply with the applicable requirements of Section 03 3200 Cast-in-place Concrete for mixing and placing concrete, and as herein specified.

B. Do not place concrete until sub-base and forms have been checked for line and grade. Moisten sub-base if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

D. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than hour, place a construction joint.

E. Do not place concrete on a soft, muddy or frozen base course. Do not permit workmen to walk in the concrete with boots or shoes covered with earth or other foreign substances.

F. Place lower layer of concrete followed promptly by the welded wire fabric and then place the upper layer of concrete. Remove any portions of the bottom layer of concrete which have been placed more than fifteen (15) minutes without being covered with top layer and replace with freshly mixed concrete.

G. Consolidate concrete thoroughly by tamping, spading and vibrating to eliminate honeycombing and voids. Space carefully to avoid dislocation of reinforcing materials, dowels and joints installing devices.

3.8 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to produce uniform texture.

B. After floating, test surface for trueness with a ten (10) foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs and formed joints with an edging tool, and round to one half-inch radius or as indicated within the drawings.

1. Eliminate tool marks on concrete surface.

D. After completion of floating and when excess moisture or surface sheen has disappeared, complete trowelling and finish surface as follows:

1. Broom finish by drawing a broom across concrete surface perpendicular to line of traffic.

a. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.

E. Do not remove forms for twenty-four (24) hours after concrete has been placed. After form removal, clean ends of joints and joint-up any minor honeycombed areas.

1. Remove and replace areas of sections with major defects, as directed by the Engineer.

3.9 CURING

A. Protect and cure finished concrete paving in compliance with applicable requirements of Section 03 3200 Cast-in-place Concrete. Use membrane-forming curing and sealing compound or approved moist-curing methods.

3.10 REPAIRS AND PROTECTIONS

A. Repair or replace broken or defective concrete, as directed by the Engineer.

B. Drill test cores where directed by the Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland Cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least fourteen (14) days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Sweep concrete pavement and wash free of stains, discoloration, dirt, and other foreign material one (1) week prior to substantial completion.

END OF SECTION

SECTION 32 1723

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Temporary or permanent painted pavement markings, including but not limited to center lines, lane lines and shoulder lines, stop bars, crosswalks, parking stalls, lane arrows, legends, markings within gore areas, and painting of paved islands or medians.

2. Temporary plastic pavement marking tape.

3. Black line mask pavement marking tape.

4. Maintaining access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs, and warning lights as required.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 SUBMITTALS

A. Submit material specifications and shop drawings for all materials furnished under this Section.

B. Submit material certificates signed by the material producer and Contractor, certifying that materials comply with these Specifications.

1.3 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020 and any supplements.

C. Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction

D. ASTM International (ASTM)

1. ASTM C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.

2. ASTM D211 - Standard Specification for Chrome Yellow and Chrome Orange Pigments.
3. ASTM D476 - Standard Classification for Dry Pigmentary Titanium Dioxide Products.
4. ASTM D562 - Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.
5. ASTM D605 - Standard Specification for Magnesium Silicate Pigment (Talc).
6. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
7. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
8. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
9. ASTM D869 - Standard Test Method for Evaluating Degree of Settling of Paint.
10. ASTM D1475 - Standard Test Method for Density of Liquid Coatings, Inks, and Related Products.
11. ASTM D1763 - Standard Specification for Epoxy Resins.
12. ASTM D2240 - Standard Test Method for Rubber Property- Durometer Hardness.
13. ASTM D2486 - Standard Test Methods for Scrub Resistance of Wall Paints.
14. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
15. ASTM D4505 - Standard Specification for Preformed Retroreflective Pavement Marking Tape for Extended Service Life.
16. ASTM E303 - Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
17. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.

E. American Association of State High and Transportation Officials (AASHTO)

1. AASHTO M 247 - Standard Specification for Glass Beads Used in Traffic Paints.

F. American Concrete Institute

1. ACI 503R - Use of Epoxy Compounds with Concrete.

G. United States General Services Administration, Federal Specifications.

1. Federal Specification TT-P-1952D - Paint, Traffic and Air Field Marking, Water Emulsion Base.

H. United States General Services Administration, Federal Standards.

1. Federal Standard No. 595 - Colors Used in Government Procurement.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Contractor shall furnish one technical expert, who shall be fully knowledgeable about all equipment operations and application techniques, to oversee the work of this Section.

PART 2 PRODUCTS

2.1 WATERBORNE PAVEMENT MARKING PAINT

A. General

1. White and yellow fast-drying waterborne pavement marking paint, low VOC, ready-mixed, one component, 100 percent acrylic, Federal Specification TT-P-1952D.

2. Paint shall be capable of being applied with paint striping equipment at ambient temperatures.

3. Weight per gallon shall not be less than 12.5 pounds/gallon when tested in accordance with ASTM D1475.

4. Colors: ASTM D211 and per Federal Standard No. 595.

B. Manufacture

1. Paint shall be formulated and manufactured from first-grade raw materials and shall be free from defects and imperfections that might adversely affect the serviceability of the finished product. The materials shall not exhibit settling or jellying after storage in the sealed containers as received that will affect the performance of the products. The paint shall provide the proper anchorage, refraction and reflection for the finished glass spheres when applied as specified.

C. Composition

1. Composition of the paint shall be at the discretion of the manufacturer, provided that the finished product meets the requirements of any applicable Federal, State or Local regulations for products of this type and the requirements as follows:

a. Paint shall not contain more than 0.06% lead.

b. Total nonvolatile shall not be less than 70% by weight (mass).

c. Pigment shall be 45–55% by weight (mass).

d. Resin solids shall be composed of 100% acrylic emulsion polymer.

e. Volatile organic compounds shall not exceed 150 grams/liter, excluding water.

f. Closed-cup flash point shall not be less than 100°F (38°C), and weight per gallon shall not be less than 12.5 pounds/gallon when tested in accordance with ASTM D1475.

D. Viscosity

1. Consistency of the paint shall not be less than 80, nor more than 90 Kreb units when tested in accordance with ASTM D562. The paint shall have good spraying characteristics when the material is heated to application temperature of 130°F to 145°F.

E. Flexibility

1. Paint shall not show cracking or flaking when subjected to the TT-P-1952D flexibility test in which the panels used shall be tin plates that are 3 inches x 5 inches in area and 35 – 31 U.S. Gauge in thickness. The tin panels shall be lightly buffed with steel wool and thoroughly cleaned with solvent before being used for tests.

F. Dry Opacity

1. Both white and yellow paints shall have a minimum contrast ratio of 0.96. Contract ratio shall be determined by applying a wet film thickness of 0.005 inches (127 microns) to a standard hiding power chart. After drying, the black and white reflectance values shall be determined using a suitable reflectometer and the contrast ratio determined.

G. Bleeding

1. Paints shall have a minimum bleeding ratio of 0.97 when tested in accordance with FS TT-P-1952D.

H. Abrasion Resistance

1. No less than 210 liters of sand shall be required to remove paint film when tested in accordance with TT-P-1952D.

I. Color

1. Yellow: FS 595, No. 13538, latest issue.

2. White: No darker or yellower than FS 595, No. 17778, latest issue, when the material is placed in a type EH weatherometer for a period of 500 hours and weathered according to ASTM G153.

3. Color determination shall be made without beads, after a minimum of 24 hours. If not a visual match, the diffuse day color of the paint shall conform to the CIE Chromaticity coordinate limits as follows:

Paint CIE Chromaticity Coordinate Limits

	x	Y	x	y	x	y	x	y	Brightness
White	0.305	0.295	0.360	0.360	0.388	0.377	0.280	0.310	84.0 Min
Yellow	0.485	0.455	0.506	0.452	0.484	0.428	0.477	0.438	50.0 Min

4. Paint shall not discolor in sunlight and shall maintain colorfastness throughout its life, approximately two years.

J. Glass Bead Adhesion

1. Paint with glass beads conforming to M.07.30, applied at the rate of 6.0 pounds/gallon of paint, shall require not less than 150 liters of sand to remove paint film and glass beads.

K. Scrub Resistance

1. Paint shall pass 300 cycles minimum when tested in accordance with ASTM D2486.

L. Drying time

1. Reflectorized line shall dry to no pick up in 15 minutes or less as tested by ASTM D711 when applied at the ratio provided for specified glass spheres to paint (the paint at 15+ 1 mil (381 millimeters + 25 millimeters) wet film thickness equivalent to 100–115 square foot/gallon and the glass spheres at the equivalent rate of 6.0 pounds/gallon.

2.2 HOT-APPLIED WATERBORNE PAVEMENT MARKING PAINT

A. General

1. White and yellow fast-drying waterborne pavement marking paint, low VOC, ready-mixed, one component, 100 percent acrylic, Federal Specification TT-P-1952D.

2. Paint shall be capable of being applied with paint striping equipment at an application temperature of 130°F to 145°F.

3. Color: ASTM D211 and per Federal Standard No. 595.

4. Glass Beads: AASHTO M 247, Type 1.

B. Manufacture

1. Paint shall be formulated and manufactured from first-grade raw materials and shall be free from defects and imperfections that might adversely affect the serviceability of the finished product. The materials shall not exhibit settling or jellying after storage in the sealed containers as received that will affect the performance of the products. The paint shall provide the proper anchorage, refraction and reflection for the finished glass spheres when applied as specified.

C. Composition

1. Composition of the paint shall be at the discretion of the manufacturer, provided that the finished product meets the requirements of any applicable Federal, State or Local regulations for products of this type and the requirements as follows:

a. Paint shall not contain more than 0.06% lead.

b. Total nonvolatile shall not be less than 76% by weight (mass).

c. Pigment shall be 58–63% by weight (mass).

d. Resin solids shall be composed of 100% acrylic emulsion polymer.

e. Volatile organic compounds shall not exceed 150 grams/liter, excluding water.

f. Closed-cup flash point shall not be less than 100°F, and weight per gallon shall not be less than 12.5 pounds/gallon when tested in accordance with ASTM D1475.

D. Viscosity

1. Consistency of the paint shall not be less than 80, nor more than 90 Kreb units when tested in accordance with ASTM D562. The paint shall have good spraying characteristics when the material is heated to application temperature of 130°F to 145°F.

E. Flexibility

1. Paint shall not show cracking or flaking when subjected to the TT-P-1952D flexibility test in which the panels used shall be tin plates that are 3 inches x 5 inches (76 millimeters x 127 millimeters) in area and 35 – 31 U.S. Gauge in thickness. The tin panels shall be lightly buffed with steel wool and thoroughly cleaned with solvent before being used for tests.

F. Dry Opacity

1. Both white and yellow paints shall have a minimum contrast ratio of 0.96. Contract ratio shall be determined by applying a wet film thickness of 0.005 inches (127 microns) to a standard hiding power chart. After drying, the black and white reflectance values shall be determined using a suitable reflectometer and the contrast ratio determined.

G. Bleeding

1. Paints shall have a minimum bleeding ratio of 0.97 when tested in accordance with FS TT-P- 1952D.

H. Abrasion Resistance

1. No less than 210 liters of sand shall be required to remove paint film when tested in accordance with TT-P-1952D.

I. Color

1. Yellow: FS 595, No. 13538, latest issue.

2. White: No darker or yellower than FS 595, No. 17778, latest issue, when the material is placed in a type EH weatherometer for a period of 500 hours and weathered according to ASTM G153.

3. If not a visual match, the diffuse day color of the paint shall conform to the CIE Chromaticity coordinate limits as follows:

Paint CIE Chromaticity Coordinate Limits

	x	Y	x	y	x	y	x	y	Brightness
White	0.305	0.295	0.360	0.360	0.388	0.377	0.280	0.310	84.0 Min
Yellow	0.485	0.455	0.506	0.452	0.484	0.428	0.477	0.438	50.0 Min

4. Paint shall not discolor in sunlight and shall maintain colorfastness throughout its life, approximately two years. Color determination shall be made without beads, after a minimum of 24 hours.

J. Glass Bead Adhesion

1. Paint with glass beads shall require not less than 150 liters of sand to remove paint film and glass beads.

K. Scrub Resistance

1. Paint shall pass 300 cycles minimum when tested in accordance with ASTM D2486.

L. Drying time

1. Reflectorized line shall dry to no pick up in 120 seconds or less when applied at the ratio provided for specified glass spheres to paint (the paint at 15+ 1 mil (381 millimeters + 25 millimeters) wet film thickness equivalent to 100–115 square foot/gallon (2.45–2.82 square meters/liter) and the glass spheres at the equivalent rate of 6.0 pounds/gallon (0.72 kilograms/liter). The paint shall be applied with equipment so as to have the paint at a temperature of 130°F to 145°F (54°C to 63°C) at the spray gun.

2.3 EPOXY RESIN PAVEMENT MARKINGS

A. Epoxy Resin Material: The material shall be composed of epoxy resins and pigments only.

B. Composition:

1. White (percent by weight): 20% +/- 2% Titanium Dioxide, ASTM D476 Type 3 and 80% +/- 2% Epoxy Resins.

2. Yellow (percent by weight): 25% +/- 2% Chrome Yellow, ASTM D211 Type 3 and 75% +/- 2% Epoxy Resins.

3. Epoxy Resins: ASTM D1763.

C. Color

1. Yellow: FS 595, No. 13538, latest issue.

2. White: No darker or yellower than FS 595, No. 17778, latest issue, when the material is placed in a type EH weatherometer for a period of 500 hours and weathered according to ASTM G153.

D. Adhesion Capabilities

1. When the adhesion of the material to portland cement concrete (test concrete shall have a minimum of 300 psi tensile strength) is tested according to ACI 503R testing procedure, the failure of the system must take place in the concrete. The concrete shall be 90 °F when the material is applied, after which the material shall be allowed to cure for 72 hours at 73 +/- 3.5 °F.

E. Abrasion Resistance

1. When the abrasion resistance of the material is tested according to ASTM C501 with a CS-17 wheel under a load of 1000 grams for 1000 cycles, the wear index shall be no greater than 82. (The wear index is the weight (mass) in milligrams that is abraded from the sample under the test conditions).

F. Hardness

1. The Type D durometer hardness of the material shall be not less than 75 nor more than 90 when tested according to ASTM D2240 after the material has cured for 72 hours at 73 +/- 3.5 °F.

G. Tensile Strength

1. Tensile strength of the material, when tested according to ASTM D638, shall not be less than 6,000 psi after 72 hours cure at 73 +/- 3.5 °F.

H. Compressive Strength

1. Compressive strength of the material, when tested according to ASTM D695, shall not be less than 12,000 psi after 72 hours cure at 73 +/- 3.5 °F.

I. Shelf Life

1. Individual components shall not require mixing prior to use when stored for a period of 12 months.

2.4 GLASS BEADS

A. Beads shall be transparent, clean, colorless glass, smooth and spherically shaped, free of milkiness, pits, or excessive air bubbles.

B. Quality Assurance Control

1. Beads shall be segregated into maximum lots of 2,500 pounds (1125 kilograms) and lot numbers shall be stamped onto each lot. Each lot shall be tested for gradation, rounds and embedment coating.

C. Gradation - The glass spheres shall meet the following gradation requirements:

Glass sphere gradation (ConnDOT Grading “A”)

Sieve Size	% Passing
20 (850 um)	100
30 (600 um)	80–95
50 (300 um)	9–42
80 (180 um)	0–10

Glass sphere gradation (ConnDOT Grading “B”)

Sieve Size	% Retained
10 (2.0 mm)	0
12 (1.7 mm)	0–5
14 (1.4 mm)	5–20
16 (1.18 mm)	40–80
18 (1.0 mm)	10–40
20 (850 um)	0–5
Pan	0–2

D. Roundness: Glass beads shall have a minimum of 80% rounds per screen for two highest sieve quantities and no more than 3% angular particles per screen for Grading “B”. The remaining sieve fractions shall typically be no less than 75% rounds.

E. Refractive Index: Glass beads shall have a refractive index of 1.50 to 1.52.

PART 3 EXECUTION

3.1 GENERAL

A. Pavement markings shall be applied in accordance with the details shown on the plans and the control points established by the Contractor and approved by the Engineer.

B. No paint shall be applied to new bituminous pavement until the top course has cured at least one week minimum.

C. Pavement areas to be painted shall be dry and sufficiently cleaned of sand and road debris so as to provide an acceptable bond between the paint and the pavement.

D. All painting shall be performed in a neat and workmanlike manner. The lines shall be sharp and clear with no feathered edging or fogging and precautions shall be taken to prevent tracking by tires of the striping equipment. Paint shall be applied as shown on the Drawings with no unsightly deviations.

E. Contractor shall protect the buildings, walks, pavement, curbing, trees, shrubs, mulch, etc. from over-spray of paint and damage by his operations.

F. Operations shall be conducted only when the road surface temperature is at least 40°F or as allowed by Engineer. They shall be discontinued during periods of rain, and shall not continue until Engineer determines that the pavement surface is dry enough to achieve adhesion.

G. After application, paint shall be protected from crossing vehicles using traffic cones or other acceptable method for a time at least equivalent to the drying or curing time of the paint.

H. The material shall be applied to the pavement by equipment used specifically for the application of pavement markings and shall be of a standard commercial manufacturer.

I. Contractor shall provide survey control for layout of pavement markings by utilizing his own surveyor or hiring a registered land surveyor. The cost of this survey control shall be included in other items of work.

3.2 WATERBORNE PAVEMENT MARKINGS

A. Painted legend, arrows, and markings includes paint installed with a hand striping machine such as: stop bars, crosswalks, parking stalls, lane arrows, legends, markings within gore areas, and painting of paved islands or medians.

B. Painted pavement markings and hot applied painted pavement markings include paint installed with a truck-mounted painting machine such as center lines, lane lines and shoulder lines.

C. Waterborne Paint, Ambient Temperature

1. Apply paint at a rate of 100 to 115 square feet per gallon, with glass beads applied at a rate of 6 pounds per gallon of paint for painted pavement markings and painted legend, arrows, and markings

D. Waterborne Paint, Hot-Applied

1. Hot-applied paint shall be applied at a temperature of 130°F to 145°F at the spray gun.

2. Apply paint at a rate of 8 pounds per gallon of paint for hot-applied painted pavement markings.

3.3 EPOXY RESIN PAINTED PAVEMENT MARKINGS

A. Epoxy resin pavement markings includes epoxy resin installed with a truck-mounted machine such as center lines, lane lines, and shoulder lines.

B. Epoxy resin pavement markings, symbols and legends include stop bars, crosswalks, parking stalls, lane arrows, legends, and markings within areas such as paved islands, gore areas and paved medians.

C. Equipment

1. Equipment furnished shall include an applicator truck of adequate size and power, together with the following:

a. Remote application equipment designed to apply an epoxy resin material in a continuous pattern.

b. Portable glass bead applicators, one for each size bead, designed to provide uniform and complete coverage of the epoxy binder by a controlled free-fall method. Pressurized glass bead application shall not be used. Before epoxy color is changed, equipment shall be cleaned out sufficiently to ensure that the color of material applied will be correct.

2. When working on a highway with more than one lane in either direction, the applicator truck (striper) shall have a permanently mounted direction variable illuminated arrow board, fully operational and visible to approaching traffic. There will be no additional payment for the arrow board. Its cost shall be included in the bid price for this item.

3. For markings applied on pavements over one year old, equipment furnished shall also include a power washing machine capable of cleaning the pavement with a pressure of 2,400 to 2,800 psi with water heated to 180°F – 195°F. No chemicals shall be added to the water used in the process. The power washer shall be equipped with a turbo blast tip with an oscillating head and shall be capable of supplying a minimum of 5 gallons/minute gun.

4. All guns on the spray carriages shall be in full view of the operator(s) during operation.

D. Procedures

1. The road surface shall be cleaned at the direction of the Engineer just prior to application. Pavement cleaning shall consist of power washing using clean water heated to 180°F – 195 °F at a pressure of 2,240 – 2,800 psi. The areas to be power washed shall include all areas where epoxy marking symbols and legends (including stop bars and crosswalks) are to be applied and at least 1 inch beyond the area to be marked. The surface shall be cleaned to the satisfaction of the Engineer.

a. For other pavement areas, cleaning shall consist of brushing with rotary broom (non-metallic), and any additional work as recommended by the material manufacturer and acceptable to the Engineer.

b. New portland cement concrete surfaces shall be cleaned by abrasive blasting to remove any surface treatments and/or laitance.

c. New bituminous concrete surfaces are not to be power washed.

2. All surfaces that are power washed shall be allowed to dry sufficiently prior to the application of the epoxy markings. The areas to be marked shall be broom cleaned immediately prior to the application of the epoxy markings. Glass beads shall be applied immediately after application of the epoxy resin marking to provide an immediate notrack system.

3. Contractor will place necessary "spotting" at appropriate points to provide horizontal control for striping and to determine necessary starting and cutoff points. Broken line intervals will not be marked. Longitudinal joints, pavement edges and existing markings shall serve as horizontal control when so directed.

4. A tolerance of 0.25 inch under or 0.25 inch over the specified width shall be allowed for striping provided the variation is gradual and does not detract from the general appearance. Alignment deviations from the control guide shall not exceed 2 inches provided the variation is gradual and does not detract from the general appearance. Material shall not be applied over a longitudinal joint. Establishment of application tolerances shall not relieve Contractor of the responsibility to comply as closely as practicable with the planned dimensions.

5. Glass beads conforming to the requirements of Grading "B" (larger beads) as specified herein shall be applied at a rate of 12 pounds per gallon of epoxy pavement marking material, immediately followed by a second drop of glass beads conforming to the requirements of Grading "A" (smaller beads) as specified herein applied at a rate of 13 pounds per gallon of epoxy pavement marking material.

6. Time to No-Track: The material shall be in "no-tracking" condition within 15 minutes, or as allowed by Engineer. The no-tracking time shall be determined by passing over the line with a passenger car or pickup truck in the simulated passing maneuver. A marking showing no visual deposition of the material to the pavement surface when viewed from a distance of 50 feet (15 meters) shall be considered as showing "no-tracking" and conforming to this requirement for time to no-track.

7. When stencils are used during the application of epoxy markings, care must be used when removing the stencils so that the epoxy resin does not drip on the road, sidewalk, grass, etc., and so that the applied markings have edges which are clean, straight and neat.

8. Epoxy resin pavement markings may be applied over existing painted markings provided they are sufficiently worn to allow adequate adhesion. If required by the Engineer, existing plastic, thermoplastic, epoxy or freshly painted markings shall be removed prior to the application of epoxy markings.

E. Crosswalks

1. Only glass beads conforming to the requirements of Grading "A" (smaller beads) as specified herein shall be applied at a rate of 25 pounds per gallon of epoxy pavement marking material.

F. Performance

1. In order to be accepted, the applied markings must meet the following minimum retroreflectivity reading as measured using an LTL 2000 Retrometer with 30-meter geometry 1 to 2 weeks after installation:

   a. White Epoxy 250 millicandelas per square foot per foot candle (millicandelas per square meter per lux).

   b. Yellow Epoxy 175 millicandelas per square foot per foot candle (millicandelas per square meter per lux).

3.4 PAVEMENT MARKING REMOVAL

A. Pavement markings shall be removed before any change is made in the traffic pattern.

B. Pavement markings shall be removed from the pavement by any method that does not materially damage the surface or texture of the pavement. Any damage to the pavement surface caused by pavement marking removal shall be repaired by Contractor at its expense by methods acceptable to Engineer.

1. Removal of temporary plastic pavement marking tape shall be accomplished without the use of heat, solvents, grinding or sandblasting and in such a manner that no damage to the pavement results.

C. Sand or other material deposited on the pavement as a result of removing pavement markings shall be removed as the work progresses. Accumulations of sand or other material which might interfere with drainage or might constitute a hazard to traffic will not be permitted.

D. Where blast cleaning is used for the removal of pavement markings and such removal operation is being performed within 10 feet of a lane occupied by traffic, the residue including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the blast cleaning operation, or by other methods approved by Engineer.

END OF SECTION

SECTION 32 1816

RESILIENT RUBBERIZED
PLAYGROUND SURFACING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnishing and installing poured-in-place rubber surfacing.

2. The synthetic surfacing consists of either impact attenuating substrate covered by a wear surface bonded to produce a unified system, shredded rubber of aggregate substrate covered by a polyethylene plastic woven sheet wear surface, or a uniform material manufactured in such a way that the top portion meets the requirements specified for wear surface.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. American Society for Testing and Materials (ASTM).

1. ASTM C67- Standard Test Method for Sampling and Testing Brick and Structural Clay Tile

2. ASTM C136- Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate.

3. ASTM D297- Standard Test Methods for Rubber Products-Chemical Analysis-Density.

4. ASTM D412- Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers Tension.

5. ASTM D412- Compressive and Flexural Creep and Creep Rupture of Plastic Lumber and Shapes.

6. ASTM D573- Standard Test Method for Rubber Deterioration in an Air Oven.

7. ASTM D624- Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.

8. ASTM D648- Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.

9. ASTM D1557- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

10. ASTM D2261- Tearing Strength of Fabrics by the Tongue Procedure.

11. ASTM D2859- Flammability of Finished Floor Cover.

12. ASTM D3389- Abrasion Testing.

13. ASTM E303- Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.

14. ASTM E1912- Accelerated Site Characterization for Confirmed or Suspected Petroleum Releases.

15. ASTM F1015- Relative Abrasiveness of Synthetic Turf Playing Surfaces.

16. ASTM F1292- Impact Attenuation of Surface Systems Under and Around Playground Equipment.

17. ASTM F1487- Standard Consumer Safety Performance Specification for Playground Equipment for Public Use.

18. ASTM F1951- Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.

19. ASTM F2075- Standard Specifications for Engineered Wood Fiber.

20. ASTM F2223- Standard Guide for ASTM Standards on Playground Surfacing.

21. ASTM F2479- Standard Guide for Specification, Purchase, Installation and Maintenance of Poured-in-Place Playground Surfacing.

22. ASTM G21-96- Fungal Resistance

D. Consumer Product Safety Commission (CPSC)

1. CPSC Pub. No. 325- Handbook for Public Playground Safety.

E. U.S. Environmental Protection Agency

1. Method 3052; 1996

1.3 JOB CONDITIONS

A. Weather Limitations

1. The polyurethane agents shall not be placed whenever the surface is wet, frozen or when the temperature is outside the limitations stated by the manufacturer’s recommendations for installation.

1.4 SUBMITTALS

A. Material certificates or other data indicating compliance with these Specifications for color, and accessories.

B. Manufacturer's warranty.

C. Product Data

1. Manufacturer's descriptive data, and catalogue cuts.

2. Manufacturer's specifications, handling and storage requirements, installation procedures, and safety data sheets to include warnings and critical height performance standards for synthetic surfacing.

3. A list to include part numbers of furnished protective surfacing materials and the components for synthetic surfacing.

4. Impact attenuation and critical height performance for each thickness of synthetic surfacing provided.

D. Samples

1. Synthetic Surfacing: A minimum 2 inch by 2 inch sample.

E. Material Test Reports

1. Synthetic Surfacing: Chemical composition, color granule percentage, and test results to which material has been subjected, identifying each material and component containing recycled materials and showing the estimated percentage of recovered material content. Freezing temperature life cycle durability.

F. Qualification Data: For Installer. Include list of similar project experience of size for a minimum of 5 projects over the past 5 years.

G. Certificate: Prior to delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include composition and tests to which the material has been subjected.

H. Operation and Maintenance Data: Two bound copies of manufacturer's operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a dry area at a minimum temperature of 40 degrees F.

C. Protect materials during handling and installation to prevent damage or contamination.

1.7 WARRANTY

A. Provide manufacturer's standard warranty, as applicable, for all products furnished under this Section. Warranty shall be registered in Owner's name.

1. Warranty: 5 Years

B. Bind warranties in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

C. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the 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 the Installer.

D. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of Contractor.

E. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.8 LIMITATIONS

A. The following chemicals may cause damage to the poured in place safety surfacing and should be avoided: disinfectants, concentrated chlorine bleach, gasoline, diesel fuel, hydraulic and lubricating oils, acids and organic solvents.

B. Dissolved minerals and other chemicals such as hydrochlorides from water play areas, pool surrounds and similar applications may cause surface discoloration.

C. Areas in excess of 1,000 square feet or composed of adjacent colors may contain a cold joint or seam due to the nature of the installation process.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide surfacing material to the extent indicated on the Drawings.

2.2 GEOTEXTILE SEPARATION FABRIC

A. See Section 31 2543 Geotextiles.

2.3 POURED IN PLACE SYNTHETIC SURFACING

A. Primer: 100 percent solids, single component polyurethane binding agent

B. Aromatic Binder: Methylene Dephenyl Isocyanate (MDI) based binder.

C. Impact Course: 100 Percent recycled, shredded, black SBR rubber granules and polyurethane binder.

1. Binder to Rubber Ratio: Approx. 16 pounds of binder to 100 pounds of rubber.

2. Thickness: Sufficient to meet impact attenuation requirements as determined by designated fall height of playground equipment.

D. Wear Course: Blend of colored and/or black EPDM rubber granules and binding agent.

1. Binder to Rubber Ratio: Approx. 22 pounds of binder to 100 pounds of rubber

2. Granule Size: 1-3mm in diameter.

3. Thickness: ½ inch, nominal.

4. Total Thickness: As determined by designated fall height of playground equipment. (ASTM F1292)

E. Warranty: Surfacing shall maintain required impact attenuation characteristics and be guaranteed against color fading, cracking, loss of resilience, delamination, defects in workmanship and material for a period of no less than five (5) years or as specified and agreed upon per contract.

F. Physical Properties:

Tensile Strength (ASTM D412)	60 psi Minimum
Elongation at Break (ASTM D412)	140% Minimum
Flammability (ASTM D2859)	Pass
Coefficient of Friction (ASTM D204) Wet	0.9 minimum
Coefficient of Friction (ASTM D204) Dry	1.0 minimum
Water Permeability	0.4 gal./sq. yd./sec. minimum

2.4 COLOR

A. 50/50 blend of Purple and Black, 50/50 blend of Sky and Black, where indicated on the drawings.

2.5 TEST RESULTS

A. Impact Attenuation ASTM F1292

1. G-max: Less than 200

2. Head Injury Criteria: Less than 1000

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive poured-in-place playground safety surfacing. Ensure all applicable site work, including subsurface preparation, fencing, playground equipment installation and all other relevant work, has been completed. Notify owner if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

B. Acceptance of Prior Work: Upon completion of the base and drainage work, the Site General Contractor shall submit a letter, addressed to the Owner, signed by the Site General Contractor and the Synthetic Playground Surfacing Installer. The letter shall confirm Synthetic Playground Surfacing base has been reviewed and is acceptable for installation of the Synthetic Playground Surfacing. Any discrepancies, problems, and/or conflicts shall be addressed prior to issuance of the letter. Continuing with the installation of the Resilient Rubberized Playground Surfacing over the base without issuance of such letter shall be considered as an approval of the base by the Resilient Rubberized Playground Surfacing Installer.

3.2 WEATHER LIMITATIONS

A. Ambient and surface temperatures must be 50°F and rising.

B. Installation should not be conducted during rainfall or when rainfall is imminent.

C. Do not apply when surface temperature is more than 140°F.

D. Apply the synthetic surfacing material only during favorable weather conditions. Work is to proceed only when adequate curing can be guaranteed by the manufacturer and installer.

E. All materials shall be installed in strict compliance with the manufacturer´s specifications and instructions.

F. The Contractor shall be responsible to have the entire playground area closed and secured of all activities 24 hours per day through the curing and completion of the synthetic playground surface.

3.3 PREPARATION

A. Prepare subsurface in accordance with manufacturer's instructions to ensure proper support and drainage for poured-in-place playground safety surfacing. Finished elevations of subsurface shall be as indicated on the Drawings.

B. It shall be the responsibility of the general contractor to determine if the substrate meets all design specifications, i.e. cross slopes, planarity and specific project criteria. After all the above conditions are met, the synthetic playground surfacing contractor must, in writing, accept the planarity of the stone receiving base, before work can commence.

3.4 AGGREGATE SUBSURFACE

A. Work performed by others. Not part of the synthetic playground surfacing installer's scope of work.

3.5 INSTALLATION

A. Ensure prepared subsurface is dry, clean and free of any foreign or loose material.

B. Components of the pour in place system shall be mixed mechanically on site in accordance with manufacturer's recommendations. Hand Mixing will not be acceptable. Installation of poured-in-place surfacing shall be seamless and completely bonded to subsurface. Material shall cover foundations and shall be tight around elements penetrating the surface.

C. Install geotextile fabric over a compacted aggregate base as indicated. Fabric shall cover the entire area and shall be lapped a minimum 4 inch width at seams. Seams shall be adhered in accordance with manufacturer's recommendations. The fabric shall be installed smooth, and free of tensile stresses, folds, and wrinkles. The fabric shall be protected from clogging, tears, or other damage.

D. Impact Course: The impact course shall be installed in one continuous pour on the same day. When second pour is required, the edge of the previous work shall be fully coated with polyurethane binder to ensure 100 percent bond with new work.

E. Wear Course: Wear surface shall be bonded to impact course. Adhesive shall be applied to impact course in small amounts so that the wear surface can be applied before adhesive dries. Surface shall be hand troweled to a smooth, even finish. When wear course is composed of different color patterns, pour shall be continuous and seamless.

1. When seams are required due to color change of field conditions, the adjacent wear surface shall be placed as soon as possible, before initial pour has cured. The edge of initial pour shall be coated with adhesive and wear course mixture shall be immediately applied.

F. Install poured-in-place, bonded rubber playground safety surfacing in accordance with manufacturer's instructions at locations indicated on the Drawings.

G. Install edges in accordance with manufacturer's instructions and as indicated on the Drawings.

3.6 TOTAL THICKNESS

A. Overall depth of the poured rubber shall be based on the critical fall heights and installers test results. Depth of EPDM shall be no less than ½ inch.

3.7 PROTECTION

A. Do not allow foot traffic on poured-in-place playground safety surfacing until a minimum of 80 percent cure is obtained. Estimated time to obtain 80 percent cure will range from 6 to 72 hours depending on temperature and humidity.

B. Protect completed poured-in-place playground safety surfacing from damage during installation and cure time.

C. Protect completed poured-in-place playground safety surfacing from damage from subsequent construction activity.

3.8 CLEAN UP

A. The site shall be kept clean and free of debris throughout the installation. Empty barrels, sacks, bags, and remnant materials shall be stored or disposed daily in a proper container or legal manner.

END OF SECTION

SECTION 32 9000

PLANTING

PART 1 GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment, services, and perform all operations necessary to complete the work of this section as indicated within the drawings and specified herein which shall include, but is not limited to, the following:

1. Supplying Trees, Shrubs, Perennial, and Groundcover
2. Landscape Edging
3. Mulch
4. Maintenance including watering
5. Warranty

B. The contractor is responsible for all health and safety.

1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than sizes indicated; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

G. 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.

H. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

I. Planting Area: Areas to be planted.

J. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

K. 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.

L. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

1.3 SUBMITTALS

A. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

1. Plant Photographs: Include color photographs in 3- by 5-inch print format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

B. Pesticides and Herbicides: Include product label and manufacturer’s application instructions specific to the Project.

1. Contractor shall follow all Connecticut DEEP regulations for pesticide and herbicide applications.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer’s capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners’ contact persons.

D. Product Data: For each type of product indicated, including soils.

E. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Submit material specifications, manufacturer’s literature and installation instructions where applicable attesting that the following materials meet the requirements specified:

a. Fertilizer

b. Anti-Desiccant

c. Mulch

d. Soil Amendments

e. Edging

f. Weed Control Barrier

2. Manufacturer's certified analysis of standard products.

3. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

F. Maintenance Manual

1. The landscape contractor shall submit a written manual, prepared for the Owner that outlines a schedule for proper maintenance of the plantings. This schedule should include timing and methods for watering, fertilization, mulching, pruning and other maintenance operations to be conducted after the three month maintenance contract period.

G. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants including the preparation, mixing and installation of soil mixes to support planting.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

2. Experience: Five years' experience in landscape installation of size and scope similar to this project.

3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

a. Certified Landscape Technician – Exterior, with installation maintenance specialty area(s), designated CLT-Exterior.

b. Certified Landscape Technician – Interior, designated CLT-Interior.

c. Certified Ornamental Landscape Professional, designated COLP.

5. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.

2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

E. Preinstallation Conference: Conduct conference at Project site.

F. Work to be done shall be coordinated with all other trades on site. Work includes furnishing all labor, materials, equipment and services required to complete all planting indicated on the drawings, as specified in this section.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. 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.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

G. 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. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.

2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.

3. Do not remove container-grown stock from containers before time of planting.

4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of each service or utility.

2. Do not proceed with interruption of services or utilities without Construction Manager’s written permission.

C. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring:

a. Deciduous materials: March 1 to May 15

b. Evergreen Materials: March 1 to June 1

2. Fall:

a. Deciduous materials: From September 1 until the ground freezes.

b. Evergreen Materials: August 15–October 15

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

E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.7 PLANT WARRANTY

A. Plant 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, or neglect by Owner, or incidents that are beyond Contractor's control.

b. Structural failures including plantings falling or blowing over.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Substantial Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months

b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months

c. Annuals: Three months

3. When the work is accepted in parts, the warranty periods shall extend from each of the partial Substantial Completion Acceptances to the terminal date of the last warranty period. Thus, all warranty periods for each class of plant warranty, shall terminate at one time.

4. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.

b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.

c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.

d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

5. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.

1.8 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until substantial completion but for not less than maintenance period below if substantial complete comes earlier.

1. Maintenance Period: Three months from date of planting completion.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until substantial completion but for not less than maintenance period below if substantial completion comes earlier.

1. Maintenance Period: Three months from date of planting completion.

C. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.9 PLANT SUBSTITUTIONS FOR PLANTS NOT AVAILABLE

A. Submit all requests for substitutions of plant species, or size to the Owner's Representative, for approval, prior to purchasing the proposed substitution. Request for substitution shall be accompanied with a list of nurseries contacted in the search for the required plant and a record of other attempts to locate the required material. Requests shall also include sources of plants found that may be of a smaller or larger size, or a different shape or habit than specified, or plants of the same genus and species but different cultivar origin, or which may otherwise not meet the requirements of the specifications, but which may be available for substitution.

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 on the 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.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than ¾ inch in diameter; or with stem girdling roots will be rejected.

2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper in each planting bed with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

E. If formal arrangements or consecutive order of plants is shown on the Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

F. 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.

G. Plant List: If there is any discrepancy between quantities shown on the Plant Schedule and work shown on the drawings, the Landscape Contractor shall supply the plants necessary to complete the work as intended on the drawings. Where the size of a plant on the Plant Schedule is a variation between a minimum and maximum dimension, the sizes of the plants furnished will be equal to the average of the two dimensions. Where a single dimension is given, this dimension represents the minimum size of the plants to be furnished.

2.2 PLANTING SOIL

A. See Specification Section 32 9100 – Planting Soil

2.3 MULCHES

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

1. Type: Aged double-shredded bark.

2. Size Range: 2 inches maximum, ½ inch minimum.

3. Color: Natural.

2.4 PESTICIDES

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

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

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

2.5 WATERING BAGS

A. Plastic tree watering bags holding a minimum of 15 gallons of water and with a slow drip hole(s) water release system, specifically designed to water establishing trees. Water should release over a several day period, not within a few hours.

B. Watering bags shall be:

1. Treegator Irrigation Bags sized to the appropriate model for the requirements of the plant, manufactured by Spectrum Products, Inc., Youngsville, NC 27596.

2. Ooze Tube sized to the appropriate model for the requirements of the plant, manufactured by Engineered Water Solutions, Atlanta, GA.

3. Or approved equal.

C. Submit manufacturer's product data for approval.

2.6 LANDSCAPE EDGING

A. Heavy Duty Straight Profile Edging: 3⁄16″ x 6″ high, extruded aluminum, 6063 alloy, T-6 hardness, landscape edging for straight-line and curvilinear applications in corrugated straight profile.

B. Section shall have loops on side of section to receive stakes spaced approximately 2 to 3 feet apart along its length.

C. Thickness: 3⁄16 inch gage section at 0.116 inch minimum thick with 0.187 inch exposed top lip.

D. Connection Method: Section ends shall splice together with an interlocking stakeless snap-down design.

E. Stake: 12″ extruded aluminum stake. Stakes to interlock into section loops.

F. Finish: Mill Finish. Paint finish shall comply with AAMA 2603 for electrostatically baked on paint.

2.7 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

C. Burlap: Non-synthetic, biodegradable.

D. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine the surface grades and soil conditions to confirm that the requirements of the Specification Section – Planting Soil – and the soil and drainage modifications indicated on the Planting Soil Plan and Details (if applicable) have been completed. Notify the Owner's Representative in writing of any unsatisfactory conditions.

B. Planting shall only be performed when weather and soil conditions are suitable for planting the materials specified in accordance with locally accepted practice. Install plants during the planting time as described below unless otherwise approved in writing by the Owner's Representative. In the event that the Contractor request planting outside the dates of the planting season, approval of the request does not change the requirements of the warranty.

3.2 LAYOUT AND PLANTING SEQUENCE

A. Relative positions of all plants and trees are subject to approval of the Owner's Representative.

B. Notify the Owner's Representative, one (1) week prior to layout. Layout all individual tree and shrub locations. Place plants above surface at planting location or place a labeled stake at planting location. Layout bed lines with paint for the Owner's Representative's approval. Secure the Owner's Representative's acceptance before digging and start of planting work.

C. When applicable, plant trees before other plants are installed.

D. It is understood that plants are not precise objects and that minor adjustments in the layout will be required as the planting plan is constructed. These adjustments may not be apparent until some or all of the plants are installed. Make adjustments as required by the Landscape Architect including relocating previously installed plants.

3.3 SOIL PROTECTION DURING PLANT DELIVERY AND INSTALLATION

A. Protect soil from compaction during the delivery of plants to the planting locations, digging of planting holes and installing plants.

1. Where possible deliver and plant trees that require the use of heavy mechanized equipment prior to final soil preparation and tilling. Where possible, restrict the driving lanes to one area instead of driving over and compacting a large area of soil.

2. Till to a depth of 6 inches, all soil that has been driven over during the installation of plants

3.4 SOIL MOISTURE

A. Volumetric soil moisture level, in both the Planting Soil and the root balls of all plants, prior to, during and after planting shall be above permanent wilt point and below field capacity for each type of soil texture within the following ranges.

Soil Texture	Permanent Wilting Point	Field Capacity
Sand, Loamy sand, Sandy loam	5–8%	12–18%
Loam, Sandy clay, Sandy clay loam	14–25%	27–36%
Clay loam, Silt loam	11–22%	31–36%
Silty clay, Silty clay loam	22–27%	38–41%

B. The Contractor shall confirm the soil moisture levels with a moisture meter (Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent). If moisture is found to be too low, the planting holes shall be filled with water and allowed to drain before starting any planting operations. If the moisture is too high, suspend planting operations until the soil moisture drains to below field capacity.

3.5 INSTALLATION OF PLANTS – GENERAL

A. Observe each plant after delivery and prior to installation for damage of other characteristics that may cause rejection of the plant. Notify the Owner's Representative of any condition observed.

B. Excavation of the Planting Space: Using hand tools or tracked mini-excavator, excavate the planting hole into the Planting Soil to the depth of the root ball measured after any root ball modification to correct root problems, and wide enough for working room around the root ball or to the size indicated on the drawing or as noted below.

1. For trees and shrubs planted in soil areas that are NOT tilled or otherwise modified to a depth of at least 12 inches over a distance of more than 10 feet radius from each tree, or 5 feet radius from each shrub, the soil around the root ball shall be loosened as defined below or as indicated on the drawings.

a. The area of loosening shall be a minimum of 3 times the diameter of the root ball at the surface sloping to 2 times the diameter of the root ball at the depth of the root ball.

b. Loosening is defined as digging into the soil and turning the soil to reduce the compaction. The soil does not have to be removed from the hole, just dug, lifted and turned. Lifting and turning may be accomplished with a tracked mini excavator, or hand shovels.

C. If an auger is used to dig the initial planting hole, the soil around the auger hole shall be loosened as defined above for trees and shrubs planted in soil areas that are NOT tilled or otherwise modified.

D. The measuring point for root ball depth shall be the average height of the outer edge of the root ball after any required root ball modification.

E. If motorized equipment is used to deliver plants to the planting area over exposed planting beds, or used to loosen the soil or dig the planting holes, all soil that has been driven over shall be tilled to a depth of 6 inches.

F. For trees to be planted in prepared Planting Soil that is deeper than the root ball depth, compact the soil under the root ball using a mechanical tamper to assure a firm bedding for the root ball. If there is more than 12 inches of planting soil under the root ball excavate and tamp the planting soil in lifts not to exceed 12 inches.

G. Set top outer edge of the root ball at the average elevation of the proposed finish. Set the plant plumb and upright in the center of the planting hole. The tree graft, if applicable, shall be visible above the grade. Do not place soil on top of the root ball.

H. The Owner's Representative or Landscape Architect may request that plants orientation be rotated when planted based on the form of the plant.

I. Backfill the space around the root ball with the same planting soil or existing soil that was excavated for the planting space.

J. Brace root ball by tamping Planting Soil around the lower portion of the root ball. Place additional Planting Soil around base and sides of ball in six-inch (6″) lifts. Lightly tamp each lift using foot pressure or hand tools to settle backfill, support the tree and eliminate voids. DO NOT over compact the backfill or use mechanical or pneumatic tamping equipment. Over compaction shall be defined as greater than 85% of maximum dry density, standard proctor when the volumetric soil moisture is lower than field capacity.

   1. When the planting hole has been backfilled to three quarters of its depth, water shall be poured around the root ball and allowed to soak into the soil to settle the soil. Do not flood the planting space. If the soil is above field capacity, allow the soil to drain to below field capacity before finishing the planting. Air pockets shall be eliminated and backfill continued until the planting soil is brought to grade level.

K. Where indicated on the drawings, build a three-inch-high, level berm of Planting Soil around the outside of the root ball to retain water. Tamp the berm to reduce leaking and erosion of the saucer.

L. Thoroughly water the Planting Soil and root ball immediately after planting.

M. Remove all nursery plant identification tags and ribbons.

N. Remove corrugated cardboard trunk protection after planting.

3.6 TREE, SHRUB, AND VINE PLANTING

A. Before 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. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare flush with adjacent finish grades.

   1. Use planting soil for backfill.

2. 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. 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.

4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Set container-grown stock plumb and in center of planting pit or trench with root flare flush with adjacent finish grades.

1. Use planting soil for backfill.

2. Carefully remove root ball from container without damaging root ball or plant.

3. 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.

4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Set and support bare-root stock in center of planting pit or trench with root flare flush with adjacent finish grade.

1. Use planting soil for backfill.

2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.

3. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about 1 inch from root tips; do not place tablets in bottom of the hole or touching the roots.

4. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. 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.

3.7 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 Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by 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.

3.8 PLANTING BED FINISHING

A. After planting, smooth out all grades between plants before mulching.

B. Separate the edges of planting beds and lawn areas with a smooth, formed edge cut into the turf with the bed mulch level slightly lower, 1 and 2 inches, than the adjacent turf sod or as directed by the Owner's Representative. Bed edge lines shall be as depicted on the Drawings.

3.9 LANDSCAPE EDGING INSTALLATION

A. Preparation: Ensure that all underground utility lines are located and will not interfere with the proposed edging installation before beginning work. Locate border line of edging with string or other means to assure border straightness and curves as designed. Bed edge lines shall be as depicted on the Drawings. Dig trench 1 inch deeper than set of edging bottom.

B. Set edging into trench with top at ½ inch above compacted finish grade on turf side with side having loops for stakes placed on opposite side of turf. Drive stakes through edging loops until locked in place. Requires 3 stakes evenly spaced for each 8 feet section with a total of 8 stake loops available in each 16 feet section if necessary. Provide additional stakes at approximately 24 inches apart, longer stakes, heavier gage stakes, or any combination of previously mentioned as necessary to firmly secure edging for permanent intended use.

C. Where edging sections turn at corners and at angled runs, cut edging partially up through its height from bottom and turn back to desired angle to form rounded exposed radius.

D. Backfilling and Cleanup: Backfill both sides of edging, confirm and adjust if necessary that sections are securely held together, and compact backfill material along edging to provide top of edging at 1 inch above turf finish grade. Cleanup and remove excess material from site.

3.10 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 four-foot radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.

2. Organic Mulch in Planting Areas: Apply 2-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.11 WATERING

A. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants from the point of installation until the date of Substantial Completion Acceptance. The Contractor shall adjust the automatic irrigation system, if available, and apply additional or adjust for less water using hoses as required.

B. Hand water root balls of all plants to assure that the root balls have moisture above wilt point and below field capacity. Test the moisture content in each root ball and the soil outside the root ball to determine the water content.

C. The Contractor shall install 15 gallon watering bag for each tree to be maintained and used for tree watering during the warranty period.

D. The watering bags shall remain the property of the Owner at the completion of the work.

3.12 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. 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.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

D. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner’s property.

3.13 PLANT MAINTENANCE PRIOR TO SUBSTANTIAL COMPLETION

A. During the project work period and prior to Substantial Completion Acceptance, the Contractor shall maintain all plants.

B. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

C. 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.

D. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.14 SUBSTANTIAL COMPLETION ACCEPTANCE

A. Upon written notice from the Contractor, the Owners Representative shall review the work and make a determination if the work is substantially complete.

1. Notification shall be at least 7 days prior to the date the contractor is requesting the review.

B. The date of substantial completion of the planting shall be the date when the Owner's Representative accepts that all work in Planting, Planting Soil, and Irrigation installation sections is complete.

C. The Plant Warranty period begins at date of written notification of substantial completion from the Owner's Representative. The date of substantial completion may be different than the date of substantial completion for the other sections of the project.

3.15 END OF WARRANTY FINAL ACCEPTANCE

A. At the end of the Warranty period the Owner's Representative shall observe the work and establish that all provisions of the contract are complete and the work is satisfactory.

B. If the work is satisfactory, the maintenance period will end on the date of the final observation.

C. If the work is deemed unsatisfactory, the maintenance period will continue at no additional expense to the Owner until the work has been completed, observed, and approved by the Owner's Representative.

END OF SECTION

SECTION 32 9200

TURF AND GRASS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide all labor, materials, equipment, services, and perform all operations necessary to complete the work of this section as indicated within the drawings and specified herein which shall include, but is not limited to, the following:

1. Supplying screened loam.

2. Preparation and spreading of stockpiled topsoil (if available).

3. Fine grading.

4. Fertilizers and additives as necessary.

5. Seeding.

6. Erosion Control Matting.

7. Maintenance including watering.

B. Contractor is responsible for all health and safety.

1.2 QUALITY ASSURANCE

A. The Contractor must be a member in good standing of the Associated Landscape Contractors of America.

B. The Contractor must show previous evidence of having successfully installed and maintained landscape projects of similar scope to the subject project with regard to quantities of seeding involved, complexity and a minimum of five (5) years experience on projects similar to this one. The Owner's Representative shall have the right to review the qualifications and references of the Contractor for approval to work on this project.

C. Source Quality Control:

1. Analysis and standards: Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

D. Within 30 days after award of Contract and before any seeding materials are delivered to the job site, submit to the Owner a complete list of all seeding and other items proposed to be installed. At least 10 days prior to shipment delivery of materials, the Contractor shall submit to the Owner a one (1) cubic foot representative sample, certifications, certified test results for materials as specified below. The Contractor shall provide a listing of the addresses (locations) identifying the origin of the soil to be delivered. If the origin is from multiple locations, test results must be provided for each source as well as the blended final product and all locations shall be provided at the time of submission of required information specified above. No material shall be ordered or delivered until the required submittals have been submitted and approved by the Owner. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The Owner reserves the right to reject, on or after delivery, any material that does not meet these specifications.

E. Existing Topsoil from Stockpile may be used providing it can be made to comply with the specifications for screened loam. The Contractor shall provide representative samples for testing and approval. Two (2) test samples of shall be taken and analyzed from each potential loam borrow pit and two each shall be taken and analyzed of existing topsoil stockpiled on site. Site of sample shall comply with testing lab requirements. Contractor shall deliver samples to testing laboratory, have testing report sent directly to the Owner's Representative and pay all costs. Report shall be submitted at least one (1) month before any loaming is to be done.

1. Mechanical and chemical analysis shall be by a public extension service agency or a certified private testing laboratory in accordance with the current "Standards" of the Association of Official Agriculture Chemists and acceptable to the Landscape Architect.

2. Soil test report shall include a mechanical sieve analysis with soil classification. Organic content shall be reported. Chemical analysis shall include pH (1:1 soil-water ratio), buffer pH, Soluble Salts (1:2 soil-water ratio), Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Aluminum, Magnesium, Manganese, Ferric Iron and Sulfate.

3. Test report shall clearly recommend appropriate additives including limestone and fertilizer requirements.

1.3 RELATED SECTIONS

A. Section 31 2310—EARTHWORK

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 3300—SUBMITTAL PROCEDURES:

1. Sod—statement of composition percentages of purity and germination of each variety.

2. Soil analysis in accordance with the current "Standards of the Association of OFFICIAL Agricultural Chemists".

3. Provide watering and fertilizing schedule to Landscape Architect for approval.

4. Provide two marked up prints to the Landscape Architect indicating square footages for all lawn areas with quantities of all soil additives and sod for each area prior to beginning work.

1.5 PROJECT CONDITIONS

A. All areas to be seeded shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Landscape Architect prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas to be seeded, and he shall assume full responsibility for the work of this Section.

1.6 REFERENCES

A. The work shall conform to the codes and standards of the following agencies, publications as further cited herein:

B. AAN: American Association of Nurserymen, Inc., “Standards for Nursery Stock” ANSI Z60.1—1980, or current edition.

C. ASTM: ASTM International (ASTM), 1916 Race Street, Philadelphia, Pennsylvania, 19103, USA as Published in “Compilation of ASTM Standards in Building Codes”.

D. BHCU: Bailey Hortorium of Cornell University, 1976, Hortus Third, A Concise Dictionary of Plants Cultivated in the United States and Canada (for nomenclature).

E. NAA: National Arborist Association, 3537 Stratford Road, Wantagh, New York, 11793, USA, as published in “Standards for Pruning Shade Trees...”, 1979, or latest edition (for pruning standards).

F. USDA: United States Department of Agriculture, 1941 Yearbook, “Climate and Man” (for average last frost date at locality).

1.7 QUALITY CONTROL/QUALIFICATIONS

A. Provide affidavits from manufacturers major suppliers where required by these Specifications.

B. Fine grading and installation of sod shall be done under the supervision of a qualified foreman acceptable to the Landscape Architect.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver all items to the site in their original containers with all labels intact and legible at time of Owner’s inspection.

B. Immediately remove from the site all seeding materials, which are not true to name, and all materials, which do not comply with the provisions of this Section of these Specifications.

C. Use all means necessary to protect seeding materials before, during, and after installation and to protect the installed work and materials of all other trades.

D. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

PART 2 PRODUCTS

2.1 SCREENED LOAM

A. Screened Loam shall be "coarse sandy loam" determined by mechanical analysis (ASTM D422) and based on the "USDA" Classification System". Screened Loam has the following mechanical analysis:

Textural Class	Percentage of Total Weight	Average Percentage
Sand (0.05–2.0 mm dia. range)	45–75	60
Silt (0.002–0.05 mm dia. range)	15–35	25
Clay (Less than 0.002 mm dia. range)	5–20	15

Coarse Sandy loam shall have: less than 30% fine/very fine sand, and 50% or more medium/coarse/very coarse sand.

B. Screened Loam shall be a natural product consisting primarily of natural topsoil, free from subsoil, and obtained from an area which has never been stripped, as noted above, the location of the source of the Loam must be submitted to the Landscape Architect. Screened Loam shall not contain less than 3 percent nor more than 10 percent organic matter as determined by the loss on ignition of oven-dried samples, at 100°C ± 5°C. To adjust organic matter content, the soil may be amended, prior to site delivery, by the addition of composted leaf mold or peat moss. Use of organic amendments is accepted only if random soil sampling indicates a through incorporation of these materials. No mixing or amending of Loam will be permitted on site. The Loam shall not be delivered when in a wet or frozen condition.

C. Screened Loam shall consist of fertile, friable, natural loam capable of sustaining vigorous plant growth. Loam shall be without admixture of subsoil, and refuse, resulting in a homogeneous material free of stones greater than ½″ in the longest dimension, be free of lumps, plants, glass, roots, sticks, excessive stone content, debris, and extraneous matter. Screened Loam shall fall within the pH range of 6.0 to 6.5 except as where noted on plans and details. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The maximum soluble salt index shall be 100. Screened Loam shall not have levels of aluminum great than 200 parts per million.

D. If limestone is required to amend the screened loam to bring it within a pH range of 6.0 to 6.5 no more than 200 pounds of limestone per 1,000 square feet of loam, incorporated into the soil, or 50 pounds of limestone per 1,000 square feet of loam, surface application, within a single season.

E. The Owner will reject any material delivered to the site that, after post-delivery testing, does not meet these specifications. If the delivered screened loam does not meet the specifications stated in this document the delivered screened loam will be removed by the Contractor at the Contractor's expense and at the time of rejection.

F. The Contractor shall take representative samples of topsoil from the site and from topsoil to be hauled in and shall submit samples to a Soil Testing Laboratory for chemical analysis, and physical analysis. The Contractor shall indicate to the testing agencies that turf is to be planted and who the Owner is. The Contractor shall forward to the Owner two copies of analysis and recommendations of the testing agencies.

G. Topsoil, which has been stockpiled on the site, may be used provided it can be made to comply with these Specifications herein for screened loam.

H. All loam provided from off-site sources shall be brought to the site meeting all specification requirements. There must be no mixing or amending of soil on site. No loam shall be spread prior to screening. The loam must not be handled or moved when in a wet or frozen condition.

I. To assure loam borrow purchased and topsoil stockpiled fulfills specified requirements regarding textural analysis, organic matter content, and pH, soil testing results will be obtained by the Contractor and submitted to the Owner's Representative for approval one (1) month before any soil is delivered to the site.

2.2 SOIL ADDITIVES

A. Sand shall be clean sand, free of deleterious materials. Sand shall meet AASHTO M-6 or ASTM C33 with grain size of 0.02″–0.04″.

B. Commercial fertilizer, peat, humus or other additives shall be used to counteract soil deficiencies as recommended by the soil analysis and as directed by the Owner's Representative.

C. If stored at the site, protect fertilizer from the elements at all times.

D. Fertilizer shall be commercial fertilizer, based upon soil tests. Fertilizer mixture containing at least sixty percent (60%) of organic material.

1. Percentages of nitrogen, phosphorous and potash shall be based on laboratory test recommendations as approved by the Landscape Architect. For purpose of bidding, assume ten percent (1 0%) nitrogen, twenty percent (20%) phosphorus and six percent (6%) potash by weight. At least fifty percent (50%) of the total nitrogen shall contain no less than three percent (3%) water-insoluble nitrogen.

2. Fertilizer shall be delivered to the site, mixed as specified, in the original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear the manufacturer's guaranteed statement of analysis, or a manufacturer's certificate of compliance covering analysis shall be furnished to the Landscape Architect. Store fertilizer in a weatherproof place and in such a manner that it will be kept dry and its effectiveness will not be impaired.

3. Fertilizer shall be applied in two (2) applications. The first application shall be within one (1) week before the sodding at the rate of thirty-five (35) pounds per thousand (1,000) square feet harrowed into the top two (2) inches of sod bed. The second application shall be done as a maintenance application.

4. At least four (4) days shall lapse after the application of lime and fertilizer before sodding shall begin.

E. Humus shall be natural humus, reed peat or sedge peat. It shall be free from excessive amounts of zinc, low in wood content, free from hard lumps and in a shredded or granular form. According to the methods of testing of A.O.A.C., latest edition, the acidity range shall be approximately 5.5 pH to 7.5 pH and the organic matter shall be not less than 85% as determined by loss on ignition. The minimum water absorbing ability shall be 200% by weight on an oven-dry basis.

F. Manure shall be well-rotted, unbleached stable manure not less than eight months and not more than two years old. It shall be free from sawdust, shavings or refuse of any kind and shall not contain over twenty-five (25) percent straw. The Contractor shall furnish information as to the kind of disinfectant or chemicals, if any, that may have been used in storage of the manure.

G. Lime: Natural dolomitic limestone containing not less than 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not less than 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not less than 90 percent passes a 10-mesh sieve and not less than 50 percent passes a 100-mesh sieve.

H. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than 18% available phosphoric acid. Superphosphate shall be applied with the fertilizer at the rate of twenty (20) pounds per thousand (1,000) square feet. At least four (4) days shall lapse after the application of lime and fertilizer before sodding shall begin.

I. Aluminum Sulfate: Commercial grade.

J. Bonemeal: Commercial, raw, finely ground; 4 percent nitrogen and 20 percent phosphoric acid.

K. Water: The Contractor shall be responsible for furnishing his own supply of water to the site at no extra cost. If possible, the Owner will furnish the Contractor upon request with an adequate source and supply of water at no charge. However, if the Owners water supply is not available or not functioning, the Contractor will be held responsible to furnish water.

1. Water shall be free from impurities injurious to vegetation.

2.3 SEED

A. Lawn Areas

1. Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall weed seed content exceed 1% by weight. The seed shall be furnished and delivered in the proportion specified below in new, clean, sealed and properly labeled containers. All seed shall comply with State and Federal seed laws. Submit manufacturers Certificate of Compliance. Seed that has become wet, moldy or otherwise damaged will not be acceptable.

a. Manufacturer: Pearl's Premium or an equivalent seed blend to the following:

Purity	Seed Species	Germination Rate
19.75%	Dakota Tall Fescue	90%
19.75%	Frontier Perennial Ryegrass	92%
19.65%	Deepblue Kentucky Bluegrass	88%
19.65%	Harpoon Hard Fescue	80%
19.65%	Carmen Chewings Fescue	90%
01.47%	Inert Matter	

00.05%	Other Crop Seed
00.03% (max.)	Weed Seed

2. Seed mixture to be applied at the following rate:

   a. Five (5) pounds per 1,000 square feet.

3. Seed shall be mixed by a dealer.

2.4 EROSION CONTROL MATTING

A. Shall be on all slopes 2:1 and greater in slope.

B. Jute mesh shall be a uniform, open, plain weave cloth of undyed and unbleached single jute yarn. The yarn shall be of a loosely twisted construction and it shall not vary in thickness more than one-half its normal diameter. Jute mesh shall be furnished in rolled strips and shall meet the following requirements:

Width—48 inches, plus or minus one inch
78 warp—ends per width of cloth (minimum)
41 weft—ends per yard (minimum)
Weight shall average 1.22 pounds per linear yard with a tolerance of plus or minus 5%.

C. Staples shall be U-shaped and shall be approximately six inches long and one inch wide. Machine made staples shall be of No. 11 gauge or heavier steel wire. Handmade staples shall be made from 12-inch lengths of No. 9 gauge or heavier steel wire.

PART 3 EXECUTION

3.1 PREPARATION OF PLANTING SOIL

A. Mix specified soil amendments and fertilizers with topsoil and/or loam borrow at rates specified by testing agency. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.

B. Loam, organic material and bonemeal for plant backfill for both planting beds and individual plants shall be thoroughly premixed in the proportions of one (1) part of organic material with seven (7) parts of loam together with ten (10) pounds of bonemeal per cubic yard of mixture.

C. Maintain at all times during the planting operations one or more stockpiles of approved loam borrow or topsoil from stockpile.

3.2 FINE GRADING AND LOAMING

A. After the areas to be loamed have been brought to rough grade, and immediately prior to spreading the loam borrow or topsoil, the subgrade shall be loosened by disking or rototilling to a depth of at least three inches to permit bonding of the loam to the subsoil. Remove all stones greater than one (1) inch in diameter and all debris or rubbish. Such material shall be removed from the site, at no additional cost to the Owner.

B. Provide a minimum depth of six (6) inches of planting soil in all areas indicated for seeding and all areas disturbed by excavation and construction operations.

C. Screened loam borrow or screened topsoil from stockpile shall be placed and spread over approved areas to a depth sufficiently greater than six inches so that after natural settlement and light rolling, the completed work will conform to the lines, grades, and elevations indicated. Supply additional loam, after testing and approval as may be needed, to give the specified depths and finished grades under the Contract without additional cost to the Owner.

D. Disturbed areas outside the limit of seeding shall be spread with six (6) inches of screened loam or screened topsoil to the finished grade as specified herein above.

E. No subsoil or loam shall be handled in any way if it is in a wet or frozen condition.

F. Sufficient grade stakes be set for checking the finished grades. Stakes must be set in the bottom of swales and at top of slopes. Grades shall be established which are accurate to one tenth of a foot either way. Connect contours and spot elevations with an even slope.

G. After loam has been spread, it shall be carefully prepared by scarifying or harrowing and hand raking. All large stiff clods, lumps, brush, glass, roots, stumps, litter and other foreign matter, and stones over one inch in diameter shall be removed from the loam. Loam shall also be free of smaller stones in excessive quantities as determined by the Owner's Representative.

H. The whole surface shall then be rolled with a hand roller weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlements or rolling shall be filled with additional loam and the surface shall be regraded and rolled until it presents a smooth and even finish to the required grade.

I. Contractor shall obtain Owner's Representatives written approval of fine grading and bed preparation before doing any seeding or sodding.

3.3 SEEDING

A. All areas indicated on the plan shall be loamed and seeded only after written approval of the Owner's Representative of bed preparation. All disturbed areas outside the limit of seeding shall be seeded.

B. Immediately before seeding, the ground shall be restored, as necessary, to a loose friable condition by dicing or other approved method to a depth of not less than 2″. The surface shall be cleared of all debris and of all stones 1″ or more in diameter.

C. Seeding shall be done only during the period from April 1 to May 30 or August 15 to October 15. The actual planting of seed shall be done, however, only during periods within this season which are normal for such work as determined by weather conditions and by accepted practice in this locality. At his option, and on his responsibility, the Contractor may plant seed under unseasonable conditions at no increased cost to the Owner.

D. Seeding of lawns shall be done only by experienced workmen under the supervision of a qualified foreman.

E. Soil additives shall be spread and thoroughly incorporated into the layer of loam by harrowing or other methods approved by the Owner's Representative. The following soil additives shall be incorporated.

1. Spread ground limestone as required by soil analysis to achieve a pH of 6 to 6.5, but the maximum amount applied shall be one pound per square yard.

2. Spread fertilizer at the rate of forty (40) pounds per one thousand (1,000) square feet or more as required by soil analysis.

3. Spread Superphosphate at the rate of twenty (20) pounds per one thousand (1,000) square feet.

4. Incorporate humus in the soil as required by soil analysis prior to delivery to site. Contractor shall have loam retested with organic matter incorporated and shall obtain approval prior to brining any loam on the site.

F. Seed only when the bed is in a friable condition, not muddy or hard.

G. Seed all areas to be seeded with specified grass seed, sowing evenly with an approved mechanical seeder at the rate of 6 pounds per 1,000 square feet. Sow 3 pounds per 1,000 square feet in one direction and 3 pounds per 1,000 square feet at right angles to the first seeding. Spread seed when soil is moist. Cultipacker, or approved similar equipment, may be used to cover the seed and to firm the seedbed in one operation. In areas inaccessible to cultipacker, the seeded ground shall be lightly raked and rolled in two directions with a water ballast roller. Extreme care shall be taken during seeding and raking to insure that no change shall occur in the finished grades and that the seed is not raked from one spot to another. Hydroseeding is an acceptable manner of seeding, providing the Contractor certifies in writing that the hydro-seed fertilizer mix is as herein specified and applied at the equivalent rate of 6 pounds per 1,000 square feet.

H. If covering and rolling is not properly accomplished by the seeding machine, the seed shall be lightly raked into the ground, after which the ground shall be rolled with a five hundred pound roller and thoroughly and evenly watered with a fine spray to penetrate the soil to a depth of at least two (2) inches.

I. Promptly after seeding, wet the seedbed thoroughly, keeping all areas moist throughout the germination period.

J. Mulch shall be placed immediately after seeding. Straw or salt marsh hay that has been thoroughly fluffed shall be spread evenly and uniformly at the rate of two to three tons per acre. Lumps and thick mulch materials shall be thinned. All mulch anchor stakes, strings and matting shall be removed before final acceptance of lawns. In addition, following mulching, all slopes of 3:1 or greater shall be covered with jute, biodegradable tobacco netting or approved equal. Securely stapled in place. Overlap all joints in netting a minimum of 6″.

K. Hydroseed mix: All work shall be installed using an approved spraying machine specifically used for this purpose. Amounts of fertilizer used shall be as the testing agency recommendations prescribe and as directed by the Owner’s Representative. The Contractor shall submit to the Owner’s Representative for approval prior to the start of any seeding work, a certified statement as to the number of pounds and types of fertilizer, amounts and types of grass seed and processed fiber per one hundred (100) gallons of water.

1. Hydromulch shall be Terra-Sorb GB or approved equal

    a. Add Terra-Sorb to the hydroseed tank at the rate of sixty (60) pounds per acre.

3.4 EROSION CONTROL MATTING

A. Jute mesh shall be placed within 48 hours after finish grading or topsoiling of an area is completed. If seeding is specified, within 24 hours after seeding of an area is completed. The jute mesh shall be placed in a manner that will minimize disturbance of the underlying soil. All equipment and application processes shall be approved by the LANDSCAPE ARCHITECT prior to use.

B. The surface shall be smoothed and all gullies and potholes backfilled prior to applying jute mesh. All rocks or clods larger than two inches in size and all sticks and other foreign material that will prevent contact of the jute mesh with the surface shall be removed. If the surface is extremely dry, the ENGINEER may require watering prior to placement.

C. Jute mesh shall be placed uniformly, in contact with the underlying soil, at the locations shown on the Drawings or directed by the LANDSCAPE ARCHITECT. The top edge of each strip shall be anchored by placing a tight fold of mesh vertically in a six inch deep slot or trench in the soil and tamping and stapling in place. Edges of adjacent strips shall be lapped six inches with a row of staples at a maximum interval of three feet in the lapped area. Bottom edges shall be lapped 12 inches over the next lower strip, if applicable, or buried as specified for top edges.

D. Check slots shall consist of separate four foot strips of jute mesh placed at right angles to the direction of water flow immediately prior to placing the general covering of jute mesh. Check slots shall be anchored by burying the top edge of the strip as described above.

E. Check slots shall be spaced so that one check slot, or junction slot of the jute mesh occurs every 75 feet on gradients of less than 4% and every 50 feet on gradients of more than four percent. On slope drains, a check slot or an end slot shall occur every 25 feet unless otherwise specified.

F. Edges of jute mesh shall be buried around the edges of catch basins and other structures.

G. Jute mesh shall be held in place by wire staples driven vertically into the soil. The mesh shall be fastened at intervals not more than three feet apart in three rows for each strip of mesh, with one row along each edge and one row alternately spaced in the middle. All ends of the mesh and check slots shall be fastened at six inch intervals across their width.

H. The Contractor shall maintain the areas covered by jute mesh until final acceptance of the project. Prior to final acceptance, any damaged areas shall be reshaped as necessary, reseeded, if applicable; and the jute mesh satisfactorily repaired or replaced.

3.5 MAINTENANCE FOR SEEDED AREAS

A. Maintenance shall begin immediately after any area is seeded and shall continue until final acceptance, but in no case, less than the following period.

1. Sixty (60) days after substantial completion of seeding.

a. Maintenance may continue until the next growing season if in the opinion of the Owner’s Representative the season enters a winter dormancy and no maintenance should continue.

b. Seeded lawns shall be maintained until all areas have a close stand of grass which has received a minimum of three mowings, has no bare spots greater than two inches in diameter, and at least 90% of the grass established shall be permanent grass species.

B. Maintenance shall include reseeding, mowing, watering, weeding and fertilizing.

C. Watering of Seeded Areas:

1. First Week: The Contractor shall provide all labor and arrange for all watering necessary to establish an acceptable lawn. In the absence of an adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of at least two inches.

2. Second and Subsequent Weeks: Water seeded areas as necessary to supplement natural rain to the equivalent of one (1) inch rainfall per week The Contractor shall water the lawn as required to maintain adequate moisture, in the upper two inches of soil, necessary for the promotion of deep root growth.

3. Watering shall be done in a manner, which will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply one complete coverage to the seeded areas in an eight (8) hour period.

D. Protection:

1. Seeded areas shall be protected by stakes and caution tape or snowfence as directed by the Landscape Architect. Wire shall not be used.

2. Barriers must be raised immediately after seeding and shall be maintained until acceptance.

E. Reseeding: After the grass in seeded areas has appeared, all areas and parts of areas which, in the opinion of the Owner's Representative, fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas shall be seeded repeatedly until all areas are covered with a satisfactory growth of grass. Reseeding together with necessary grading, fertilizing, and trimming shall be done at the expense of the Contractor.

F. Mowing:

1. At the time of the first cutting, there shall be a uniform stand between 3″ and 3½″ high, and mower blades shall be set between 2½″ and 3″ high.

2. Mowing shall include removal of clippings.

G. Fertilizing: A second application of fertilizer, as specified herein, shall be applied after one (1) season of growth of a minimum of two (2) months duration, but only during the months of April, May, August or September. Fertilizer shall be applied at the rate of thirty (30) pounds per one thousand (1,000) square feet.

H. Liming: If more than one initial application of limestone is required by the soils analysis to bring the pH of the stockpiled topsoil/loam borrow to a specified range, the Contractor shall be responsible for all additional required lime applications.

3.6 CLEANUP AND PROTECTION

A. During seeding work, keep pavements clean and work area in an orderly condition.

B. Protect seeding work and materials from damage due to landscape operations, operations by other Contractors or trades, and trespassers.

1. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.7 ACCEPTANCE

A. The Owner shall inspect all work for Acceptance upon written request of the Contractor. The request shall be received at least 10 calendar days before the anticipated date of inspection. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Owner, he shall certify in writing to the Contractor as to the Acceptance of the work.

3.8 ACCEPTANCE IN PART

A. The work may be accepted in parts when it is deemed to be in the Owner's best interest to do so and when approval is given to the Contractor in writing to complete the work in parts. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

3.9 CLEANUP

A. When any of this work is done while buildings are occupied, pavements shall be kept clear at all times, broom cleaned to prevent tracking dirt into buildings.

B. After completion of all planting operations, dispose of all debris and excess material to the satisfaction of the Owner. All pavements shall be swept and hosed clean.

3.10 FINAL INSPECTION AND ACCEPTANCE

A. At the end of the guarantee period, the Owner will inspect all guaranteed work for the Final Acceptance upon written request of the Contractor. The request shall be received at least 10 calendar days before the anticipated date for final inspection.

B. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Owner at that time, he shall certify in writing to the Contractor as to the Final Acceptance of the project.

END OF SECTION

DIVISION 33
UTILITIES

SECTION 33 4000

STORM DRAINAGE SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Installation of new storm drain pipe, catch basins, and area drains.

2. Relocation and/or replacement of existing storm drain pipe and catch basins.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

D. Contractor is solely responsible for obtaining permits or approvals which may be required to perform the work of this section, including all costs, fees and taxes required or levied. Notify and obtain such permits or approvals from all agencies having jurisdiction prior to starting work.

1.2 REFERENCE STANDARDS

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. ASTM International (ASTM)

1. ASTM A36—Standard Specification for Carbon Structural Steel.

2. ASTM A48—Standard Specification for Gray Iron Castings.

3. ASTM A123—Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

4. ASTM A307—Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

5. ASTM A536—Standard Specification for Ductile Iron Castings.

6. ASTM A615—Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

7. ASTM C12—Standard Practice for Installing Vitrified Clay Pipe Lines.

8. ASTM C14—Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.

9. ASTM C55—Standard Specification for Concrete Building Brick.

10. ASTM C76—Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

11. ASTM C94—Standard Specification for Ready-Mixed Concrete.

12. ASTM C139—Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.

13. ASTM C150—Standard Specification for Portland Cement.

14. ASTM C207—Standard Specification for Hydrated Lime for Masonry Purposes.

15. ASTM C270—Standard Specification for Mortar for Unit Masonry.

16. ASTM C387—Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.

17. ASTM C425—Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.

18. ASTM C443—Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

19. ASTM C443—Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

20. ASTM C478—Standard Specification for Precast Reinforced Concrete Manhole Sections.

21. ASTM F493—Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

22. ASTM C507—Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.

23. ASTM C564—Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

24. ASTM F656—Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

25. ASTM C700—Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.

26. ASTM C877—Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.

27. ASTM C890—Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

28. ASTM C913—Standard Specification for Precast Concrete Water and Wastewater Structures.

29. ASTM C923—Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

30. ASTM C990—Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants.

31. ASTM C1479—Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations

32. ASTM C 1628—Standard Specification for Joints for Concrete Gravity Flow Sewer Pipe, Using Rubber Gaskets.

33. ASTM D1784—Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

34. ASTM D1785—Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120.

35. ASTM D2235—Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

36. ASTM D2241—Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

37. ASTM D2321—Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

38. ASTM D2412—Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.

39. ASTM D2466—Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

40. ASTM D2467—Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

41. ASTM D2564—Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

42. ASTM D2855—Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

43. ASTM D2665—Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

44. ASTM D2729—Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

45. ASTM D2855—Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

46. ASTM D3212—Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

47. ASTM D3350—Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

48. ASTM D4396—Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Nonpressure Applications.

49. ASTM F402—Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings.

50. ASTM F405—Corrugated Polyethylene (PE) Tubing and Fittings.

51. ASTM F477—Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

52. ASTM F656—Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

53. ASTM F679—Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

54. ASTM F714—Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

55. ASTM F758—Smooth-Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage.

56. ASTM F894—Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe.

57. ASTM F1803—Standard Specification for Poly (Vinyl Chloride)(PVC) Closed Profile Gravity Pipe and Fittings Based on Controlled Inside Diameter.

58. ASTM F2306—Standard Specification for 12 to 60 inch [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.

59. ASTM F2648—Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.

D. American Concrete Pipe Association (ACPA).

1. ACPA 01-103—Concrete Pipe and Box Culvert Installation (latest revision and applicable supplements thereto).

E. American Association of State High and Transportation Officials (AASHTO).

1. AASHTO H20—Standard Specifications for HS-20, Highway Loading.

2. AASHTO M105—Standard Specification for Gray Iron Castings.

3. AASHTO M198—Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.

4. AASHTO M252—Standard Specification for Corrugated Polyethylene Drainage Pipe.

5. AASHTO M294—Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter.

F. Corrugated Polyethylene Pipe Association (CPPA), division of the Plastics Pipe Institute (PPI).

1. Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings (latest revision and applicable supplements thereto).

G. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction, Form 818, 2020 and any supplements.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings, descriptive literature, or both, showing pipe materials and appurtenances to be furnished. Shop drawings shall be submitted to Engineer for approval prior to ordering materials.

2. Shop drawings showing the configuration, dimensions, layout, and spacing of major and minor components such as pipe, joints, couplings, restraints, and other proposed details of assembly. Show in large-scale details any unique assembly, pipe/pipe transitions, pipe/structure transitions, and/or installation requirements.

B. Copies of manufacturer-provided installation instructions, operation instructions, and maintenance material for all equipment furnished under this Section.

C. Manufacturer's warranties and associated warranty registration data in Owner's name. Submit two (2) copies of each warranty to Engineer in the manufacture/supplier standard form or if there is no standard form available, in a form specified by Engineer.

D. As-Built Drawings.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.

C. Sample pipe for testing, when requested by Engineer, shall be furnished by Contractor in sufficient numbers. The Contractor and/or the pipe manufacturer shall make the facilities and services for making the load tests available.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage

1. Manufacturer shall package the pipe and other drainage materials in a manner designed to deliver the pipe to the Project Site neatly, intact, and without physical damage. Transportation carrier shall use an appropriate method to ensure the pipe is properly supported, stacked, and restrained during transport. Inspect materials delivered to site for damage; store with minimum of handling.

2. Unloading of the pipe and other drainage materials should be controlled so as not to collide with the other pipe sections or fittings, and care should be taken to avoid chipping or spalling, especially to the spigots and bells. For manhole sections, cone sections, bases, fittings and other precast appurtenances, utilize lifting holes or lifting eyes provided.

3. In cold weather conditions, use caution to prevent impact damage. Handling methods considered acceptable for warm weather may be unacceptable during cold weather.

4. Storage:

a. Store materials on site in enclosures or under protective coverings. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

b. Pipe shall be stored on clean, level ground to prevent undue scratching or gouging.

c. Store solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials under cover out of direct sunlight. Provide additional storage measures in accordance with the manufacturer's recommendations. Discard materials if storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

d. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

e. Cement, Aggregate, and Reinforcement: As specified in Section 033200—Site Cast-in-Place Concrete.

f. Store manhole units in an upright position.

PART 2 MATERIALS

2.1 GENERAL

A. Products furnished under this Section which are damaged or found defective in any way prior to being set in place and final acceptance, may be rejected. Engineer may reject an entire lot of pipe should the sample pipe from such lot fail to meet requirements.

2.2 CONCRETE GRAVITY PIPE

A. Reinforced concrete pipe:

1. Pipe less than 12 inches in diameter: ASTM C14, Class 3.

2. Pipe greater than 12 inches in diameter: ASTM C76, Class 3.

3. Class 4 pipe shall be required when cover is less than 12 inches.

B. Fittings and specials: conform to the applicable requirements specified for the pipe.

C. Gaskets and pipe ends for rubber gasket joint: ASTM C443.

2.3 CORRUGATED POLYETHYLENE PIPE

A. Pipe: High density polyethylene, corrugated, smooth interior, ASTM D3350, Cell Classification 424420C.

1. Four (4) inch through 10-inch diameter pipe: AASHTO M252, Type S.

2. 12 inch through 60-inch diameter pipe: AASHTO M294, Type S or ASTM F2306.

B. Joints: Bell-and-spigot joint, AASHTO M252, AASHTO M294, or ASTM F2306. Bell shall be an integral part of the pipe and provide a minimum pull-apart strength of 400 pounds. Bell-and-spigot joint shall incorporate a gasket making it silt-tight. Gaskets shall be installed in the bell, or on the pipe by the pipe manufacturer.

1. Four-inch (4″) through 60-inch (60″) diameter pipe joint, watertight, ASTM D3212. Gaskets: polyisoprene, ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

2. 12-inch (12″) through 60-inch (60″) diameter pipe shall have a reinforced bell with a bell tolerance device. The bell tolerance device shall be installed by the manufacturer.

3. Coupling bands shall conform to the manufacturer’s specifications. Couplers shall cover not less than one corrugation on each section of pipe.

C. Fittings: AASHTO M252, AASHTO M294, or ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the watertight joint performance requirements of AASHTO M252, AASHTO M294 or ASTM F2306.

D. Saddle Tee

1. Saddle tees shall be manufactured saddle tees designed to connect to the corrugated polyethylene pipe.

2. Fittings shall conform to AASHTO M 294. Fabricated fittings shall be welded on the interior and exterior of all junctions.

3. A soil-tight seal shall be obtained with the coupling at the saddle tee stub to the storm service pipe.

2.4 POLYVINYL CHLORIDE (PVC) GRAVITY PIPE

A. Polyvinyl Chloride Pipe formulated for drainage application:

1. Pipe 4-inch to 15-inch diameter: ASTM D3034, SDR-35. Elastomeric gasket joints, retained gaskets, part of a complete pipe section and supplied as such.

2. Pipe 18 inch to 36-inch diameter: ASTM F679. Elastomeric gasket joints, retained gaskets, part of a complete pipe section and supplied as such.

B. PVC Cell classification: 12454 or 12364, ASTM D1784.

C. Pipe shall have a minimum pipe stiffness that equals or exceeds 46 psi (lbs/in.^{2}).

D. Pipe shall be marked along the outside of the barrel with the following:

1. The manufacturer's name or trademark.

2. The standard to which it conforms/ASTM Designation.

3. Pipe size.

4. Material designation code/PVC cell classification.

5. SDR number or schedule number.

E. Standard length of pipe: maximum of 20 feet with the following exceptions.

1. Length of 6-inch pipe shall be a maximum of 13 feet unless otherwise approved by Engineer.

2. Pipe used in house connections and/or laterals shall not exceed 6.5 feet in length unless otherwise approved by Engineer.

F. PVC Plastic Gravity Joints and Jointing Material.

1. Joints: ASTM D3213, gasketed, bell-and-spigot, push-on type.

2. Gaskets: ASTM F477. Since each pipe manufacturer has a different design for push-on joints, gaskets shall be part of a complete pipe section and provided as such. Gaskets may be factory installed or field installed as recommended by the pipe manufacturer. Lubricant shall be as recommended by the pipe manufacturer.

G. Fittings: SDR-35, ASTM D3034 and ASTM F1336, specifications as pipe.

H. The manufacturer shall provide waterstops acceptable to Engineer, which shall be applied to the outside of the plastic pipe where the pipe is to be enclosed in any structure where concrete or mortar is used to prevent leakage along the outer wall of the barrel of the pipe.

I. No single piece of pipe shall be laid on any project covered by these specifications unless it is found to be generally straight. Such pipe shall have a maximum ordinate as measured from the concave side of the pipe not to exceed 1/16 inch per foot of length. If the deviation from straightness exceeds this requirement, then the particular piece of pipe shall be rejected.

2.5 UNDERDRAIN

A. Pipe: Perforated Polyvinyl Chloride (PVC) Gravity Pipe or Corrugated Polyethylene Pipe as indicated on the Drawings.

1. Perforated Polyvinyl Chloride (PVC) Gravity Pipe: ASTM F758.

a. Perforations shall be uniformly spaced along the length and circumference of the pipe.

b. Joints: Solvent weld with primer (ASTM F656) and solvent cement (ASTM F493) per ASTM D2855 or integrally-formed bell and spigot gasketed connections with elastomeric seals (gaskets) meeting the requirements of ASTM F477.

2. Corrugated Polyethylene Pipe: AASHTO M252 Type SP (Double Wall).

a. Perforations: Class 2 slotted perforations per AASHTO M252. Perforations shall be uniformly spaced along the length and circumference of the pipe.

b. Joints: Joint: Silt-tight, ASTM D3212.

2.6 JOINT LUBRICANT

A. As specified by pipe manufacturer, ANSI/AWWA C111/A21.11.

2.7 CATCH BASINS

A. Reinforced precast concrete base, sump, transition, riser, corbel, and top: ASTM C913 for precast rectangular catch basins, ASTM C478 for precast circular catch basins. Type, construction, and dimensions as indicated on the Drawings.

1. Concrete: 4,000 psi minimum, 4%–7% entrained air.

2. Reinforcement: ASTM C890. Steel bars, ASTM A615. Welded-wire fabric, ASTM A185. Additional reinforcing at openings.

3. Precast sections shall consist of smooth sections in standard nominal inside diameters. All precast concrete sections shall be free from cracks, damaged joints, exposed reinforcing, aggregate pockets, spalls, and dimensional distortions or other irregularities. Lifting holes shall be filled with mortar, or other approved material.

4. Openings or “knockouts” in precast units shall be located as shown on the Drawings and to accommodate the inflow and outflow pipe orientation required. Openings shall be sized sufficiently to permit passage of the largest outside dimension of pipe or fittings. Prior to ordering precast manhole bases, all angles between incoming pipes are to be field checked to incorporate possible line changes required in the field layout.

B. Gaskets for joints between sections: Butyl rubber, ASTM C443.

C. Grade Rings: ASTM C478, precast reinforced concrete, 1-inch to 4-inch thickness, dimensions to match basin and top section.

D. Frame and Grate.

1. Cast iron: AASHTO M 105, Class 25 for frames and Class 30 for grates.

2. Cast steel: ASTM A27, Grade optional, thoroughly annealed.

3. Structural Steel: ASTM A36, or A283, Grade B or better, as to quality and details of fabrication, except that in the chemical composition of the steel, the 1/10 of 1% of copper may be omitted.

4. Grate type: ConnDOT “Type A” unless otherwise specified.

5. Covers and gratings shall bear uniformly on their supports.

6. Frame and grate shall be ConnDOT Form 818 M.06.03. Cast Iron frames and grates shall not be galvanized.

2.8 YARD DRAIN/AREA DRAIN

A. Configured as indicated on the Drawings. Pre-formed PVC unit with integral inlets/outlets or PVC pipe stock assembled to provide a complete unit. Provide pipe adaptors as required to connect to drainage piping of the type specified.

B. Frame and Grate: Ductile iron as an integral part of the surface drainage inlet and furnished by the same manufacturer of the drain, frame and grate set manufactured for use on PVC pipe, or insert-type grate manufactured for use on PVC pipe.

1. Grates for drain basins shall be capable of supporting H-20 wheel loading for traffic areas or H-10 loading for pedestrian areas.

2. 12″ and 15″ square grates will be hinged to the frame using pins. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron.

3. Grates shall be provided painted black.

2.9 CONCRETE MANHOLE

A. Precast concrete manhole risers, base sections, and tops: ASTM C478. Precast manhole sections shall consist of smooth circular sections in standard nominal inside diameters. All precast concrete manhole sections shall be free from cracks, damaged joints, exposed reinforcing, aggregate pockets, spalls, and dimensional distortions or other irregularities. Lifting holes, when provided, shall be filled with mortar, or other approved material.

1. Concrete: 4,000 psi minimum, 4%–7% entrained air.

2. Diameter: 48 inches unless otherwise indicated.

3. Base and first riser: Monolithic and built to the dimensions and requirements indicated on the Drawings.

a. Bottoms shall be integrally cast unless specialty bases at points of connection to existing piping (“Dog-House”) is indicated on the Drawings or otherwise proposed for use. Unless indicated on the Drawings, any special bases or riser used must be detailed in shop drawings and submitted for approval.

4. Riser sections: As required to provide depths indicated.

5. Top Section: Concentric-cone type, unless eccentric-cone or flat-slab-top type is indicated. Cones shall have the same wall thickness and reinforcement as riser sections. If required or called-for, flat slab shall be a minimum of 8 inches thick designed to carry AASHTO H-20 loading with one foot cover and conform to ASTM C478.

6. External damp-proofing: Asphalt, ASTM D449, Type A.

7. Internal waterproofing: Where required, 60-mil polyvinylchloride or polyethelene sheet with webs or ribs to mechanically lock the sheet to the manhole wall. Joint strips shall be ribless and shall be a minimum of 4 inches wide.

8. Openings or "knockouts" in precast units shall be located as shown on the Drawings and to accommodate the inflow and outflow pipe orientation required. Openings shall be sized sufficiently to permit passage of the largest outside dimension of pipe or fittings. Prior to ordering precast manhole bases, all angles between incoming pipes are to be field checked to incorporate possible line changes required in the field layout.

B. Gaskets for joints between manhole sections: Butyl rubber, ASTM C443.

C. Grade Rings: ASTM C478, precast reinforced concrete, 1 inch to 4 inch thickness, diameter to match manhole and frame.

D. Mortar: Packaged, ASTM C387 or as Specified in Section 033200—Site Cast-in-Place Concrete.

E. Frame and Cover: Grey Cast Iron, ASTM A48, Class 25B (Frame) and Class 30B (Covers), uncoated.

1. Cover: 26 inch diameter, non-vented with non-penetrating pickholes. Unless otherwise detailed or indicated, covers shall be cast with 1½ inch wide, raised letters, indicating "STORM SEWER" unless other lettering is called-for.

2. Frame and cover shall be supplied as a pair from the same manufacturer. Castings shall be of tough, even-grained iron, free from scale, lumps, blisters, sand-holes and other injurious defects, and of the size and type shown on the Drawings. Frames and covers shall have machined bearing surfaces to seat firmly and prevent rocking and rattling under traffic loads. Before leaving the foundry, castings shall be thoroughly cleaned, subjected to hammer tests for soundness and given two coats of coal tar pitch varnish.

F. Resilient connectors for joints between manhole and pipes entering manhole: Continuous boot of ⅜ inch minimum thickness neoprene, ASTM C923 or ASTM C990. Boots shall be either cast into the manhole wall or installed into a cored opening using internal compression rings. Installed boot shall result in a water-tight connection meeting the performance requirements of ASTM C443.

G. Manhole Steps: ASTM C478 and OSHA 29 CFR 1910.27, drop front or equivalent. Steps shall be nine inches in depth and at least twelve inches in width with an abrasive step surface.

1. Composite Plastic-Steel: One-half (½) inch deformed steel reinforcing rod, ASTM A615, Grade 60, encapsulated in a co-polymer polypropylene plastic, ASTM D2146, Type II, Grade 16906.

2. Steps shall be placed in vertical alignment as indicated on the Drawings. Steps shall be uniformly spaced not more than sixteen inches (16″) on center, including the spacing between the top step and the manhole cover. Steps shall be embedded in the wall a minimum distance of 4 inches in either cast or drilled holes. Steps shall not be driven or vibrated into fresh concrete and shall withstand a pullout resistance of 2000 lbs when tested in accordance with ASTM C497. Each step shall project a minimum of 5 inches from the wall measured from the point of embedment.

2.10 DROP MANHOLE

A. Drop inlet shall be constructed with ductile iron gravity pipe laid in undisturbed soil in conformance with ASTM A746-82. Adapt to PVC with Fernco coupling or approved equivalent.

B. Vertical drop pipe shall be 8″, 10″, or 12″ maximum SDR 35 PVC with 90 degree short bend radius shall conform to ASTM D3034.

C. Vertical drop pipe shall be anchored a minimum of every 4 feet with ⅛″ x 1½″ type 304 stainless steel pipe straps set as ordered with lag bolts and shields.

2.11 MASONRY UNITS

A. Brick: ASTM C32 Grade MS or ASTM C62 Grade SW.

B. Concrete block: Solid block, ASTM C139.

2.12 MORTAR

A. Mortar: ASTM C387.

1. Portland Cement: ASTM C150, Type I.

2. Sand: ASTM C144.

3. Hydrated Lime: ASTM C207.

4. Water: Potable.

5. Mix proportions for manhole rims and covers: 1 part portland cement, 2 parts sand, and ¼ part hydrated lime by dry volume. Hydrated lime shall not exceed 10 percent by weight of the total dry mix. Quantity of water in mixture shall be sufficient to produce a stiff, workable mortar, but in no case shall exceed 5½ gallons of water per sack of cement.

6. Mix Proportions for invert construction: 1 part portland cement and 2 parts sand by volume. Quantity of water in mixture shall be sufficient to produce a stiff, workable mortar, but in no case shall exceed 5½ gallons of water per sack of cement.

2.13 BEDDING

A. Bedding for concrete and PVC pipes: Bedding, Haunching and Initial Backfill shall consist of screened gravel, maximum size ¾ inches and minimum size ⅜ inches.

B. Bedding for HDPE pipes: Bedding, Haunching and Initial Backfill shall consist of ConnDOT No. 6, No. 67, or No. 8 aggregate, or other materials meeting the requirements of ASTM D2321 for Class IA, Class IB, Class II, or Class III unless otherwise specified by the pipe manufacturer.

C. Bedding for Catch Basins: Screened Gravel or Crushed Stone, well graded in size from ¾ inch to ⅜ inch consisting of clean, hard, and durable fragments. No limestone shall be permitted.

PART 3 EXECUTION

3.1 PIPE INSTALLATION

A. As soon as the excavation is completed to the normal grade of the bottom of the trench, the Contractor shall immediately place the bedding material in the trench. Then the pipe shall be firmly bedded in the compacted bedding material to conform accurately to the lines and grade indicated on the Drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions.

1. Concrete pipe shall be installed per ASTM C1479, as may be modified by the pipe manufacturer's instructions.

2. HDPE pipe shall be installed per ASTM D2321, as may be modified by the pipe manufacturer's instructions.

C. Notch under pipe bells and joints, where applicable to provide for uniform bearing under entire length of pipe.

D. Excavation, backfilling and compaction shall be as specified in Section 312310—Earthwork of these Specifications.

E. Maintain optimum moisture content of bedding material to attain required compaction density.

3.2 MANHOLES AND CATCH BASINS

A. Manholes and Catch Basins shall be constructed at the locations and to the lines, grades and dimensions noted on the Drawings, or as required.

B. Precast concrete construction shall be done in a manner to insure watertight construction and all leaks in precast concrete shall be sealed. If required, precast concrete shall be repaired or replaced to obtain watertight construction.

C. Concrete barrels and cones shall be precast concrete sections.

1. Bases shall be either precast with a barrel integrally cast with the base, or poured concrete suitably shaped by means of accurate bell-rung forms to receive the barrel sections. Manhole invert channels in manholes shall be formed in concrete.

2. Precast manholes shall have an adjustment ring at the top of the cone to permit the frame and cover to meet the finished surface. This shall consist of courses of brick or reinforced grading rings not to exceed 11 inches.

D. Stubs shall be short pieces cut from the bell ends of the appropriate size and class of pipe. Concrete stubs shall be plugged with brick masonry unless otherwise directed.

E. Manhole inverts shall conform accurately to the size of the adjoining pipes.

1. Manhole inverts shall be constructed of concrete developing 3,500 psi with the concrete being placed to the spring line of the pipe form.

2. Smooth plastic pipe, matching the dimension of the outlet pipe, shall be used to form the invert.

3. Side inverts and main inverts, where the direction changes, shall be laid out in smooth curves of the longest possible radius, which is tangent, within the manhole, to the centerline of adjoining pipelines.

4. Invert shelves shall be graded to provide a 1-inch per 1-foot wash from the manhole walls.

F. Manhole sections shall contain manhole steps accurately positioned and embedded in the concrete when the section is cast. Precast-reinforced concrete manhole sections shall be set so as to be vertical and with sections and steps in true alignment.

G. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs, made specifically for this purpose, or with mortar. The mortar shall be one part cement to 1½ parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

H. The Contractor may, as an alternate to suitable nonshrink mortar joints, use premolded elastomeric-sealed joints for pipe into precast manhole bases.

1. All materials, accessories and construction methods used in making the joints shall be supplied or approved by the manufacturer of the premolded elastomeric-sealed joint.

I. Openings for pipe and materials to be embedded in the walls of the base for these joints shall be cast in the base at the required locations during the manufacturer of the base. Incorrectly cast and patched pipe openings will be rejected.

J. Manhole risers and tops shall be installed using approved "o-ring" type, neoprene gaskets for sealing joints. Units shall be installed level and plumb. Water shall not be permitted to rise over newly made joints nor until after inspection as to their acceptability. All jointing shall be done in a manner to insure water tightness.

K. Openings shall be provided in the risers to receive entering pipes. These openings may be made at the place of manufacture. The openings shall be sized to provide a uniform 1 inch maximum annular space between the outside of the pipe wall and the opening in the riser. After the pipe is in position, the annular space shall be solidly filled with nonshrink mortar. Care shall be taken to assure that the openings are located to permit setting of the entering pipe at its correct elevation as indicated.

L. Openings, which are cut in the risers in the field, shall be carefully made by coring so as not to damage the riser. Damaged risers will be rejected and shall be replaced at no additional expense to the Owner.

M. Where required by the Drawings, a slot and opening shall be cast in the catch basin wall suitable for mounting the cast iron hood and discharge pipe. The hood hinge may be furnished to the precast supplier by the Contractor for incorporation into the casting during manufacture.

3.3 BRICK MASONRY

A. Brick Masonry Construction shall be done in a manner to insure watertight construction and all leaks in brick masonry shall be sealed. All workmanship shall conform to the best standard practice and all brick masonry shall be laid by skilled workmen.

B. All beds on which masonry is to be laid shall be cleaned and wetted properly. Brick shall be wetted as required and shall be damp but free of any surface water when placed in the Work. Bed joints shall be formed of a thick layer of mortar, which shall be smoothed or furrowed slightly. Head joints shall be formed by applying to the brick to be laid a full coast of mortar on the entire end, or on the entire side as the case requires, and then shoving the mortar covered

end or side of the brick tightly against the bricks laid previously. The practice of buttering at the corners of the brick and then throwing the mortar or crappings in the empty joints will not be permitted. Dry or butt joints will not be permitted. Joints shall be uniform in thickness and shall be approximately 1¼ inch thick.

C. Brickwork shall be constructed accurately to dimensions and brickwork at top of manholes shall be to the dimensions of the flanges of the cast-iron frames.

D. Joints on the inside face of walls shall be tooled slightly concave with an approved jointer when the mortar is thumbprint hard. The mortar shall be compressed with complete contact along the edges to seal the surface of the joints.

E. All castings to be embedded in the brickwork shall be accurately set and built-in as the Work progresses. Cast-iron frames and manhole covers shall be well bedded in mortar and accurately set to finished graded indicated or as directed.

F. Water shall not be allowed to flow against brickwork or to rise on the masonry for 60 hours after it has been laid, and any brick masonry damaged in this manner shall be replaced as directed at no additional expense to the Owner. Adequate precautions shall be taken in freezing weather to protect the masonry from damage by frost.

3.4 CONCRETE MASONRY UNITS

A. Concrete Masonry unit construction shall be soaked in water before laying. As circular concrete block walls are laid-up, the horizontal joints and keyways shall be flushed full with mortar. As rectangular blocks are laid-up, all horizontal and vertical joints shall be flushed full with mortar. Plastering of the outside of block structures will not be required. The joints in precast units shall be wetted and completely mortared immediately prior to setting a section. No structure shall be backfilled until all mortar has completely set.

3.5 MANHOLE STEPS

A. Placement of steps into the precast walls shall be by a proven method as recommended by the supplier of the precast manhole sections. Details of the steps and method of placement shall be submitted for approval.

B. Plastic steps shall be placed into the wet concrete wall during manufacture or if designed for press fit installation shall be driven into a wall opening according to the manufacturer’s specifications. Steps shall not be mortared into place after the concrete has set.

C. All manholes, catch basins, lawn inlets, etc., which are in excess of five feet in depth, shall be constructed with standard aluminum steps, spaced at 12-inch on center.

3.6 DROP INLETS

A. Drop inlets shall be constructed to the lines, grades, dimensions and design at the locations indicated on the Drawings or as required.

B. Construction shall conform to requirements outlined in Section 033013—Site Cast-in-Place Concrete.

C. Engineer may permit brick or concrete masonry construction. If this alternate is being employed, construction shall be done in accordance with paragraphs 3.04 or 3.05 in this Section.

3.7 CASTINGS

A. Cast-iron frames for grates and covers shall be well bedded in cement mortar and accurately set to the grades indicated or as directed. The frames shall be encased with a thick cement-mortar collar around the entire perimeter of the frames.

B. All voids between the bottom flange shall be completely filled to make a watertight fit. A ring of mortar, at least one inch thick and pitched to shed water away from the frame shall be placed over and around the outside of the bottom flange. The mortar shall extend to the outer edge of the masonry all around its circumference and shall be finished smooth. No visible leakage will be permitted.

C. Structures within the limits of bituminous concrete pavement shall be temporarily set at the elevation of the bottom of the binder course or as ordered. After the binder course has been compacted, these structures shall be set at their final grade. Backfill necessary around such structures after the binder course has been completed shall be made with Class A concrete unless otherwise ordered.

3.8 CLEANING

A. At the completion of the Work, clean all piping, structures and open drainage courses, through and to which water from this construction is directed, to the satisfaction of Engineer.

3.9 AS-BUILT DRAWINGS

A. Contractor shall be solely responsible for complying with the requirements of local permitting authorities for preparation and submittal of as-built drawings. The requirements for the preparation of as-built drawings as defined herein shall be considered the minimum requirements of Engineer, but shall in no way relive Contractor from satisfying the requirements of local permitting authorities.

B. As work progresses, record the following on two (2) sets of Drawings:

1. All changes and deviations from the design in location, grade, size, material, or other feature as appropriate.

2. Any uncharted locations of utilities or other subsurface feature encountered during installation, including the characteristics of such uncharted utility or subsurface feature such as utility type, size, depth, material of construction, etc.

C. Recording of changes shall be clearly and neatly marked in red pen or pencil. All changes shall be noted on the appropriate Drawing sheets.

D. Make measurements from fixed, permanent points on the Project Site to accurately locate the work completed. Such measurements shall consist of at least three (3) ties showing the distance of each item relative to each of the fixed, permanent points.

E. As-Built drawings shall be complete and shall indicate the true measurement and location, horizontal and vertical, of all new construction. As-Built drawings shall also contain any additional information required by Engineer.

END OF SECTION