PROJECT MANUAL

Portsmouth High School Tennis Courts

50 Andrew Jarvis Drive

Portsmouth, NH 03801

Prepared for

City of Portsmouth School Department

Kenneth Linchey

50 Andrew Jarvis Drive

Portsmouth, NH 03801

June 2023

Prepared By:
BL Companies
2346 Post Road, Suite 100
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Project Number: 2101920

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DIVISION 1

City of Portsmouth, New Hampshire

School Department

Portsmouth High School Tennis Courts

50 Andrew Jarvis Drive

Portsmouth, NH 03801

SUMMARY OF WORK - 010100

PART 1 - GENERAL

1.1 PROJECT DESCRIPTION

A. Project Identification: The project consists of a new tennis court facility at the Portsmouth, New Hampshire High School.

Project Location:

- Portsmouth High School Tennis Courts
  50 Andrew Jarvis Drive
  Portsmouth, NH 03801

Owner: City of Portsmouth, New Hampshire School Department
("Client")

Engineer Identification: The Contract Documents, dated January 03, 2023, were prepared for the project by BL Companies, 2346 Post Road, Suite 100, Warwick, RI 02886.

B. Work Included: The scope of work for this project generally includes, but is not limited to, the following major elements:

1. Selective demolition.
   Offsite disposal of all removed materials.
2. Stripping of topsoil
3. Coordination work for utility improvements.
4. Bituminous, Concrete, and site amenity work described in the Construction Documents.
5. Amending, screening and spreading of topsoil
6. Turf and Landscaping establishment.

C. Schedule: Shall be agreed upon by Client and Contractor after award. Contact duration shall not exceed 6 months.

1.2 CONTRACTOR USE OF PREMISES

A. Contractor shall coordinate its' work activities with the Owner on a daily basis and advise the Owner of its scheduled activities two weeks in advance.

B. General: Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy and use by the public to the remainder of the site and building.

C. Confine operations to as small work area and access ways as possible. As much as possible and without damage to the finishes, doors, and related building systems or surrounding area.

D. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

E. Shall maintain existing egress patterns, exit doors and means of egress during construction, which will include the provision of temporary walkways, sideways, or other means necessary to provide adequate life safety for the building occupants, particularly at exit ways which must continue to remain open and serviceable while adjacent construction activity occurs.

F. Use of the Existing Building: Maintain the existing building in a weather tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period. Keep the Facility (building and grounds) clean on a daily basis. Perform a final cleaning of work area(s) and adjacent areas effected by Contractors work activities. Repair any damage to the Facility caused by contractor's work activities, including but not limited to landscaping, roads and curbs, lighting, etc……

G. Contractor shall at its expense make all permanent connections and tie-ins during time that will not affect the operations of the School.

1.3 OWNER OCCUPANCY

A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate owner usage. Pre-schedule construction operations with the Owner for coordination of demolition operations and the location of dumpsters and construction staging areas. Perform the Work so as not to interfere with the Owner's operations.

B. Contractor shall take precautions to minimize the impact of its operation on the site. Contractor agrees to perform work that interferes with the building during off hours or weekends and holidays at no additional cost to the Client.

1.4 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: Division 1 thru Division 34, and on the construction drawings.

B. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

C. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the section text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to all Sections of these Specifications.

1.5 TYPE OF CONTRACT

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

B. Contractor Qualifications: An experienced contractor with a minimum of 5 years of tennis court construction experience. In addition, the contractor must prove experience in similar type and monetary value. Contractor must have sufficient resources to perform the improvements at the site while meeting the project deadlines. Contractors that cannot comply with these qualifications will not be considered for the project.

1.6 WORK SCHEDULES

A. All work shall be completed on or before October 30, 2023. Coordinate all work and exact dates with the Client.

B. Contractor shall coordinate its work and schedule activities with the Client calendar.

C. If the deadlines cannot be met, then the contractor must provide temporary services to the portions of the site that is not in operation until work under this contract is complete.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 01 00

WORK RESTRICTIONS - 011400

PART 1 - GENERAL

1.1 USE OF PREMISES

A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the work is indicated.

1. Limits: Confine constructions operations to areas so indicated on the Drawings. Coordinate use of the construction area with the Owner on a daily basis.

2. Owner Occupancy: Allow for Owner occupancy and use by the public of the remainder of site and building.

3. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, visitors, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

4. Schedule deliveries not to conflict with Owner’s use of driveways and entrances. Contractor shall give Client a minimum forty-eight (48) hour notice in writing. Contractor shall not interfere with School staff or visitors.

5. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

6. Contractor shall protect its work until accepted by the Portsmouth, New Hampshire School Department.

7. Contractor shall only park in designated location as directed by the Client. Contractor shall not interfere with School staff or visitor parking.

8. Normal work hours at School Facilities are between the hours of 7 am and 3:30 pm Monday through Friday. Off hours and weekends must be coordinated and approved by the Client.

9. Contractor shall obey all local ordinances including but not limited to work hours and noise requirements.

1.2 OCCUPANCY REQUIREMENTS

A. Owner will occupy and have full use of areas of the site not used by the Contractor. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Partial Owner Occupancy: Owner reserves the right to occupy and to place and install equipment in completed areas of the site before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and

partial occupancy shall not constitute acceptance of the total work.

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1. Before partial Owner occupancy, sidewalk access shall be fully operational, and required tests and inspections shall be successfully completed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 14 00

CONTRACT MODIFICATION PROCEDURES - 012500

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

A. Architect, Engineer, Landscape Architect will issue supplemental instructions authorizing minor changes in the work, not involving adjustment to the Contract Sum or the Contract Time.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect, Engineer, Landscape Architect will issue a detailed description of proposed changes in the work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

2. Within fifteen calendar days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor shall immediately submit a Request for Information (RFI) to the Architect, Engineer, Landscape Architect and a copy to the Client. If the Architect concurs in writing, the Contractor shall submit a Proposal Request to the Architect and a copy to the Client.
The Proposal Request shall include the following minimum information.

1. Include a statement outlining reasons for the change and the effect of the change on the work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Cost Proposals shall be in a format acceptable to the Client. Cost shall be broken out for Labor & Material. If requested by the Client, Contractors shall use the client supplied change order form.

4. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

1.4 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in- place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.

2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.

3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.

4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect, Engineer, Landscape Architect will issue a Change Order for signatures of Owner, Contractor and Architect.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect, Engineer, Landscape Architect may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

PAYMENT PROCEDURES - 012900

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related sections include the following:

1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.2 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with the following:

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.

2. Submit the Schedule of Values to Architect for approval at earliest possible date but no later than fifteen (15) days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line-item for each Specification Section. These values are to be broken down by Material & Labor and by area and phase if applicable to project. Contractor shall also include specific line items for the following items: Bond, Insurance, Submittals, Project Schedule & Updates, and Close-out. Mobilization and de-mobilization line items are not allowable.

1. Identification: Include the following Project identification on the Schedule of Values:

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

e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.
   h. Percentage of the Contract Sum to nearest one percent, adjusted to total 100 percent.

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

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

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

   a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required per Client requirements.

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

7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

   a. Per Client direction, temporary facilities and other major cost items that are not direct cost of actual work in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense.

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

1.4 APPLICATIONS FOR PAYMENT

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

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

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

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment or as directed by the Client.

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

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien, certified payroll, OSHA certification and similar attachments as required.

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

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.

2. When an application shows completion of an item, submit final or full waivers.

a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the work covered by the application who is lawfully entitled to a lien.

3. Waiver Forms: Submit waivers of lien on Client forms, executed by an officer of the company or authorized Contractor representative.

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

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Certified Payroll
15. OSHA Certifications

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the work claimed as substantially complete.

1. Include documentation supporting claim that the work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. All Warrantees and Guarantees
3. All O& M Manuals
4. Letter from Contractor certifying that no Hazardous material were used in the materials of construction including but not limited to Asbestos, PCB’s, Lead.
5. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
6. Updated final statement, accounting for final changes to the Contract Sum.
7. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
8. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
9. AIA Document G707, "Consent of Surety to Final Payment."
10. Evidence that any and all claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

PROJECT MANAGEMENT AND COORDINATION - 013100

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes administrative provisions for coordinating construction operations on project including, but not limited to, the following:

1. General project coordination procedures.
2. Coordination Drawings.
3. Administrative and supervisory personnel.
4. Project meetings.

B. Related Sections: The following Sections contain requirements that relate to this section:

1. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.2 COORDINATION

A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, which depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.

3. Coordinate the installation and removal of site utilities, systems and elements to ensure uninterrupted system integrity.

4. Make adequate provisions to accommodate items scheduled for later installation.

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

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

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities

include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Prepare weekly, a two week look-ahead schedule
3. Preparation of the Schedule of Values.
4. Installation and removal of temporary facilities and controls.
5. Delivery and processing of submittals & Request or Information.
6. Progress meetings.
7. Preinstallation conferences.
8. Project closeout activities.

1.3 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.

2. Indicate required installation sequences.

B. Contact Information:

1 . Within seven (7) days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at project site and individuals assigned as standbys in the absence of individuals assigned to Project. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including cell, office telephone numbers and email address.

2. Provide names, addresses, description/responsibilities, cell number, office telephone numbers and emails address for all Contractor’s Consultants, Subcontractors and Vendors.

3. Provide Portsmouth, New Hampshire School Department with Emergency Contact information to reach Contractors essential personnel 24/7 in case of an emergency.

1.4 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the work.

1. Include special personnel required for coordination of operations with other contractors.

1.5 PROJECT MEETINGS

A. General: The Contractor shall schedule and conduct meetings and conferences at the Project site, unless otherwise indicated or instructed by the Portsmouth, New Hampshire

School Department.

1. Attendees: The Contactor shall inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. The Contractor shall notify Owner, Subcontractor(s) and Architect of scheduled meeting dates and times. Meetings shall occur weekly while the Contractor is on site.

2. Agenda: The Contractor shall prepare the meeting agenda and distribute the agenda to all invited attendees.

3. Minutes: The Contractor shall record significant discussions and agreements achieved, and distribute the meeting minutes to everyone concerned, including Owner and Architect, within three (3) days of the meeting.

B. Preconstruction Conference: The Contractor shall schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than ten (10) days after execution of the Agreement. The conference shall be held at the Project site or a location acceptable by the Client. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Designation of responsible personnel.
    b. Distribution of the Contract Documents.
    c. Construction Schedule.
    d. Two – Week Look Ahead scheduling
    e. Phasing.
    f. Critical work sequencing.
    g. Submittal & RFI procedures.
    h. Procedures for processing field decisions and Change Orders.
    i. Procedures for processing Applications for Payment.
    j. Responsibility for temporary facilities and controls.
    k. Use of the premises and Working hours.
    l. Parking availability.
    m. Site Logistics: Field Office, Work, Traffic and Storage Areas.
    n. Equipment deliveries and priorities.
    o. Security.
    p. Safety – (shall be discussed at every meeting)
    q. Progress cleaning.
    r. Preparation of Record Documents

C. Progress and Coordination Meetings: The Contractor shall conduct progress and coordination meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at

these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

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

   b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Contractor shall update its project schedule and submit it to the Architect and Portsmouth, New Hampshire School Department no later than the 10th of each month or with its monthly requisition, whichever is sooner.

   c. Review present and future needs of each contractor present, including the following:

      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site utilization.
      8) Temporary facilities and controls.
      9) Work hours.
      10) Hazards and risks.
      11) Progress cleaning.
      12) Quality and work standards.
      13) Change Orders.

3. Reporting: The Contractor shall record and distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SUBMITTAL PROCEDURES - 013300

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for submitting Applications for Payment.

2. Division 1 Section "Quality Requirements" for submitting test and inspection reports and Delegated-Design Submittals.

3. Division 1 Section "Project Closeout" for submitting warranties, Project Record Documents and operation and maintenance manuals.

C. Contractor shall provide Designer and Client an electronic PDF copy of all its submittals on a flash drive. Contractor shall transmit partial information to Designer and Client on a monthly basis no later than the 10th of each month or as directed by the Client. If requested Contractor shall also forward at the conclusion of the project a complete electronic PDF copy of all submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. General: At Architect’s discretion, electronic copies of CAD Drawings may be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

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

a. Architect reserves the right to withhold action on a submittal requiring

coordination with other submittals until related submittals are received.

C. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Architect's receipt of submittal.

1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow 14 days for initial review of each submittal.

3. If intermediate submittal is necessary, process it in same manner as initial submittal.

4. Allow 14 days for processing each re-submittal.

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

D. Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 4 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.

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

a. Project name.
b. Date.
c. Name and address of Contractor.
d. Name and address of subcontractor.
e. Name and address of supplier.
f. Name of manufacturer.
g. Unique identifier, including revision number.
h. Number and title of appropriate Specification Section.
i. Drawing number and detail references, as appropriate.
j. Other necessary identification.

E. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review received from sources other than Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the

related submittal.

2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

H. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. Architect may retain two copies; remainder will be returned to the Contractor. Mark up and retain one returned copy as a Project Record Document.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operating and maintenance manuals.
k. Compliance with recognized trade association standards.
l. Compliance with recognized testing agency standards.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.

D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."

E. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups.

2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:

a. Generic description of Sample.
b. Product name or name of manufacturer.
c. Sample source.

5. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.

a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

F. Product Schedule or List: Prepare a written summary indicating types of products required for the work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.

G. Delegated-Design Submittal: Comply with requirements in Division 1 Section "Quality Requirements."

H. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."

I. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."

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

1. Name, address, and telephone number of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.

3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit four copies of each submittal, unless otherwise indicated. Architect will not return copies.

2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."

B. Contractor's Construction Schedule: Comply with requirements in Division 1 Section

"Construction Progress Documentation."

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific project.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

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

J. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

K. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.
7. Other required items indicated in individual Specification Sections.

L. Provide MSDS and SDS on all material being installed. The Contractor shall verify and certify in writing to the Client that no hazardous material has been utilized in the construction of this facility.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval Stamp: Contractor shall stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

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

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect and Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.

1. Architect shall stamp submittals "No Exceptions Taken," "Furnish as Corrected," "Revise and Resubmit," or "Rejected."

2. In any submittal that is noted "No Exceptions Taken," or "Furnish as Corrected," the review shall not extend to details or dimensions and shall not relieve the Contractor from his responsibility for compliance with the Contract Drawings and Specifications.

C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01 33 00

QUALITY REQUIREMENTS- 014000

PART 1 - GENERAL

1.1 SUMMARY

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

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

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.

3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.

2. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

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

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

C. Mock-ups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not samples.

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

1.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.4 SUBMITTALS

A. Qualification Data: 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.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

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

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Entity responsible for performing tests and inspections.

D. Reports: Prepare and submit certified written reports that 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. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

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

1.5 QUALITY ASSURANCE

A. 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.

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

C. 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.

D. 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.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of New Hampshire 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 to those indicated for this project in material, design, and extent.

F. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

G. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.

1. Contractor responsibilities include the following:

    a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
    b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the work.
    c. Fabricate and install test assemblies using installers who will perform the same

tasks for Project.

d. When testing is complete, remove assemblies; do not reuse materials on project.

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

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

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.

2. Notify Architect seven days in advance of dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Demolish and remove mockups when directed, unless otherwise indicated.

1.6 QUALITY CONTROL

A. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as Contractor's responsibility, or required by the Contract Documents and not part of the services provided by the Owner, Contractor shall engage a qualified testing agency to perform these quality-control services.

2. Notify testing agencies at least 24 hours in advance of time when work that requires testing or inspecting will be performed.

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

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

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

6. Costs for retesting and reinspecting construction that replaces or is necessitated by

work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Special Inspections: Contractor will engage a testing agency to conduct special inspections and testing required by authorities having jurisdiction as the responsibility of Owner.

1. Testing agency will notify Special Inspector, Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Special Inspector and Architect, with copy to Contractor and to authorities having jurisdiction.

3. Special Inspector will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

4. Special Inspector will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

5. Testing agency will retest and reinspect corrected work.

6. The Schedule of Special Inspections for the project is attached to this Specification Section.

C. 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.

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

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

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the work during performance of its services.

2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality- control service through Contractor.

4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the work.

5. 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. Preliminary design mix proposed for use for material mixes that require control by testing agency.

6. 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 quality-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. Submit schedule within 30 days of date established for the Notice to Proceed.

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

I. Testing lab costs, other than Special Inspections and tests not required in the Construction Documents, shall be paid by the Contractor. The Contractor shall be responsible for the coordination and scheduling of all testing services. No additional costs shall be incurred by the Owner and no time extensions shall be granted because of the Contractor's failure to coordinate and schedule testing in a timely manner or as required by the work progress.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

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

1. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

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

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

END OF SECTION 01 40 00

REFERENCES - 014200

PART 1 - GENERAL

1.1 DEFINITIONS

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

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

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

D. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Installer": An installer is the 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. The term "experienced," when used with an entity, means having successfully completed a minimum of five previous projects similar in size and scope to this project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. "Project Site" is the space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

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

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

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

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

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

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

E. Abbreviations and Acronyms for Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the attached list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

F. Abbreviations and Acronyms for Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the attached. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

G. Abbreviations and Acronyms for Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the attached list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

PROJECT REQUIREMENTS - 014500

PART 1 - GENERAL

1.1 PROJECT REQUIREMENTS

A. General: This Section identifies Project Requirements and defines terms not otherwise included in the remainder of the Construction Documents.

1.2 SUPERVISION AND CONSTRUCTION PROCEDURES

A. The Contractor shall coordinate the work of the various trades required for the project to assure the efficient and orderly sequence of installation of construction elements. The Contractor will verify that characteristics of interrelated equipment are compatible, and shall coordinate the work of various trades having interdependent responsibilities for installing, connecting and placing equipment in service.

B. The Contractor and each Subcontractor will verify all new and existing dimensions for all built-in work and/or work adjoining that of other trades, before ordering any material or doing any work. They will be responsible for the correction of all dimensions found to be in error. Any discrepancy in dimensioning will be submitted, in writing, to the Architect for his consideration, before proceeding with the work.

C. The Contractor will notify “Dig Safe,” at least three (3) full working days before any proposed excavation activity. The Contractor will provide the Architect with written evidence of a Dig Number and Start Date prior to commencing any excavation work. The Contractor will have full responsibility for maintaining and protecting original utility mark-outs and for periodically notifying “Dig Safe” in accordance with State requirements. Should the Contractor require additional mark-outs as a result of the Contractor’s failure to adequately protect the original mark- outs, the Contractor will bear the cost for those additional mark-outs.

D. The Contractor will satisfy himself regarding the accuracy of the base lines, benchmarks, etc., established by the Land Surveyor. He will protect all such stakes and/or marks as required to hold them free from damage or displacement, until they are no longer needed, or to the Date of Substantial Completion.

1.3 SPECIAL PROCEDURES FOR THE PROJECT

A. “Plan of Use”: The Contractor shall prepare a “Plan of Use” for the Project which shall describe in detail the Contractor’s proposed use of the Site, both inside and outside the Contract Limit Area. The “Plan of Use” shall include, but not be limited to, the following: **phasing of the project**, including coordination and interaction with the Owner, allowances for Owner mobilization between phases, proposed vehicle and equipment access routes, locations of proposed storage areas, office trailer and dumpster locations, location of perimeter construction

fencing and gates, other ground level protection measures around the Site, proposed pedestrian traffic flows around the Site and coordination with staging areas of other, concurrent projects at the Project Site. The Contractor shall submit the "Plan of Use" to the Architect for approval within seven (7) calendar days of the award of the first Contract for Construction, and work on the Project shall not commence until an acceptable "Plan of Use" has been approved by the Architect and by the Owner. Any delay in the Project caused by the Contractor's failure to submit an acceptable "Plan of Use" shall not alter the Contractor's responsibility to complete the work by the date of Substantial Completion as set forth in the remainder of the Documents.

B. The Contractor shall protect persons entering and exiting the building and construction area from falling debris by any measures necessary, including the construction of temporary covered walkways.

C. The Contractor shall protect the site and keep it in a clean and orderly condition. Construction debris will be cleaned up and disposed of daily. Existing site features scheduled to remain, including existing walks, driveways, parking lots, and planting and lawn areas are to be kept free of construction materials and debris.

D. Any existing site conditions which are disturbed by construction activities shall be restored by the Contractor to their original condition at the Contractor's cost. The Architect shall judge the conditions to be restored by the Contractor and final payment will not be made until those conditions are restored.

1.4 SPECIAL PROCEDURES FOR THE PROJECT

A. Weapons or Intoxicants: No person employed on this Project will bring intoxicants or any type of weapon onto the Site.

B. Fraternization of Harassment: The Contractor is advised to avoid personal contact and fraternization with, and to respect the rights and privacy of, adjacent building occupants and people visiting adjacent buildings or the construction site.

C. Smoking: Smoking shall not be permitted on site.

1.5 SITE DOCUMENTS

A. CONTRACT DOCUMENTS: The Contractor shall maintain at the Site one clean copy of the Contract Documents (Drawings and Project Manual), Addenda, approved Shop Drawings, Change Orders, Change Directives, etc., in good order with up-to-date Project information, which will be available to the Architect and Client at all times.

RECORD DOCUMENTS: The Contractor will maintain at the Site one set of the Contract Documents listed in 1.5.A which will be entitled "Record Documents." The Contractor and its Contractor/Subcontractors shall record any and all changes to the Contract Documents as soon as they occur. The "Record Documents" will be available to the Architect and Client at all times.

1.6 MANUFACTURER'S INSTRUCTIONS

A. When the Contract Documents require that installation of any part of the work will comply with a manufacturer's printed instructions, the Contractor shall obtain and distribute copies of such instructions to parties involved in the installation, including one copy to the Architect.

.1 Maintain one (1) complete set of instructions at the Site during installation and until the Date of Substantial Completion.

B. The Contractor shall handle, install, connect, clean, condition and adjust products in strict accordance with such instructions, and in conformity with specified requirements.

.1 Should job conditions or specified requirements conflict with manufacturer's instructions, the Contractor shall consult with the Architect for further instructions.

.2 The Contractor will not proceed with the work without clear instructions.

C. The Contractor shall perform all work in accordance with the manufacturer's instructions. Do not omit any preparatory step or installation procedure unless it is specifically modified or deleted by the Contract Documents.

1.7 TRAFFIC WAYS

A. The Contractor may use on-site paved roads and parking areas, as approved by the Owner, but will not block, encumber or otherwise obstruct the same. Public roadways will not be blocked by standing trucks, parked cars, material storage, and construction operations or in any other manner. The Owner will designate an area(s) within or outside of the Contract Limit Lines in which construction vehicles, dumpsters, etc., may be located, which shall be incorporated into the Contractor's "Plan of Use" per Article 1.3.A.

B The Contractor shall keep public roads and existing paved roads and driveways and parking areas on the Owner's property free of scrap or debris due to construction operations. The Contractor will repair, at the Contractor's expense, any damage to the surface of the roadways caused by the Contractor's construction operations.

C. As the work of the Contract affects public use of a street, road or highway, the Contractor shall confer with the police authority having jurisdiction to determine if and how many police are needed for public safety in addition to any barriers and signals that may be needed. The Contractor shall be responsible for payment of any required police or traffic control services, and shall include the cost of those services as part of the Base Contract.

1.8 TEMPORARY CONTROLS

A. During the progress of the work, the Contractor will conduct his operations and provide adequate pollution controls to minimize the creation and dispersion of noise, odors, dust, dirt, and/or mud within and beyond the Site. The controls will be implemented to the satisfaction of the Owner, to the extent required to assure the Owner's continued use of its remainder of the facilities on site.

B. Should the Owner's use of its facilities be denied or interrupted by the failure of the Contractor to provide adequate controls, as specified above, the Contractor will be required to cease operations until adequate controls are provided. All costs incurred in such a cessation of operations will be born by the Contractor. No extension of time will be granted due to such a cessation in operations.

1.9 CONSTRUCTION PHOTOGRAPHS/VIDEOTAPES

A. The Portsmouth, New Hampshire School Department or the Architect may take progress photographs or videotapes at any time during the construction process. The Contractor will, at all times, allow unobstructed access to the work for this purpose.

1.10 SIGNAGE

A. If approved in writing by the Portsmouth, New Hampshire School Department, the Contractor may provide a Construction Sign. If so, all entities designated on the project cover sheet shall be listed with minimum 3" high lettering.

B. Contractor shall provide all OSHA required signage. Contractor shall provide no trespassing signs around the site perimeter, Authorized Personal Only on the gates, all warning signs, all informational and traffic signs as required.

1.11 REQUESTS FOR INFORMATION (RFI)

A. Bidding and Construction Requests for Information are formal queries from the Contractor seeking interpretation of Construction Document requirements or information not otherwise available in the Construction Documents. RFIs shall clearly and concisely set forth the issue for which interpretation or information is sought, and why a response is needed from the Architect. RFIs shall describe the requesting party's understanding of the Contract Document requirement in question, along with reasons why this understanding has been reached. Responses from the Architect shall not change any requirements of the Contract Documents.

B. Routine written communications between the Owner, the Architect and the Contractor shall be in letter or field memo format. Such communications shall not be identified as Requests for Information nor shall they substitute for any other written requirements pursuant to the provisions of these Contract Documents.

C. In the event that the Contractor determines that some portion of the Contract Documents require interpretation or additional information by the Owner or Architect,

the Contractor shall submit a Request for Information (RFI) in writing to the Architect. RFIs may only be submitted by the Contractor and not by Subcontractors, although Subcontractor correspondence may be attached by the Contractor to the RFI as supporting documentation.

D. The Architect will review all RFIs to determine whether they are Requests for Information with- in the meaning of this term. If the Architect determines that the document is not an RFI, said document will be returned to the Contractor, unreviewed as to content, for resubmittal in the proper form and in the proper manner.

E. RFI's shall be consecutively numbered. The Contractor shall maintain an RFI log for the duration of the Project. The Contractors log shall be distributed to the Architect and the Client on a weekly basis. Communications determined by the Architect not to be RFIs shall be removed from the log, and their assigned number re-used so that the log will reflect consecutive RFI numbers without gap.

F. Responses to RFIs will be issued within fourteen (14) calendar days of receipt of the request from the Contractor, unless the Architect determines that a longer time is required to provide an adequate response. If a longer time is determined to be required by the Architect, the Architect will, within seven (7) calendar days of receipt of request, notify the Contractor of the anticipated response time. The Contractor shall not be allowed any time extensions on the project because of RFIs, unless the Architect is unable to provide a response within the allocated fourteen (14) calendar days.

G. Responses from the Architect shall not change any requirements of the Contract Documents. In the event the Contractor believes that a response to an RFI will cause a change in the Construction Documents, the Contractor shall, within seven (7) calendar days, give written notice to the Architect stating that the response to the RFI will cause changes to the requirements of the Construction Documents. Failure to give such notice shall waive the Contractor's right to seek additional time or cost under the Contract Modification Procedures Article of these Specifications.

1.12. CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

A. Where discrepancies or conflict occur:

1 Amendments and Addenda shall take precedence over the Specifications.

2 The Specifications shall take precedence over the Drawings.

3 Stated dimensions shall take precedence over scaled dimensions.

4 Large-scale detail drawings shall take precedence over small-scale drawings.

5 Schedules shall take precedence over other data on the drawings.

6. In case of a difference between Drawings and Specifications or within either document itself in describing the work, the better quality, greater quantity or more costly work will be assumed to be desired and shall be included in the Contractor's Bid and in the Contract price. Refer the matter to the Architect's attention for resolution after the Contract is awarded.

7. All work shown or referred to in the Contract Documents shall be included in the Contract excepting those items which are specifically noted as being "provided under an- other contract," or "provided by the Owner," or "by others," or "not in contract (NIC)."

8. Parties to the Contract shall not take advantage of any obvious error or apparent discrepancy in the Contract Documents. Notice of any discovered error or discrepancy shall immediately be given in writing to the Architect to make such corrections and interpretations as he may deem necessary for completion of the work in a satisfactory and acceptable manner.

9. Requirements stated in Divisions 1 to 33 of these Contract Documents shall take precedence over requirements of other parts of the Project Manual.

1.13. COMMUNICATIONS TO THE ARCHITECT

A. All Communications to the Architect shall be addressed to:

Dominick Celtruda
BL Companies
2346 Post Road, Suite 100
Warwick, RI 02886

1.14. CONFLICTING REQUIREMENTS

A. In case of conflicts between Division 1 requirements and those requirements outlined in the Contract General and Supplementary Conditions, the most stringent requirement shall prevail.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 45 00

CUTTING AND PATCHING - 017310

PART 1 - GENERAL

1.1 INCLUDED IN THIS SECTION

A. General cutting and patching.

B. Specific cutting and patching requirements.

1.2 CUTTING AND PATCHING - GENERAL

A. Contractor shall be responsible for any alteration of existing work and cutting, patching of work as required by the installation of materials or performance of labor in contract.

B. Match existing products and work for patching and extending work.

1. New materials as specified in individual sections.

2. Determine type and quality of existing products by inspection and any necessary testing, and workmanship by use of existing as a standard. Presence of a product, finish, or type of work, requires that patching, extending, or matching shall be performed as necessary to make work complete and consistent with specifications.

3. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent new finishes.

C. Do not cut structural members without first consulting and/or review intended procedures with Engineer. Contractor shall keep a written record of consulting and distributed this information to all relevant parties prior to proceeding. If the situation is of an unforeseen condition, prior to proceeding the Contractor shall submit a written Request for Information (RFI) to the Architect.

D. Protect existing items.

E. Bid Package Contractors are responsible for any cutting, scoring and patching in the performance of their work due to the lack of installing sleeves or blocking in walls, floors or foundations.

1. Remove, cut and patch work in a manner to minimize damage and to provide means of restoring products and finishes to original or specified condition.

F. Transitions

1. Where new work abuts or aligns with existing, make a smooth and even transition. Patched work shall match existing adjacent work in texture and appearance.

2. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3. When finished, surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendations to Architect.

PART 2 - SUBMITTALS AND JOB CONDITIONS

2.1 SUBMITTALS

A. Schedule: Submit schedule indicating proposed methods and sequence of operations for cutting and patching work to Owner's Representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

Provide detailed sequence of cutting and patching and removal work to ensure uninterrupted progress of Owner's on-site operations.

2.2 JOB CONDITIONS

A. Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to cutting and patching work.

1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from building.

2. Erect temporary covered passageways as required by authorities having jurisdiction.

3. Provide interior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.

4. Protect from damage existing finish work that is to remain in place and becomes exposed during cutting and patching operations.

5. Protect finished floors with suitable coverings.

6. Construct temporary fire-rated and insulated solid dustproof partitions to separate work area from the remainder of the school complex.

7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.

8. Remove protections at completion of work.

E. Damages: Promptly repair damages caused by cutting and patching work at no cost to Owner.

F. Traffic: Conduct cutting and patching operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Explosives: Use of explosives will not be permitted.

H. Utility Services: Maintain existing utilities to remain, keep in service, and protect against damage during cutting and patching operations.

I. Environmental Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 3 - CUTTING AND PATCHING SUBMITTALS AND JOB CONDITIONS

3.1 INSPECTION

A. Prior to commencement of cutting and patching work, inspect areas in which work will be performed. Photograph existing conditions to structure, surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from cutting and patching work. Submit these documents to the Architect prior to starting work.

3.2 PREPARATION

A. Provide interior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

Cease operations and notify the Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

B. Cover and protect furniture, equipment and fixtures to remain from soiling or damage when cutting and patching work is performed in rooms or areas from which such items have not been removed.

C. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes.

Provide weatherproof closures for exterior openings resulting from cutting and patching work.

D. Locate, identify, stub off and disconnect utility services that are not indicated to remain. Provide by-pass connections as necessary to maintain continuity of service, if required. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change-over.

3.3 CUTTING AND PATCHING

A. Perform removal, relocation and cutting and patching work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with cutting and patching schedule and governing regulations.

1. Demolish masonry in small sections. Cut masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.

2. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

3. For interior work, use removal methods that will not crack or structurally disturb adjacent floors or partitions.

B. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect rearrange cutting and patching schedule as necessary to continue overall job progress without delay.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish and other materials resulting from cutting and patching operations from building site. Transport and legally dispose of materials off site.

B. If hazardous materials are encountered during cutting and patching operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

C. Burning of removed materials is not permitted on project site.

3.5 CLEAN-UP AND REPAIR

A. Upon completion of cutting and patching work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

B. Repair cutting and patching performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of cutting and patching work. Repair adjacent construction or surfaces soiled or damaged by cutting and patching work.

END OF SECTION 01 73 10

SELECTIVE DEMOLITION - 017320

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: The work of this Section includes, but is not limited to, the following:

1. Selective demolition and removal of portions of the existing site as required to accommodate the new work. Scope shall include, but not be limited to, the following, and as indicated on the Drawings:

   a. Removal of existing concrete, masonry, miscellaneous steel work, asphalt, and existing items in the way of new construction.

2. Temporary protections, enclosures, and similar protections for utilities, structures and persons.

3. Relocation of pipes, conduits, ducts, and other mechanical and electrical work (including equipment).

4. Legal disposal of demolished materials.

1.2 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.

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

1.3 SUBMITTALS

A. Schedule: Submit a proposed schedule of operations for selective demolition for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required. Submit details for dust and noise control.

1. Provide detailed sequence of demolition and removal work to ensure uninterrupted use of the building.

B. Photographs: Photograph existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Owner's Representative prior to start of work.

C. Contractor shall provide shop drawings and calculations for all temporary supports, shoring and bracing required. Comply with Building Code requirements for preparation of submittals and do all required filing. Drawings and calculations for shoring and bracing shall be signed and sealed by a State of New Hampshire licensed Professional Engineer.

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed Selective Demolition work similar to that indicated for this Project.

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

1. All removal and demolition work shall comply with requirements of State and Local Building Codes, OSHA, and other local governing authority having jurisdiction.

C. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 – General Requirements and Bid Documents. Review methods and procedures related to selective demolition including, but not limited to, the following:

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

D. Notify appropriate agencies of any hazardous materials found at the site. Do not proceed with removal of said substances until so instructed.

1.5 JOB CONDITIONS

A. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with occupied portions of the building and other adjacent facilities.

1. Do not close or block pathways, entrances, or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

2. The Contractor shall provide, and maintain, at his/her own expense, permits, lights, barriers, sheds, and other items that are required by traffic regulations or local law.

B. Protections: Provide temporary barricades and other forms of protection as required to protect personnel from injury due to selective demolition work.

1. Provide shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.

C. Damages: Promptly repair damages caused to adjacent spaces by demolition work at no cost to Owner.

D. Utility Services: Contractor to arrange for disconnecting and sealing of any utilities serving structures to be demolished, moved, or relocated, prior to start of demolition work.

1. Maintain and protect existing utilities to remain. Protect against damage during selective demolition operations.

2. Do not interrupt existing utilities, except when authorized in writing by Owner and coordinated with the Contractor.

E. Environmental Controls: Use temporary enclosures, and other suitable methods to limit dust and dirt to lowest practical level. Comply with governing regulations for environmental protection.

F. Hazardous Materials: It is expected that hazardous materials will be encountered in the work. Coordinate with appropriate Specification Section (See Paragraph 1.01.5 in this Specification Section).

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. General: Use repair materials identical to existing materials.

1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible; repair materials and workmanship are subject to the Architects acceptance/approval.

2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

A. General: Prior to the commencement of all demolition work, inspect areas in which work will be performed. Photograph existing conditions which could be misconstrued as damage resulting

from demolition work; file with Owner's Representative prior to starting work.

B. Verify that utilities have been disconnected and capped.

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

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

E. Survey the condition of the area or building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.

F. Perform surveys as the work progresses to detect hazards resulting from demolition activities.

3.2 UTILITY SERVICES

A. Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

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

1. Do not interrupt existing utilities serving occupied, operating, or adjacent facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.

2. Provide not less than 72 hours' notice to Owner if shutdown of service is required during changeover.

3.3 PREPARATION

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

C. Conduct demolition operations to prevent injury to people and damage to adjacent rooms and facilities to remain. Ensure safe passage of people around demolition area. Coordinate with additional requirements specified in Division 1 of the specifications.

D. Erect temporary protection where required by authorities having jurisdiction.

3.4 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not create hazardous or objectionable conditions, such as ice, flooding, and pollution, when using water.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

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

3.5 SELECTIVE DEMOLITION

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

1. Proceed with selective demolition systematically, from higher to lower level.

2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering, and chopping. Temporarily cover and barricade openings to remain in compliance with these documents and authorities having jurisdiction.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain adequate ventilation when using cutting torches.

B. Concrete: Demolish concrete in small sections. Cut masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

1. Break up and remove materials to the extent indicated, and as required to accommodate the proposed construction.

3.6 PATCHING AND REPAIRS

A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry walls to remain with an approved masonry patching material, applied according to manufacturer's printed recommendations.

C. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

D. Patch and repair surfaces in the new space where demolished walls or partitions extend one finished area into another. Provide a flush and even surface of uniform color and appearance.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site. Do not burn demolished materials. Transport demolished materials off property and legally dispose of them.

3.8 CLEANING

A. Sweep the building broom clean on completion of selective demolition operation.

END OF SECTION 01 73 20

WARRANTIES AND BONDS - 017400

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.

2. General closeout requirements are included in Section "Project Closeout."

3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

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

1.2 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the 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. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the 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 the 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 the Owner can enforce such other duties, obligations, rights, or remedies.

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

2. The 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 the Engineer at the time of Substantial Completion. The start date of all project warrantees shall be the date of Substantial Completion for the Project.

B. When a special warranty is required to be executed by the Contractor, or the 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 the Owner through the Architect for approval prior to final execution.

C. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 74 00

PROJECT CLOSEOUT - 017700

PART 1 - GENERAL

1.1 SUMMARY

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

1. Inspection procedures.
2. Project Record Documents.
3. Operation and maintenance manuals.
4. Instruction of Owner's personnel.
5. Final cleaning.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.

2. Division 1 Section "Warrantees and Bonds" for warrantee submittal requirements.

3. Divisions 2 through 34 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the work is not complete.

2. Advise Owner of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Obtain and submit releases permitting Owner unrestricted use of the work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.

6. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

8. Advise Owner of changeover in utilities.

9. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

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

2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."

2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect

will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1. Organize list of spaces in sequential order.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Contractor.
d. Page number.

1.5 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.

2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the work at the same location.

3. Mark important additional information that was either shown schematically or omitted from original Drawings.

4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.

5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

D. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.6 OPERATION AND MAINTENANCE MANUALS

A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data:

   a. Emergency instructions and procedures.
   b. System, subsystem, and equipment descriptions, including operating standards.
   c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
   d. Description of controls and sequence of operations.
   e. Piping diagrams.

2. Maintenance Data:

   a. Manufacturer's information, including list of spare parts.
   b. Name, address, and telephone number of Installer or supplier.
   c. Maintenance procedures.
   d. Maintenance and service schedules for preventive and routine maintenance.
   e. Maintenance record forms.
   f. Sources of spare parts and maintenance materials.
   g. Copies of maintenance service agreements.
   h. Copies of warranties and bonds.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Provide instructors experienced in operation and maintenance procedures.
2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.

3. Schedule training with Owner, through Architect, with at least ten business days' advance notice.

4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.

B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:

1. System design and operational philosophy.
2. Review of documentation.
3. Operations.
4. Adjustments.
5. Troubleshooting.
6. Maintenance.
7. Repair.

3.2 FINAL CLEANING

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

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

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

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove labels that are not permanent.
   h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
   i. Replace parts subject to unusual operating conditions.
   j. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
   k. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems or wetlands. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

DIVISION 3

City of Portsmouth, New Hampshire

School Department

Portsmouth High School Tennis Courts

50 Andrew Jarvis Drive

Portsmouth, NH 03801

CONCRETE FORMWORK - 031000

PART 1 – GENERAL

1.1 REQUIREMENTS

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

B. All applicable portions of Division 1 - General Requirements are to be considered as included with this section.

C. All Federal, Local and/or State Codes and Ordinances shall govern when their requirements are in excess hereof.

1.2 DESCRIPTION

A. Provide all materials, labor, equipment, service, scaffolding, etc., necessary and incidental to the completion of all Formwork as indicated on drawings and as specified herein.

B. Work included consists of but is not limited to the following formwork:

1. Concrete footings and foundations.
2. Equipment pads and curbs.
3. Exterior sidewalk slabs, aprons, ramps, curbs, etc.

C. Setting of miscellaneous rough hardware, frames, angles, bolts, etc. Those items embedded in flat work concrete, not requiring formwork, shall be set by Concrete Contractor.

1.3 FORMING REQUIREMENTS

A. Forms shall be used, wherever necessary to confine the concrete and shape it to the required dimensions. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain specified tolerances.

B. Provide all forms as required to form poured in place curbs, sidewalks, pavements, exterior slabs, ramps, aprons, footings, abutments, etc.

1.4 QUALITY ASSURANCE

A. The contractor shall be required to have available at all time, for reference, the latest editions of the following regulations, standards, etc., which are hereby included in and made a part of these specifications.

1. Recommended Practice for Concrete Formwork ACI 347.
2. Specifications for Structural Concrete for Buildings ACI 301.
3. Building Code Requirements for Reinforced Concrete ACI 318.

B. The design, engineering and construction of all formwork shall be the responsibility of the Formwork Subcontractor (if subcontractor is used). Formwork design, allowable loads, lateral pressure and stresses shall be in accordance with Recommended Practice for Concrete Formwork ACI 347 and for wind loads and other applicable requirements of the controlling local building code.

1. Tolerances for formed concrete shall not exceed ACI standards.
2. This subcontractor shall maintain sufficient control points and benchmarks to establish locations of the construction and to maintain specified tolerances.

1.5 JOB CONDITIONS

A. Make provisions to coordinate with and provide access to Mechanical and Electrical Contractor for the installation of required pipe sleeves, conduit, etc.

B. Provide ample notice to all trades and subcontractors to facilitate installation of all items embedded in formed concrete.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Steel forms or form liners shall be standard commercially available prefabricated steel forms.

B. Fiberglass forms shall be standard quality.

C. Plywood forms shall be B-B ply-form, Class I or Class II, 5/8" minimum thickness, edge sealer. No loose knots, holes, or cracks allowed for exposed concrete.

D. Boards, sheathing and form lumber shall be No. 3, common or better, 3/4" minimum thickness.

E. Framing lumber shall be standard or better.

F. Form accessories embedded in concrete shall be commercially manufactured type. Non-fabricated wire ties are not permitted.

2.2 CONSTRUCTION

A. All forms used for exposed concrete work shall be new plywood forms. Reused plywood forms, fiberglass forms and standard steel forms may be used for all concealed concrete work, provided that the reused forms are cleaned and re-oiled prior to reinstallation.

B. All exterior corners and edges of exposed concrete shall be chamfered or bull-nosed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Rigidly support and substantially construct forms. Forms shall be erected plumb, straight, and true to line, shape and dimensions and in precise position to form the lines and designs indicated. Forms shall be suitable for removal without prying against the concrete. Make forms tight, without cracks or holes and prevent any leakage of mortar or loss of fine particles from the concrete. Knots that have loosened, leaving holes, holes that are not used and cracks that have opened up shall be covered with sheet metal for unexposed concrete. No loose knots, holes or cracks allowed for exposed concrete.

B. Set all miscellaneous rough hardware, etc. required to be cast-in formed concrete.

1. All items shall be firmly supported, in true alignment and plane and in accordance with approved erection and shop drawings.

C. Forms for exterior concrete sidewalks, slabs, pads, aprons, etc., shall be set directly in contact with prepared subgrade or base which shall be compacted for a sufficient distance outside the area of the pavement to support the form.

1. Forms shall be securely staked, braced and tamped into position. Top surface of form shall be set within a tolerance of 1/8" in ten feet.

D. Surfaces of forms coming in contact with newly placed concrete shall be coated with an approved non-staining form oil, a commercial form release agent or a non-absorptive form liner to prevent moisture penetration of the form and to prevent bond with the concrete.

1. Do not permit coating to puddle or come in contact with reinforcing steel and hardened concrete at construction joints.

3.2 FORM REMOVAL

A. Formwork may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations and developed sufficient strength to sustain its own weight and any superimposed loads.

3.3 ADJUST AND CLEAN

A. After completion of all formwork this subcontractor shall remove all debris from site.

END OF SECTION 03 10 00

1

REINFORCEMENT - 032000

PART 1 – GENERAL

1.1 REQUIREMENTS

A. All applicable portions of Division 1 - General Requirements are to be considered as included with this section.

B. All Federal, Local and/or State Codes and Ordinances shall govern when their requirements are in excess hereof.

1.2 DESCRIPTION

A. Provide all materials, labor, equipment, service, scaffolding, etc., necessary and incidental to the supply and placing of all Reinforcement as indicated on the drawings and as specified herein.

B. Work included consists of but is not limited to the following:

1. Reinforcement and dowels for all concrete footings, foundations, piers, slabs, pads, curbs, etc.
2. Welded wire fabric for all floor slabs and all exterior sidewalks, slabs, loading docks, platforms, aprons, ramps, curbs etc. as shown on the Contract Plans.
3. Dowels for masonry walls.
4. Reinforcement for masonry lintels, walls and bond beams.

1.3 QUALITY ASSURANCE

A. The contractor shall be required to have available at all time, for reference, the latest editions of the following regulations, standards, etc., which are hereby included in and made a part of these specifications.

1. Specifications for Structural Concrete ACI 301.
2. Building Code Requirements for Reinforced Concrete ACI 318.
3. Manual of Standard Practice of the Concrete Reinforcing Steel Institute.
4. Manual of Standard Practice for Detailing Reinforced Concrete Structures ACI 315.
5. Building Design Handbook of the Wire Reinforcement Institute.

B. A certified copy of the mill test on each heat of reinforcing steel, in accordance with CRSI "Manual of Standard Practice", shall be provided upon request of Owner.

C. All materials shall conform to specified ASTM standards.

1.4 SUBMITTALS

A. Submit shop drawings for all reinforcing steel fabrication and placement for approval. Reinforcing steel shop drawings shall be prepared by an experienced reinforcing detailer for fabrication, bending, and placement of concrete reinforcement. Fabrication, placement and shop drawings shall comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Reproductions of Contract Drawings shall not be permitted.

1.5 PRODUCT DELIVERY AND STORAGE

A. Reinforcing bars shipped from the mill shall be properly separated and tagged with manufacturer’s heat or test number.

B. All reinforcing bars shall be marked, in the surface of the bar, with designation indicating the point of origin, size, type of steel and minimum yield.

C. Reinforcing bars shall be shipped to the site and stored in such a manner as to prevent injurious defects, protection from excessive rust, and to maintain a clean finish.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel reinforcing bars shall conform to "Specifications for Deformed Billet - Steel Bars for Concrete Reinforcement", ASTM A-615, Grade Number 60, having a minimum yield strength of 60,000 p.s.i.

B. Tie wire shall be black annealed wire, 16-gauge minimum.

C. Bar supports shall conform to the "Bar Support Specifications" contained in "Manual of Standard Practice" as published by CRSI. Bar supports and accessories within 1/2" of surface of concrete exposed to weather shall be non-corrosive.

D. Welded Wire Fabric shall be smooth wire fabric conforming to ASTM A-82 and A-185. Welded intersections shall be W1.4 x W1.4.

E. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.

F. All Steel is to be epoxy coated in accordance with applicable sections of ASTM D3963.

2.2 FABRICATION

A. Fabricate reinforcing bars of size and length indicated. Accurately bend or form to the shapes indicated by methods that will not injure the materials. Heating of reinforcement for bending will not be allowed.

B. Fabrication and placing tolerances of reinforcing bars and welded wire fabric shall conform to CRSI "Manual of Standard Practice" and ACI 318 Building Code Requirements for Reinforced Concrete for Buildings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Place reinforcing is accordance with the approved shop drawings. Provide copies of shop drawings bearing the engineer's approval stamp for use in the field.

B. Accurately place reinforcement and securely tie in precise position, using at least 16-gauge annealed steel wire at points where bars cross, and in such a way as to hold them against displacement during the placing of concrete. Comply with the Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

C. Reinforcing bars shall be free from mud, oil, form release compounds or any other non-metallic coatings that adversely affect bonding properties. Rust and mill scale are permitted provided ASTM minimum standards are maintained.

D. Exercise particular care in placing and securing of reinforcement to maintain the proper distance and clearance between parallel bars and between bars and the forms, or neat excavations. Provide metal spreaders and spacers to maintain vertical steel centering, and to hold horizontal steel in position. Support steel at proper height with chairs, transverse steel bars, with hangers, or other manner as necessary.

E. Splicing of reinforcement shall be detailed per Chapter 12 of A.C.I. 318-89 unless otherwise noted on drawings.

F. Place, straighten, and cut welded wire fabric to required size. Touch up cut ends with epoxy-coating. Lap and support fabric in accordance with ACI, and CRSI requirements. Avoid splices in areas of minimum stress.

1. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operation. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
2. Install welded wire fabric in longest lengths practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.2 ADJUST AND CLEAN

A. Upon completion of work this subcontractor shall remove all debris from site.

3.3 FIELD QUALITY CONTROL

A. All reinforcing steel installation shall be reviewed and accepted by Owner's Project Representative prior to placing concrete.=The contractor shall notify the Owner's Representative in writing 48 hours before scheduling the placing of any concrete to allow inspector to review rebar installation. See also Section 32 13 13.

END OF SECTION 03 20 00

DIVISION 26

City of Portsmouth, New Hampshire

School Department

Portsmouth High School Tennis Courts

50 Andrew Jarvis Drive

Portsmouth, NH 03801

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS – 260533

PART 1 - GENERAL

1.1 SUMMARY

A. Raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 MATERIALS

A. Nonmetallic Wireways: PVC plastic.

B. Surface Raceways: Nonmetallic, rigid PVC.

C. Handholes and Boxes for Exterior Underground Wiring Fiberglass, prototype tested for compliance with SCTE 77.

D. Sleeve Seals: EPDM sealing element.

1.3 INSTALLATION

A. Raceway Applications:

1. Outdoors:

   a. Exposed: RNC, Type EPC-80-PVC.
   b. Concealed, Aboveground: RNC, Type EPC-40-PVC.
   c. Underground: RNC, Type EPC-80-PVC, direct buried.
   d. Connection to Vibrating Equipment: LFNC.
   e. Boxes and Enclosures, Aboveground: NEMA Type 3R.
   f. Underground Handholes and Boxes: SCTE [**tier 15**] [**tier 8**] [**3000-lbf**] structural load rating.

2. Indoors:

   a. Exposed: EMT or RNC.
   b. Exposed and Subject to Severe Damage: Rigid steel.
   c. Concealed: EMT.
   d. Connection to Vibrating Equipment: FMC, except LFMC in damp or wet locations.
   e. Damp or Wet Locations: Rigid steel.
   f. Raceways for Distribution of Optical Fiber or Communications Cable: EMT.
   g. Boxes and Enclosures: NEMA Type 1, except Type 4 in damp or wet locations.

END OF SECTION 26 05 33

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS – 260543

PART 1 - GENERAL

1.1 SUMMARY

A. Conduits, ducts, and duct accessories for direct-buried duct banks.

B. Handholes and boxes.

1.2 QUALITY ASSURANCE

A. Quality Standard: ANSI C2.

1.3 COMPONENTS

A. Conduit:

1. Rigid steel conduit.
2. Rigid nonmetallic conduit (RNC).

B. Nonmetallic Ducts:

1. Underground plastic utilities duct, Type EB-20-PVC.
2. Underground plastic utilities duct, Type DB-80-PVC.

C. Precast concrete handholes and boxes.

D. Handholes and Boxes Other Than Precast Concrete:

1. Fiberglass handholes and boxes with covers of fiberglass.
2. High-density plastic boxes with covers of plastic.

1.4 INSTALLATION

A. Waterproofing exterior surfaces of handholes.

END OF SECTION 26 05 43

DIVISION 31

City of Portsmouth, New Hampshire

School Department

Portsmouth High School Tennis Courts

50 Andrew Jarvis Drive

Portsmouth, NH 03801

TEMPORARY TREE AND PLANT PROTECTION - 310900

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections:

1. Division 31 Section "Site Clearing" for removing existing trees and shrubs.
2. Division 32 Section "Planting Soils" for restoration of planted areas.
3. Division 32 Section “Turf and Grasses”.
4. Division 32 section “Plants”.

1.3 DEFINITIONS

A. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, as noted on the plans, or as determined in the field prior to construction.

B. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, as noted on the plans, or as determined in the field prior to construction.

C. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of the following:

1. Protection Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
2. Protection Zone Signage: Full-size Samples of each size and text, ready for installation.

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

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.

5. Description of maintenance following pruning.

D. Qualification Data: For qualified tree service firm.

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

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

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

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

A. Tree Service Qualifications: Licensed tree service in jurisdiction where Project is located.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified tree service to Project site during execution of the Work.

C. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
b. Enforcing requirements for protection zones.
c. Tree service 's responsibilities.
d. Field quality control.

1.6 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

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

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

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones, as well as newly installed plant materials and mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Planting Soil: Refer to Division 32 section “Planting Soils”.

B. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements. Previously used materials may be used when approved by Engineer.

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart.

a. Height: 4 feet.
b. Color: High-visibility orange, nonfading.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. For the record, prepare written report, endorsed by tree service, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 54 inches above the ground.

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

3.3 TREE- AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings at a distance as noted on plans. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Engineer.

B. Maintain protection zones free of weeds and trash.

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

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

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by tree service if a root buffer effective against soil compaction is constructed as directed by tree service. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Earth Moving."

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

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

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

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to tree service.
3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible according to requirements in Division 31 Section "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune roots flush with the edge of the protection zone, by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction only if approved in writing by Owner or Engineer. Prune branches as follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by tree service. .
2. Pruning Standards: Prune trees according to ANSI A300 (Part 1)
3. Cut branches with sharp pruning instruments; do not break or chop.
4. Do not apply pruning paint to wounds.

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

3.7 REGRADING

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

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by tree service unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

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

D. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with planting soil. Place planting soil in a single un-compacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

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

3.9 REPAIR AND REPLACEMENT

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

1. Submit details of proposed root cutting and tree and shrub repairs.
2. Have tree service perform the root cutting, branch pruning, and damage repair of trees and shrubs.
3. Treat damaged trunks, limbs, and roots according to tree service's written instructions.
4. Perform repairs within 24 hours.
5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Engineer.

B. Soil Aeration: Where directed by Engineer, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of auger blended soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

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

END OF SECTION 31 09 00

SITE CLEARING - 311000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.

D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

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

F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings.

G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Engineer.

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Utility Locator Service: Notify “Call Before You Dig” for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

F. The following practices are prohibited within protection zones:

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

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

I. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer.

1. Use coating with a VOC content of 3.5 lb/gal. or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 54 inches (1372 mm) above the ground.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

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

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Engineer not less than two (2) days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Engineer's written permission.

E. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Remove stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade outside the perimeter of the building and parking areas.
3. Use only hand methods for grubbing within protection zones.
4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 12 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated on plans and necessary to facilitate new construction.

B. Remove slabs, footings, fencing, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00

EARTH MOVING - 312000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. GEOTECHNICAL DATA AND DESIGN BASIS REPORT PROPOSED IMPROVEMENTS TO PORTSMOUTH HIGH SCHOOL TENNIS COURTS LOCATED IN PORTSMOUTH, NEW HAMPSHIRE PREPARED BY GEI CONSULTANTS DATED DECEMBER 7, 2021

C. State of New Hampshire Department of Transportation, Standard Specifications for Road and Bridge Construction, International Building Code 2015.

1.2 SUMMARY

A. Section Includes:
1. Construction stakeout performed by a licensed surveying firm provided by the contractor.
2. Excavation and backfilling to provide access to all work areas.
3. Excavation and stockpiling of materials suitable for reuse at an approved on-site location
4. Excavation and legal off-site disposal of unsuitable or excess materials, including existing fill materials, boulders, excess topsoil, boulders, and overburden soils.
5. Soil excavation, fill, backfill, refill and subgrade preparation as indicated herein and per Contract Drawings or required, using specified materials.
6. Soil structure excavation, placement of bedding and backfilling of utility trenches.
7. Furnishing and placing specified materials required to balance site cuts and fills as close as feasible.
8. Preparation of subgrade for structures, slabs, pavements and landscaping.
9. Furnishing and installing sheeting, shoring and bracing for excavations as required by Federal, State and Local laws, regulations and ordinances.
10. Removal of unsuitable materials from beneath proposed building, utilities and pavement areas.
11. Furnishing and placing subbase and accessories for roadways, parking lots and sidewalks, as indicated on the site Contract Drawings.
12. Furnishing and placing various gradations of crushed stone and related materials in areas designated on the plan.
13. Removal of rock, ledge, boulders, concrete, masonry and rubble as required for foundations and site excavation to the lines and grades indicated on the drawings and as described within this specification and the Geotechnical Report.
14. Rough and fine grading including compaction for existing materials, backfills and refills, and crushed stone.
15. Dewatering, pumping, bailing and control of all groundwater and surface water for all work under this Contract.
16. Dust, erosion, siltation and environmental controls.
17. Subbase and base course for the sidewalks and pavements shall be furnished, placed and rough graded by the Contractor.
18. Removal and disposal of debris materials and surplus excavated soils.
19. Excavation and backfilling for underground and above ground stormwater system.
20. Excavating and backfilling for retaining walls.

B. Related Sections:

1. Section "Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.

2. Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Section "Dewatering" for lowering and disposing of ground water during construction.
4. Section "Subsurface Geotechnical Report" for shoring, bracing, and sheet piling of excavations.
5. Section "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom; measured according to SAE J-1179.

2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.

I. 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.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches.
2. Warning Tape: 12 inches long; of each color.

C. Qualification Data: For qualified testing agency.

D. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Laboratory gradation and compaction curve for all materials used on site and according to ASTM D 1557.

E. Blasting plan approved by authorities having jurisdiction.

F. Seismic survey report from seismic survey agency.

G. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.5 QUALITY ASSURANCE

A. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan and pre-blast survey in accordance with State of New Hampshire and City of Portsmouth Fire Department standards reporting the following:

1. Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:

1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

C. Pre-excavation Conference: Conduct conference at Project site.

D. Comply with all the requirements of this section and with all applicable local, state and federal regulations having jurisdiction.

E. An independent testing laboratory, selected and paid by Owner, shall ne retained to perform construction testing on site based on the following:

1. Compaction requirements for all soils shall be in accordance with ASTM maximum dry density as determined by ASTM D-1557.

2. The in-place soil density shall be determined in accordance with ASTM Standard Method of Test for Density of Soil in Place by Nuclear Methods (shallow depth), Designation D-2922 or by the Sand-Cone Method, Designation D-1556.

3. Building Subgrade Areas, including 5'-0" Outside of Exterior Building Lines: In cut areas, not less than 1 compaction test for every 10,000 sq. ft. In fill areas, same rate of testing for each 12-in. lift, measured loose.

4. Area of Construction exclusive of Building Subgrade Areas: In cut areas, not less than 1 compaction test for every 10,000 sq. ft. In fill areas, same rate of testing for each 12-in lift, measured loose.

5. Pavement base thickness tests – One per 20,000 square feet of surface area.

6. Field density test will be required for each foot of depth of backfill at an average interval of 150 feet along the trenches.

7. If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.

8. The independent testing laboratory shall prepare test reports with the following minimum information:

   Report shall consist of narrative and sketch and include as a minimum:

   Date and job project number on each sheet
   Testing Lab name, telephone number, technician name.
   Location of each test on site sketch at location of test.
   Elevation of test.
   Date(s) of compaction.
   Date(s) of testing.
   Lab maximum densities and optimum moisture and field density at each location.
   Outline of all foundation walls.
   Outline of all underground piping and trenching.
   Gradation and moisture density proctor report for all materials used on site.

   In the event that test performed fails to meet Specifications, Owner and Contractor shall be notified immediately by the independent testing laboratory.

   Costs related to retesting due to failure shall be paid for by the Contractor at no additional expense to Owner. Owner reserves right to employ an independent testing laboratory and to direct testing

that is deemed necessary. Contractor shall provide free access to site for testing activities. Costs for sampling, transporting and making all laboratory tests required to obtain characteristics of materials from on-site and off-site sources proposed to be used for fills, refills, surcharge fills and backfills including gradation tests and determination of moisture-density relationships, shall be borne by the Contractor.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Engineer.

C. Utility Locator Service: Notify "Call Before You Dig" for area where Project is located before beginning earth moving operations.

D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 31 Section "Site Clearing," are in place.

E. Do not commence earth moving operations until plant-protection measures specified in Division 31 Section "Site Clearing" are in place.

F. The following practices are prohibited within protection zones:

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

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

I. Do not bring explosives onto site or use in work without prior written permission from the Owner and regulatory agencies, which have jurisdiction. Contractor is solely responsible for handling, storage, and use of explosive materials if their use is permitted. For such use, obtain necessary permits and transmit copies to the Owner. Contractor shall present certificates of insurance, in a form acceptable to the Owner, showing evidence that Contractor's insurance includes coverage for blasting operations, in the amounts required by the Contract for construction before bringing explosives on site.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Subbase material gradation “A”, as specified by New Hampshire Standard Specifications for Road and Bridge Construction.

E. Base Course: Processed aggregate as specified by New Hampshire Standard Specifications for Road and Bridge Construction.

F. Structural Fill: Hard durable sand and gravel free of clay, organic matter, surface coatings, and other deleterious materials. Soil finer than No. 200 sieve (the fines) shall not be plastic. Structural fill should meet the requirements of New Hampshire Standard Specifications for Road and Bridge Construction.

G. Crushed Stone: 3/8” size durable crushed rock or durable gravel stone conforming to the requirements of New Hampshire Standard Specifications for Road and Bridge Construction.

H. Rip Rap: Rip rap conforming to the requirements of New Hampshire Standard Specifications for Road and Bridge Construction.

I. Pipe Bedding: Pipe bedding and pipe zone material conforming to the requirements of New Hampshire Standard Specifications for Road and Bridge Construction grading “C’.

J. Trench Backfill: Trench backfill conforming to the requirements of New Hampshire Standard Specifications for Road and Bridge Construction.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
4. Tear Strength: 56 lbf; ASTM D 4533.
5. Puncture Strength: 56 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours’ exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
4. Tear Strength: 90 lbf; ASTM D 4533.
5. Puncture Strength: 90 lbf ASTM D 4833.
6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Verify that survey benchmark and intended elevations for the work are as indicated.

B. Identify and flag known utility locations. Maintain and protect existing utilities to remain and which pass through the work areas.

C. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

D. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

1. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site. Perform blasting without damaging adjacent structures, property, or site improvements.
2. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

3.4 EXCAVATION, GENERAL

E. All topsoil, subsoil, unsuitable fill and miscellaneous materials (i.e. structures, foundations, pavements) shall be stripped to their entire depths within the footing bearing zones and below bottom of floor slab base course within building areas if applicable to this contract. Materials suitable for reuse as determined by the Geotechnical Engineer shall be stored in designated locations that will not interfere with building operations. As previously specified, topsoil to be reused shall be free from clay, large stones and debris. All materials not suitable for reuse shall be legally disposed of off-site as specified elsewhere in the Contract Documents. Topsoil and Subsoil beneath pavements proposed in fills greater than 6 feet in height may remain in place, with the approval of the Geotechnical Engineer.

B. The Contractor shall excavate all topsoil, unsuitable fill and any other unsuitable materials to firm natural ground below all spread footings and within the area as sloping downward and outward on a one horizontal to one vertical (1H:1V) line to firm natural ground or to five (5) feet beyond structure or building lines if applicable to this Contract, whichever is greater, or as required by the Geotechnical Engineer. Unsuitable material is herein classified as existing fill, topsoil, organic silt, peat, branches, logs, stumps, boulders, cobbles, existing structures (i.e. footings, foundations, floor slabs, pavements, abandoned utilities, etc.) and any trash, (i.e., snow, roots, sod, rubbish or other deleterious or organic matter). Over excavate bedrock and natural soils below footings as described herein.

C. The Contractor shall excavate and remove topsoil, subsoil, miscellaneous unsuitable organic fill and any other unsuitable materials to 5-feet below specified finish pavement grades as indicated on the Contract Drawings then proof roll the subgrades in the manner specified below.

D. Excavated topsoil, unusable boulders, unusable excavated rock and unsuitable materials shall be removed and stockpiled at a designated location or otherwise removed from the project at the Contractor’s expense.

E. Excavated rock consisting of on-site boulders and mechanically broken ledge shall be stockpiled on site for preparation of primary and secondary crushing, as necessary, for reuse at locations on site provided material gradations after any processing, screening and mixing operations meet those outlined herein. Alternatively, all excavated rock should be legally disposed of off-site.

3.5 EXCAVATION FOR STRUCTURES

A. All areas within the limits of work shall be excavated or filled with suitable material to the subgrade lines and elevations as shown on the plans and cross sections in accordance with these specifications

The Contractor shall not excavate below top of suitable in-place natural soil subgrades except as described within this specification for spread footing foundation construction and utility installation. Do not perform soil over excavation for spread footing foundation construction and utility installation without the authorization of the Geotechnical Engineer. The Contractor shall follow a construction procedure which permits visual identification of firm natural ground.

All footing and foundation excavations shall be made to the proper depths with the proper allowance for forms, etc. All excavations shall be approximately level, and clear of loose material. Any debris or vegetable matter or unsuitable soil or material encountered in the excavation shall be removed as directed by the Geotechnical Engineer. All debris, not usable for rough grading below grass areas, excluding slope areas, shall be removed from the excavated material and shall be disposed of off-site.

Surplus material, if any, shall be disposed of off-site in a legal manner at the Contractor's expense.

B. The Contractor shall follow a construction procedure which permits visual identification of natural subgrade soils.

In the event that groundwater is encountered, the Owner may require that the size of the open excavation be limited to that which can be handled by the Contractor's chosen method of dewatering and allow visual observation of the bottom and placement of all fill in the dry.

C. If subgrade soils become loose and saturated, the Contractor shall be required to excavate such loose and saturated soils and replace them, at no additional cost to the Owner, with compacted 3/8 inch foundation stone or sand-gravel fill in order to stabilize areas which may become disturbed due to surface runoff, construction disturbances by the Contractor, and subsurface seepage pressure and also to expedite pumping. Particular areas of concern are within new building areas and under all pavement areas.

D. The Contractor shall be required, if necessary to place 4" underdrains 50 feet on center, two or more feet below grade, in ¾ inch crushed stone and filter fabric on top of the silt or clay natural ground, or, to place a twelve inch (12") to eighteen inch (18") layer of free-draining sand-gravel material over the natural underlying soil to stabilize areas which may become disturbed due to water seepage and to expedite drainage if requested by the Geotechnical Engineer or as indicated on the Contract Drawings.

E. Prior to placement of the initial layer of fill over the natural ground, proof-rolling of the exposed subgrades, if above the groundwater table, shall be performed as specified herein. This requirement may be waived by the Geotechnical Engineer based on actual conditions encountered.

F. Protect all subgrade soils. Excavate subgrade soils which become disturbed, and backfill in accordance with specifications at Contractor's expense.

G. Do not excavate to full depth when freezing temperatures may be expected unless subgrade is protected from freezing, or footings or slabs can be placed immediately after excavation is completed and are protected from freezing.

H. Maintain safe and stable excavation walls in accordance with OSHA requirements.

I. Excavate in a manner that will not disturb existing foundations to remain. Plans for excavating near existing remaining foundations shall be submitted to the Geotechnical Engineer for approval prior to beginning such excavation.

J. Correct unauthorized excavation at no additional cost to the Owner.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate for sewer, water, and drainage piping and other utilities at locations indicated on the Drawings. Dewater trenches to permit work to be performed in dry conditions. Over excavate and remove unsuitable material and replace and compact with foundation stone or material approved by the Geotechnical Engineer.

B. Cut trenches sufficiently wide to enable installation and inspection of utilities. Cut trenches sufficiently wide to allow compaction of fills with a double-drum, walk-behind vibratory roller. Slope or shore trenches in accordance with OSHA standards.

C. Support pipe and conduit during placement and compaction of pipe bedding material.

D. Backfill trenches with pipe zone material according to the specifications contained herein and the Contract Drawings to required contours and elevations.

E. Place and compact fill materials in accordance with specifications contained hereinafter.

F. Dispose of unsuitable materials, rock not to be used, etc. in a legal manner offsite.

3.8 SUBGRADE INSPECTION

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a heavy vibratory roller to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Proof-roll existing natural soil subgrade and fill subgrades within building and pavement areas prior to placement of fill in all building and pavement areas or installation of utilities, in two perpendicular directions. Proof-rolling shall be accomplished with a minimum of 8 passes of a vibratory steel drum roller with a minimum static weight of 10,000 pounds. Any soft, weaving or deleterious areas shall be locally excavated and replaced with compacted structural fill. This work shall be performed under the direct observation of the Geotechnical Engineer. The Geotechnical Engineer may elect to waive this work within wet areas, if excessive disturbance is being created.
2. Existing fill materials which may potentially remain in place below pavement areas shall be proof rolled with minimum of 8 passes of a vibratory steel drum roller with a minimum static weight of 10,000 pounds. Loose soils identified during proof-rolling shall be excavated and replaced with compacted structural fill in loose lifts not to exceed 12 inches thick.
3. If the exposed subgrade is wet or otherwise susceptible to disturbance, the Geotechnical Engineer may waive proof-rolling requirements. Proof-roll crushed stone layer below footings and slabs and where fractures in bedrock have been filled with a 5-ton static weight vibratory roller minimum to fill fractures in rock and to provide a uniformly stiff surface to receive footings and slabs.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, damp-proofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch thick, concrete-base slab support for piping or conduit less than 18 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

E. Backfill voids with satisfactory soil while removing shoring and bracing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material below subgrade.
3. Under steps and ramps, use structural fill.
4. Under building slabs, use structural fill.
5. Under footings and foundations, use structural fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1/4 inch.
3. Pavements: Plus or minus 1/4 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Place base course material over subbase course under hot-mix asphalt pavement.

2. Shape subbase course and base course to required crown elevations and cross-slope grades.
3. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
4. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material and maximum lift thickness comply with requirements.
3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.

E. Testing agency will test compaction of soils in place according to ASTM D 1557, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies or as required with the geotechnical report:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 10,000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 150 feet or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including topsoil, unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 20 00

DEWATERING- 312319

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes construction dewatering and includes the following:

1. This section specifies the designing, furnishing, installing, maintaining, operating and removing of a complete temporary dewatering system as required to lower and control water levels, hydrostatic pressures during construction; disposing of pumped water; construction, maintaining, observing and, except where indicated or required to remain in place, removing or filling of dewatering tubing and observation well; and instrumentation for control of the system.
2. The Contractor shall provide, at his own expense, adequate pumping and drainage facilities to keep the excavate areas sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures or cause excessive disturbance of underlying natural ground. The drainage of all water resulting from pumping shall be arranged so as not to cause damage to adjacent property. All requirements of local environmental or conservation authorities shall be satisfied with respect to discharge of pumped water.
3. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation, thereby decreasing the stability of excavated slopes, causing loss of material from beneath the slopes or bottom of the excavation and hauling characteristics of soil, and/or causing rupture or heaving of the bottom of an excavation.

B. Related Sections:
1. Division 03 Section “Concrete Formwork” for the placement of formwork associated with concrete footings and bridge abutments.
2. Division 31 Section "Earth Moving" for excavating, backfilling, site grading, and for site utilities.
3. Division 31 Section "Sub-surface Geotechnical Report” for guidance regarding the use of the borings and geotechnical recommendations associated with this work.

1.3 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

1.4 SUBMITTALS

A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.

1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.

B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Qualification Data: For qualified Installer and professional engineer.

D. Field quality-control reports.

E. Other Informational Submittals:

1. Photographs: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work.

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

C. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to dewatering including, but not limited to, the following:

a. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
b. Geotechnical report.
c. Proposed site clearing and excavations.
d. Existing utilities and subsurface conditions.
e. Coordination for interruption, shutoff, capping, and continuation of utility services.
f. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
g. Testing and monitoring of dewatering system.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Architect no fewer than two (2) days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Architect's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
2. The geotechnical report is included and referenced elsewhere in the Project Manual.

C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Provide temporary grading to facilitate dewatering and control of surface water.

D. Monitor dewatering systems continuously.

E. Promptly repair damages to adjacent facilities caused by dewatering.

F. Protect and maintain temporary erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing" during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 12 inches below surface of excavation.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 FIELD QUALITY CONTROL

A. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

END OF SECTION 31 23 19

SUBSURFACE GEOTECHNICAL REPORT - 313213

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Division 2 - Site Construction.

1.2 DESCRIPTION OF WORK

A. Boring Logs:

1. The Boring Logs for the project site have been prepared and are available in the project manual.

B. Geotechnical Report(s):

1. A Geotechnical Report for the project site has been prepared and is available in the project manual.
2. The Contractor must interpret this report according to his own judgment and acknowledges that he is not relying upon the data as accurately describing the subsurface conditions which may be found to exist.
3. The Contractor further acknowledges that he assumes all risk contingents upon the nature of the subsurface conditions which shall be actually encountered by him in performing the Work of this Contract.
4. The Contractor should visit the site and become acquainted with all existing conditions and may make their own subsurface investigations to satisfy themselves as to the sub-surface conditions. Such investigations shall be conducted only under time schedules and arrangements approved in advance by the Owner.

END SECTION 31 32 13

DIVISION 32

City of Portsmouth, New Hampshire

School Department

Portsmouth High School Tennis Courts

50 Andrew Jarvis Drive

Portsmouth, NH 03801

ASPHALT PAVING - 321216

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. State of New Hampshire Standard Specifications for Road and Bridge Construction 2016 Edition.

C. SUMMARY

D. Section Includes:
1. Hot-mix asphalt patching.
2. Hot-mix asphalt paving.
3. Pavement Marking paint.

E. Related Sections:
1. Division 31 Section "Earth Moving" for aggregate sub-base and base courses and for aggregate pavement shoulders.
2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants and fillers at paving terminations.

1.2 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
2. Job-Mix Designs: For each job mix proposed for the Work.
3. Tack Coat Material: Submit manufactures product data for approval by the Engineer prior to delivery of the material.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities and wheel stops.

C. Qualification Data: For qualified manufacturer and Installer.

D. Material Certificates: For each paving material, from manufacturer.

E. Material Test Reports: For each paving material.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the NHDOT.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of NHDOT for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

D. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
b. Review condition of subgrade and preparatory work.
c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F.
2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: The coarse aggregate shall consist of clean, hard, tough, durable fragments of broken stone or gravel of uniform quality throughout. It shall not contain more than 1 percent of material such as crusher dust sand elongated or soft disintegrated pieces. It shall be free of mud, dirt, organic or other injurious materials. When gravel is used at least 50 percent shall be crushed. When tested by means of the Los Angeles Rattler using AASHTO Method T-96, the loss shall not exceed 40 percent.

C. Fine Aggregate: Except for base coarse which shall be 100 percent sand, the fine aggregate shall consist of sand or a mixture of a minimum of 50 percent sand and a maximum of 50 percent stone screenings, and shall be composed of clean, tough, rough surfaced and angular grains. The fine aggregate shall be limited to material 95 percent of which passes a No. 4 sieve having square openings and not more than 8 percent of which passes a No. 200 sieve. The material shall be free from clay, loam and foreign material. The Engineer reserves the right to reject material, which does not conform to the following requirements for plasticity:

1. When the fraction of the dry sample passing the No. 100 mesh sieve is 4 percent or less by weight, no plastic limit test will be made.

2. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 4 percent and not greater than 8 percent by weight, that fraction shall not have sufficient plasticity to permit the performance of the plastic limit test using AASHTO Method T-90.

3. When the fraction of the dry sample passing the No. 100 mesh is greater than 8 percent by weight, 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 submitted 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 performance of the plastic limit test using AASHTO Method T-90. When screenings are blended, they shall be free from coatings of fine dust after drying.

D. Mineral Filler: AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: The asphalt cement shall conform to requirements of AASHTO M-20, penetration grade 85-100. The Thin-film oven test shall be performed in place of the loss on heating test. The requirements for the residue from the thin-film oven test shall be as follows:

The penetration shall not be less than 50 percent of the original penetration, and the ductility shall be not less than 75 cms.

The Saybolt-Furol viscosity at 275 degrees F. shall be not less than 150 seconds. A.S.T.M. Method E-102 shall be used.

B. Tack Coat: Tack coat material shall be grade CRS-1, CSS1 or CSS1H. Emulsified asphalt for tack coat shall use RS-1, SS-1, SS-1H conforming to AASHTO M 140.

A. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wet table powder form.

B. Sand: AASHTO M 29, Grade Nos. 2 or 3.

C. Joint Sealant: AASHTO M 324, Type II, hot-applied, single-component, polymer-modified bituminous sealant.

D. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type F; colors complying with FS TT-P-1952.

1. Color: White, Yellow, Blue or as indicated.

2.4 MIXES

A. Hot-Mix Asphalt:

Mixture Classification: These mixtures shall consist of coarse aggregate, fine aggregate, mineral filler, if necessary, and asphalt cement, combined to meet the following composition limits by weight and other characteristics:

Percent Passing By Weight (Square Mesh Sieve)	Class 1 Base Course	Class 2 Surface Course
Passing 1"	100	-
Passing 3/4"	90-100	-
Passing 1/2"	70-100	100
Passing 3/8"	60-82	90-100
Passing #4	40-65	55-80
Passing #8	28-50	40-64
Passing #30	10-32	16-36
Passing #50	6-26	8-26
Passing #100	-	-
Passing #200	3-8	3-8
Bitumen %	5-8	5-8
Marshall Tests:		
Voids %	3-6	2-5
Stability, lbs. min.	1,200	1,000
Flow inches	0.08-0.15	0.08-0.15

The fraction actually retained between any two consecutive sieves shall not be less than 4 per cent.

The temperature shall be so controlled that the temperature of the asphalt cement shall not exceed 325 degrees F. and that of the aggregate at the drier outlet shall be between 280 degrees F. and 350 degrees F. depending on the amount of moisture in the aggregate. The temperature of the mixture as it is dumped from the mixer must be between 265 degrees F. and 325 degrees F.

The materials for this work shall conform to the following requirements:

1. Asphalt Cement: Shall conform to requirements for premix bituminous macadam base material.

2. Coarse Aggregate: The coarse aggregate shall consist of clean, hard, tough, durable fragments of broken stone or gravel of uniform quality throughout. It shall not contain more than 1 percent of material such as crusher dust sand elongated or soft disintegrated pieces. It shall be free of mud, dirt, organic or other injurious materials. When gravel is used at least 50 percent shall be crushed. When tested by means of the Los Angeles Rattler using AASHTO Method T-96, the loss shall not exceed 40 percent.

3. Fine Aggregate: Except for base coarse which shall be 100 percent sand, the fine aggregate shall consist of sand or a mixture of a minimum of 50 percent sand and a maximum of 50 percent stone screenings, and shall be composed of clean, tough, rough surfaced and angular grains. The fine aggregate shall be limited to material 95 percent of which passes a No. 4 sieve having square openings and not more than 8 percent of which passes a No. 200 sieve. The material shall be free from clay, loam and foreign material. The Engineer reserves the right to reject material which does not conform to the following requirements for plasticity:

a. When the fraction of the dry sample passing the No. 100 mesh sieve is 4 percent or less by weight, 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 percent and not greater than 8 percent by weight, that fraction shall not have sufficient plasticity to permit the performance of the plastic limit test using AASHTO Method T-90.

c. When the fraction of the dry sample passing the No. 100 mesh is greater than 8 percent by weight, 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 submitted 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 performance of the plastic limit test using AASHTO Method T-90. When screenings are blended they shall be free from coatings of fine dust after drying.

d. Mineral Filler: Mineral filler shall conform to the requirements of AASHTO M17.

B. Job Mix Tolerances

Aggregate passing Sieve No. 4 and larger	5%
Aggregate passing Sieve No. 10 through No. 100	4%
Aggregate passing Sieve No. 200	2%
Bitumen	0.5%
Temperature of Mixture when dumped from mixer	15°F

C. Preparation of Mixture: The hot coarse and fine aggregates and asphalt cement shall be measured separately and accurately by weight for each batch to be mixed. After the coarse and fine aggregates have been charged into the mixer and thoroughly mixed for a period of not less than 15 seconds, the asphalt cement shall be added, and the mixing continued for a period of at least 30 seconds, or longer if necessary, to produce a homogeneous mixture in which all particles of the mineral aggregate are uniformly coated.

The ingredients shall be heated and combined in such a manner as to produce a mixture which shall be at a temperature, when discharged, of not less than 265°F. nor more than 325°F.

D. Transportation of Mixture shall conform to requirements for transportation of premix bituminous macadam base material.

E. Tack coat material shall be grade CRS-1, CSS1 or CSS1H. Emulsified asphalt for tack coat shall use RS-1, SS-1, SS-1H conforming to AASHTO M 140.

F. Sub-base shall conform to Section 312000.

G. Processed Aggregate Base shall conform to Section 312000.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction**,** repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof roll with a heavy vibratory roller.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

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

D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Re-compact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.3 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.4 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at maximum temperature of within 25 deg F of approved job mix formula.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Density: Minimum of 92 and maximum of 96 percent of reference laboratory density according to AASHTO T-209 (modified).

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 3/8 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 3/8 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/8 inch.

3.9 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T 168.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
    a. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

B. Do not allow milled materials to accumulate on-site.

END OF SECTION 32 12 16

CONCRETE - 321313

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. State of New Hampshire Department of Transportation, Standard Specifications for Road and Bridge Construction.

C. SUMMARY

D. Section Includes:

1. Pads
2. Curbs
3. Footings
4. Wheel Stops
5. Bridge Abutments
6. Detectable Warning Tiles
7. Parge Coating

E. Related Sections:

1. Section "Concrete Formwork”.
2. Section "Concrete Paving Joint Sealants".
3. Section “Site Furnishings”.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.

D. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:

E. Other Action Submittals:

1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

F. Qualification Data: For qualified Installer of detectable warnings, ready-mix concrete manufacturer, and testing agency.

G. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Fiber reinforcement.
3. Admixtures.
4. Curing compounds.
5. Applied finish materials.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.
8. Parge Coating Manufacturer.

H. Material Test Reports: For each of the following:

1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity**.**

I. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.

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

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

E. ACI Publications: Comply with ACI 301 unless otherwise indicated.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of full-thickness sections of concrete paving to demonstrate typical joints; surface finish, texture, and color; curing; and standard of workmanship.
2. Build mockups of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Engineer and not less than 96 inches by 96 inches. Include full-size detectable warning**.**
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.

4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to concrete paving, including but not limited to, the following:

   a. Concrete mixture design.
   b. Quality control of concrete materials and concrete paving construction practices.

2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:

   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete paving subcontractor.
   e. Manufacturer's representative of stamped concrete paving system used for detectable warnings.

1.5 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Refer to Section “Concrete Formwork”.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

C. Zinc Repair Material: ASTM A 780.

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, gray Portland cement Type II

   a. Fly Ash: ASTM C 618, Class C or Class F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

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

2.3 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.

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

C. Water: Potable and complying with ASTM C 94.

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

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Axim Italcementi Group, Inc.; Caltexol CIMFILM.
b. BASF Construction Chemicals, LLC; Confilm.
c. ChemMasters; Spray-Film.
d. Conspec by Dayton Superior; Aquafilm.
e. Dayton Superior Corporation; Sure Film (J-74).
f. Edoco by Dayton Superior; BurkeFilm.
g. Euclid Chemical Company (The), an RPM company; Eucobar.
h. Kaufman Products, Inc.; VaporAid.
i. Lambert Corporation; LAMBCO Skin.
j. L&M Construction Chemicals, Inc.; E-CON.
k. Meadows, W. R., Inc.; EVAPRE.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group; MONOFILM.
n. Sika Corporation, Inc.; SikaFilm.
o. SpecChem, LLC; Spec Film.
p. Symons by Dayton Superior; Finishing Aid.
q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
r. Unitex; PRO-FILM.
s. Vexcon Chemicals Inc.; Certi-Vex EnvioAssist.

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

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Anti-Hydro International, Inc.; A-H Curing Compound #2 DR WB.
b. ChemMasters; Safe-Cure Clear.

c. Conspec by Dayton Superior; D.O.T. Resin Cure.
d. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
e. Edoco by Dayton Superior; DSSCC Clear Resin Cure.
f. Euclid Chemical Company (The), an RPM company; Kurez W VOX.
g. Kaufman Products, Inc.; Thinfilm 420.
h. Lambert Corporation; AQUA KURE - CLEAR.
i. L&M Construction Chemicals, Inc.; L&M CURE R.
j. Meadows, W. R., Inc.; 1100-CLEAR SERIES.
k. Nox-Crete Products Group; Resin Cure E.
l. SpecChem, LLC; PaveCure Rez.
m. Symons by Dayton Superior; Resi-Chem Clear.
n. Tamms Industries, Inc., Euclid Chemical Company (The); TAMMSCURE WB 30C.
o. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
p. Vexcon Chemicals Inc.; Certi-Vex Enviocure 100.

2.4 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

C. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ChemMasters; Exposee.
b. Conspec by Dayton Superior; Delay S.
c. Dayton Superior Corporation; Sure Etch (J-73).
d. Edoco by Dayton Superior; True Etch Surface Retarder.
e. Euclid Chemical Company (The), an RPM company; Surface Retarder Formula S.
f. Kaufman Products, Inc.; Expose.
g. Meadows, W. R., Inc.; TOP-STOP.
h. Metalcrete Industries; Surftard.
i. Nox-Crete Products Group; CRETE-NOX TA.
j. Scofield, L. M. Company; LITHOTEX Top Surface Retarder.
k. Sika Corporation, Inc.; Rugasol-S.
l. SpecChem, LLC; Spec Etch.
m. TK Products, Division of Sierra Corporation; TK-6000 Concrete Surface Retarder.
n. Unitex; TOP-ETCH Surface Retarder.
o. Vexcon Chemicals Inc.; Certi-Vex Envioset.

2.5 DETECTABLE WARNING MATERIALS

A. Detectable Warning Tiles:

1. Manufacturers: Subject to compliance with Contract Drawings, qualified manufacturers from the New Hampshire Department of Transportation approved products list or approved equal.

B. Liquid Release Agent: Manufacturer's standard, clear, evaporating formulation designed to facilitate release of stamp mats.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days):
   a. 3500 psi for footings
   b. 4000 psi for bridge abutments and pavement
   c. 5000 psi for wheel stops
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.44.
3. Slump Limit: 4 inches, plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
1. Air Content: 6 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

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

1. Use water-reducing admixture, high-range, water-reducing admixture, or high-range, water-reducing and retarding admixture in concrete as required for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage by weight of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals**.**

G. Parge Coating: Tuff II trowel on Coating by Styro Industries or Approved equal.
1. Color: Dark Grey.

H. Limit percentage by weight of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals**:**

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.

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

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a heavy vibratory roller.
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Division 31 Section "Earth Moving."

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

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. Refer to section “Reinforcement”.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise detailed. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 20 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows**,** to match jointing of existing adjacent concrete paving:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.

a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.

E. Edging: After initial floating, tool edges of paving, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation**,** steel reinforcement**,** and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies**,** reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms**,** steel reinforcement**,** and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared, and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture, as Detailed.
2. Margin: Smooth Trowel Finish as Detailed.

C. Parge Finish: For Catch Basins and Wheel Stops (if to cover markings). Trowel Finish.

3.8 DETECTABLE WARNINGS

A. Detectable Warnings: Install detectable warning tile according to manufacturer's written instructions.

1. Before using stamp mats, verify that the vent holes are unobstructed.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

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

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot long, unleveled straightedge not to exceed 1/2 inch.

4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.12 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.

B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

CONCRETE PAVING JOINT SEALANTS - 321373

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.

B. Related Sections:

1. Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.
2. Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, Samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit no fewer than eight (8) pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint-preparation data that are based on previous testing, not older than 24 months, of sealant products for compatibility with and adhesion to joint substrates and other materials matching those submitted.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Pavement-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

D. Qualification Data: For qualified Installer

E. Product Certificates: For each type of joint sealant and accessory, from manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.

G. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each type of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer **or** are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Engineer from manufacturer's full range. Color selected to match adjacent concrete.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Crafco Inc., an ERGON company; RoadSaver Silicone.
b. Dow Corning Corporation; 888.
c. Pecora Corporation; 301 NS.

2.3 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place joint sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING

A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION 32 13 73

ACRYLIC TENNIS COURT SURFACE - 321834

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Acrylic tennis Court Surface.
   2. Line Markings.

B. Related Sections:
   1. Division 32 Section "Asphalt Paving" for asphalt pavement.
   2. Division 32 Section "Concrete Paving" for concrete pavement.
   3. Division 32 Section “Chain Link Fences and Gates” for fencing

1.3 SUBMITTALS

A. Product Data and MSDS sheets for all materials.

B. Color samples for all materials/colors chosen. Client reserves the right to adjust color choice based on full line of colors from manufacturer.

C. Qualification Data: For qualified Installer

D. Product Certificates: For each type of material from the manufacturer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. Contractor must be able to supply the owner with a list of at least twenty (20) outdoor tennis courts surfaces with the material accepted over the last five years and have required no maintenance.

B. Reference Standards: American Sports Builders Association (ASBA)

C. Product Testing: Test materials using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of materials under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by materials manufacturer **or** are below 40 deg F.
2. When substrates are wet.
3. Where contaminants capable of interfering with adhesion have not yet been removed.

PART 2 - PRODUCTS

2.1 TENNIS COURT SURFACE MATERIAL

A. This material shall be a fully pigmented system in-depth color. The material shall be from one of the following approved manufacturers:
- NOVACOURT, by Novasport USA, Framingham, MA (800) 872-6682
- DECO SURFACING, by California Products, Cambridge, MA (800) 332-6178
- LATEXITE, by Surface Coatings Co., Auburn Hills, MI (248) 338-0335
- PLEX-PAVE, by California Products, Cambridge, MA (800) 225-1141
- LAYKOLD, by Advanced Polymer Technology, Harmony, PA (888) 266-4221
- SportMaster Sport Surfaces by Seal Master, Sandusky, Ohio 800-326-1994

B. Acrylic Coloring of Courts shall be as follows:
1. Inner (Playing) Court Color: Green
2. Outer (non-Playing) Court color: Red/Maroon

C. Asphalt or tar in any form will not be permitted in any coating. The color shall be pure acrylic-type containing no asphalt or tar emulsions and no vinyl’s, alkyds or non-acrylic resins. The color finish system shall contain factory-mixed compositions requiring only the addition of water on the job site. The material shall be delivered to the site in sealed containers with the manufacturer's label affixed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Plant Mix Bituminous Asphalt shall cure for a minimum of 14 days prior to application of surfacing materials. Proceed with installation only after unsatisfactory conditions have been corrected.

B. The asphalt surface shall be flooded, and any ponding water that remains after 1 hour and is deep enough to cover the thickness of a five-cent piece shall be corrected using a patch mix by the approved surfacing manufacturer.

C. Tennis courts shall be cleaned using a stiff bristle broom and a gas-powered, water-based pressure spray unit capable of generating 2500 psi. at the nozzle tip, to remove all dirt and debris.

D. Saw-cut control joints at the net line and equal distant between the courts, as detailed, using a dry cut blade. Power wash area sufficiently to allow adhesion of acrylic color system.

E. After all leveling and patching, the tennis court area shall receive one (1) coat of sand filled acrylic surfacer material at the rate of .07 gallon/square yard.

F. Application of the system shall be in strict accordance with the printed instructions of the manufacturer. If the system is installed by someone other than the manufacturer, an experienced manufacturer's representative shall supervise the installation of the material.

G. The surface to receive the tennis surface system as specified shall be checked to be free from grease, oil and other foreign materials before starting the work. The Contractor shall remove by brush, vacuum or blower all dust, dirt, imbedded soil, etc. and shall mechanically wash areas, if required.

H. Holes, cracks and spalled areas shall be clean of dirt, water and deleterious materials before any coating operations are started. After cleaning and treating these areas with the proper filler materials, the application shall proceed only if the surfaces are dry and clean and the temperature is at least fifty degrees Fahrenheit (50°F). and rising and the surface temperature is not in excess of one hundred forty degrees Fahrenheit (140°F).

I. Apply two (2) filler coats and one (1) finish coat. Application shall be in strict accordance with manufacturer's specifications. The material shall have in-depth color in the color combinations as indicated for the final surface.

J. The filler coat shall be applied at a rate of .05 gallons (concentrated material prior to dilution) per square yard for each coat. The final surface shall be applied at a rate of .04 gallons (concentrated material prior to dilution) per square yard. Only small amounts of water shall be added if too rapid drying is occurring during application. The Contractor shall be accountable at all times for the amount of materials of each color used. Permission of the Landscape Architect shall be obtained before adding any additional water.

K. Care shall be taken to protect adjacent areas and structures (fences, posts, sidewalks, buildings, etc.) which are not to be coated. If coated, remove immediately before drying occurs.

L. Contractors must notify the Landscape Architect of all applications, 48 hours prior to installation.

M. Acceptability of work: The finished surface shall be constant in color and texture, free from voids, depressions, joint marks, ridges, wheel marks or other imperfections. If any of these become apparent during the installation of the system, the contractor will correct prior to the final coat application, or the surface shall be rejected.

3.2 LINE MARKINGS

A. Upon completion and acceptance of the tennis surface, this Contractor shall prepare and paint lines for tennis. Unless otherwise noted, tennis lines shall be white.

B. The lines shall be masked on both sides with an acceptable tape. Each measurement shall be accurately set to within 1/8" tolerance in accordance with the American Sports Builders Association (ASBA). Each court area shall be marked for doubles play.

C. All areas that have overlapped in color shall be corrected and non-appearing. All overspray in excess shall be corrected and non-appearing. No spraying shall be done with the wind factor above seven (7) mph.

END OF SECTION 321834

SITE FURNISHINGS - 323300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Portable Bench With Back
2. 3 Row x 27'-0" Bleacher
3. 4 Row x 27'-0" Bleacher
4. Tennis Nets, Posts, Center Anchor and Center Strap
5. Vinyl Coated Windscreen
6. 12'x22' Rectangular Hip Roof Structure
7. 16'x24' Rectangular Hip Roof Structure
8. Removable Bollard

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete".
2. Section 31 20 00 "Earth Moving".

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

C. Engineered shop drawings for structures and footings

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PORTABLE BENCH WITH BACK

A. Provide and install 10' long BE-PG01000 as produced by National Recreation Systems, a Playcore Company, or approved equal.

B. All components shall be aluminum.

C. Contractor to install bench per manufacturer's specifications

2.2 3 ROW x 27'-0" BLEACHER

A. Provide and install 3 row x 27'-0" Bleacher model number NB-0327APRF as produced by National Recreation Systems, Inc., or approved equal.

B. All components shall be aluminum.

C. Contractor to install bench per manufacturer's specifications.

2.3 4 ROW x 27'-0" BLEACHER

A. Provide and install 4 row x 27'-0" Bleacher model number NB-0427ALPRF as produced by National Recreation Systems, Inc., or approved equal.

B. All components shall be aluminum.

C. Contractor to install table per manufacturer's specifications.

2.4 TENNIS NETS, POSTS, CENTER ANCHOR AND CENTER STRAP

A. Provide and install Tennis nets item number 20045 TN-45 as produced by Douglas Sports, www.douglas-sports.com, or approved equal.

B. Provide and install Tennis Posts, Round Post item number 63051 color black as produced by Douglas Sports, www.douglas-sports.com, or approved equal.

C. Provide and install Tennis Net Center Anchor item number 63428 as produced by Douglas Sports, www.douglas-sports.com, or approved equal.

D. Provide and install Tennis Nets Center Strap, Procam ACS item number 20625 as produced by Douglas Sports, www.douglas-sports.com, or approved equal.

E. Contractor to install per manufacturer's specifications.

2.5 VINYL COATED WINDSCREEN

A. Provide and install Vinyl Coated Windscreen as produced by Douglas Sports, www.douglas-sports.com, or approved equal.

B. Color to be determined by owner/owner's representative.

C. Contractor to install per manufacturer's specifications.

2.6 12' x 22' RECTANGULAR HIP ROOF STRUCTURE

A. Provide and install two (2) Metal Hip Roof Shade Structure as specified below and as depicted on the Contract Drawings.

B. Manufactured by Polygon, 4240 136th Ave Holland, MI 49424 p: 616-888-3500 supplied by O'Brien and Sons. 17 Trotter drive, P. O. Box 718, Medway, Mass, P:508-359-4200 or approved equal.

C. Color shall be determined by owner/owner's representative.

D. Contractor shall install per manufacturers specifications.

2.7 16' x 24' RECTANGULAR HIP ROOF STRUCTURE

A. Provide and install one (1) Metal Hip Roof Shade Structure as specified below and as depicted on the Contract Drawings.

B. Manufactured by Polygon, 4240 136th Ave Holland, MI 49424 p: 616-888-3500 supplied by O'Brien and Sons. 17 Trotter drive, P. O. Box 718, Medway, Mass, P:508-359-4200 or approved equal.

C. Color shall be determined by owner/owner's representative.

D. Contractor shall install per manufacturers specifications.

2.8 REMOVABLE BOLLARD

A. Provide and Install One (1) Removeable Steel Bollard at the Vehicular Entrance as depicted on the Contract Drawings.

a. Bollard shall be Helix Lock Removeable Bollard (model HL 2004L) 4.5" OD, 36" height. Manufactured by TrafficGuard, Inc., P. O. Box 201, Geneva, IL 60134, P:877-727-7347or approved equal.

b. Color Shall be: Yellow (color to be confirmed with client during submittal process)

B. Mounting condition shall be sleeve mounted to concrete footing.

C. Contractor to install per manufacturers specifications.

2.9 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:

1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211.
2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221.
3. Structural Pipe and Tube: ASTM B 429/B 429M.
4. Sheet and Plate: ASTM B 209.
5. Castings: ASTM B 26/B 26M.

B. Steel and Iron: Free of surface blemishes and complying with the following:

1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53/A 53M, or electric-resistance-welded pipe complying with ASTM A 135/A 135M.
3. Tubing: Cold-formed steel tubing complying with ASTM A 500/A 500M.
4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and

complying with dimensional tolerances in ASTM A 500/A 500M; zinc coated internally and externally.
5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
6. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.
7. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.
8. Gray-Iron Castings: ASTM A 48/A 48M, Class 200.

C. Stainless Steel: Free of surface blemishes and complying with the following:

1. Sheet, Strip, Plate, and Flat Bars: ASTM A 666.
2. Pipe: Schedule 40 steel pipe complying with ASTM A 312/A 312M.
3. Tubing: ASTM A 554.

D. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.

E. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.

1. Polyethylene: Fabricated from virgin plastic HDPE resin.

F. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M; recommended in writing by manufacturer, for exterior applications.

G. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

H. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:

1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft.of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

2.10 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.

E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

F. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.11 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 ALUMINUM FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.13 STEEL AND GALVANIZED-STEEL FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

2.14 IRON FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.15 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run directional finishes with long dimension of each piece.
2. Directional Satin Finish: No 4.
3. Dull Satin Finish: No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 INSTALLATION, GENERAL

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

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

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.

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

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 BASIS OF PAYMENT

A. As directed by the City of Portsmouth, New Hampshire.

END OF SECTION 32 33 00

PLANTING SOILS - 329100

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. General: This Section includes:

1. Planting Soils
2. Vegetated Swale Soils
3. Soil Amendments
4. Inspection and Testing of Existing Soils
5. Preparation of Soil Mixes
6. Soil Installation

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 01 00 00 “General Requirements”
2. Section 31 20 00 “Earth Moving”
3. Section 32 92 00 “Turf and Grasses”

1.3 DEFINITIONS

A. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture conforming to the physical requirements and installed in the manner set forth in this manual.

1.4 SUBMITTALS

A. Product Data:

1. Fertilizers, Pesticides, and Herbicides: Contractor to provide product label and manufacturer’s application instructions for each product used.
2. Landscape Fabrics: Contractor to provide product label and manufacturer’s application instructions.

B. Samples for Verification:

1. Manufactured Soil: Provide Min. 2 Quart sample for verification as well as testing results indicating particle size nutrient analysis, organic content, and pH in conformance with product descriptions in PART 2.

2. Amended On-site Planting Soil: Provide Min. 2 Quart sample for verification as well as testing results indicating particle size nutrient analysis, organic content, and pH in conformance with product descriptions in PART 2.

C. Sources for Soil Components and Planting Soil Mixes: Submit information identifying sources for all soil components and the contractor responsible for mixing of planting soil mixes.

1. Owner or Landscape Architect shall have the right to reject any soil supplier.
2. Soil mix supplier shall have a minimum of five years' experience at supplying custom planting soil mixes.
3. Submit supplier name, address, telephone and fax numbers and contact name.
4. Submit certification that accepted supplier is able to provide sufficient quantities of materials and mixes for the entire project. Indicate quantity and type of material from each.

D. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of planting soil during a calendar year.

E. Warranty: Sample of special warranty.

1.5 TESTING

Soils Testing Laboratory
Horticulture Storage Building
University of Connecticut
2019 Hillside Road
Storrs, CT 06269

Substitute laboratory may be used only if testing agency demonstrates to Engineers/Owner's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from weather, damage, injury and theft.

B. Soil that is to be stockpiled longer than two weeks, whether on or off site, shall not be placed in mounds greater than six feet high. If soil stockpiles greater than six feet high are to be stored for more than two weeks, the contractor shall break down and disperse soil so that mounds do not exceed the six-foot height restriction or thoroughly mix the stockpile once a month.

C. Immediately separate and dispose soil materials unsuitable as planting soil from stockpiled materials

D. Keep the topsoil covered if the construction is taking place during precipitation events to keep the stockpiled soil at moisture contents below optimum compactive moisture.

PART 2 - PRODUCTS

General: Approved on site soil material shall be used stockpiled, amended, protected, and installed prior to installation. If on-site sources prove insufficient or inadequate, provide manufactured soil. On-site soil material shall only be taken from areas identified on the plans as being disturbed.

2.1 AMENDED ON-SITE PLANTING SOIL

A. Remove all organic and coarse (rocks) fragments over 1 inch in diameter in the engineered topsoil. Remove large stones (>4"), construction debris, and other root inhibiting materials from the surface of the subgrade that would affect the engineered planting soil.

B. Test stockpiled material and remove detrimental materials and/or provide amendments as needed to

achieve the required characteristics:

- Sandy Loam or loam type soil as established by the United States Department of Agriculture Classification System Based upon the proportion of sand, silt, and clay size particles.
- Penetration resistance of engineered topsoil < 150 lbs/in^2.
- < 10% rock fragment content, pH of 5.5 - 7.0, Organic matter 4 – 12%, well draining.

2.2 MANUFACTURED SOIL

A. Approved Manufacturer

B. Sterilize stockpiled soil in one of two methods:

1. Heat stockpiled soil to above 150 degrees F;
2. Apply pre-emergent weed seed killer or allow weeds to start germinating, then apply Roundup.

C. Samples of individual components of soil mixes in addition to blended mixes shall be submitted by the Contractor for testing and analysis to the approved testing laboratory.

1. No base component material or soil components for plant mixes shall be used until certified test reports by an approved agricultural chemist have been received and approved by the Landscape Architect.
2. As necessary, make any and all soil mix amendments and resubmit test reports indicating amendments until approved.

D. The Engineer may request additional testing by the Contractor for confirmation of mix quality and/or soil mix amendments at any time until completion.

E. Potential Material Suppliers: The Contractor shall submit a list of potential soil component suppliers.

1. Labeling is recommended unless an expert is available to identify material. Copy this paragraph and re-edit for labeling different types of plants if required.
2. In the event that any of the above materials are not available from suppliers or are not in compliance with specifications herein, the Contractor shall obtain material from other suppliers and conduct tests specified herein to provide materials in compliance with these specifications. If the cited suppliers cannot provide the specified material no additional compensation shall be paid to the contractor.

F. Characteristics: Sandy loam amended with organic matter. A sandy loam modified with organic component to have at least 4% organic matter but not more than 10% organic matter, dry weight basis, compacted infiltration rate of 2.5 cm/hour, pH range of 5.5 to 7.0, and no coarse fragments over 2.5 cm in size. Particle size distribution shall be:

Soil Layer Particle Size Distribution

Particle Size Class	***Passing Sieve No***	***Range in Percent Passing*** ASTM F 1632-03
fine gravel	10	100
very coarse sand	18	90 – 100
coarse sand	35	70 – 85
medium sand	60	44 – 60
fine sand	140	25 – 35
very fine sand	300	18 – 25
silt*		12 – 18
clay*		5 – 12

Organic Matter		**Percent Range by weight** ASTM F 1647-02a
OM%		4 - 12

*determined by hydrometer method in ASTM F1632-03.

2.3 SOIL AMENDMENTS

A. Compost: The organic material may be "Allgro" brewer's waste, composted sewage sludge without excessive content of woodchips, or aged composted mushroom substrate or livestock manures are also acceptable. Composted municipal waste (chipped, shredded and screened wood, leaves, bark, etc.) alone is not acceptable unless it meets all of the criteria as follows:

1. *Carbon/nitrogen ratio*. This ratio shall be between 11/1 to 22/1
2. *Degree of maturity*. Maturity shall be between Grades IV and V, “curing compost” and “very stable compost” as measured in a colorimetric-based maturity test. The compost shall be considered “stable” and not subject to continuing biologic or chemical processes.
3. *Odor*. The composted material shall not produce any unpleasant residual odor such as hydrogen sulfide, ammonia, or others.
4. *Mineral/organic content and fineness (particle size).* The organic material shall contain at least 40% organic matter (dry basis) and shall have 100% passing a 1/2-inch or smaller screen. Debris particles such as metal, glass, plastic, wood, asphalt or masonry shall not exceed 10mm in size, and shall not total more than 2 % dry weight.
5. *Reaction (pH).* The pH shall be within the range of 5.5 to 8.0. (CaCl method).
6. *Salinity.* Total salinity shall not exceed 2 grams of salt per liter (expressed as sodium chloride,NaCl).
7. *Nutrient contents*. The material shall contain some nitrogen, phosphorus, potassium, calcium, magnesium, sodium and micronutrients including iron, copper, boron, manganese, and molybdenum, so that heavy applications of fertilizer is not required to sustain plant growth. Also, the nutrients shall be present in appropriate agricultural and horticultural proportions to prevent ion antagonism.
8. *Heavy metals*. Concentrations of zinc, mercury, cadmium, lead, nickel, chromium, and copper must be below EPA and State of New Hampshire’s Department of Environmental Protection standards for applications to soils with human activity.

B. Leaf Compost: Fully matured (6-18 months), screened, ½%-1% nitrogen content by weight, free of deleterious materials, and uncomposted materials.

C. Commercial Fertilizer: Having the following minimum guaranteed composition by weight: nitrogen 5% (50% organic), available Phosphoric Acid (P2O5) 10%, Soluble Potash (K2O) 5%, unless soil tests indicate need for different composition as determined by Engineer. Elements becoming available according to methods adopted by Association of Official Agricultural Chemists. By Agway or approved equivalent.

2.4 SAND

A. Clean, washed, natural or manufactured, and free of toxic materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance. The Contractor shall examine previous work, related work, and conditions under which this work is to be performed and shall notify the Owner in writing of all deficiencies and conditions

detrimental to the proper completion of this work. Beginning work means the Contractor accepts substrates, previous work, and conditions. The Contractor shall not place any planting soil until all work in adjacent areas is complete and approved by the Architect.

1. Examine soil and remove foreign materials, stones over 1", and organic debris over 2" in length. Mix-in amendments as required by tests and as approved by the Owner's Representative. All preparation and mixing shall be accomplished when the soil moisture content is less than 10 percent by volume.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
5. Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.
6. All construction debris shall be removed from the planting areas prior to placement of the soil layers. Care shall be taken to avoid working the soil when it has 10 percent moisture content or above.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 EXCAVATION AND SCARIFICATION

A. Loosen subgrade of planting areas to a minimum depth that will allow the placement of planting soil layers according to the details.

B. Subgrade for planting areas shall be accomplished using approved materials and compacted to standard subgrade compaction ranges.

C. After the specified engineering compaction for all subgrades is accomplished and the trees are planted within scarified pits, scarify the compacted surface of the subgrade following final rough grade to a depth of 4 to 6 inches prior to the planting soil placement. The subgrade shall have a permeability of not less than 0.5 inches/hour. Determine permeability of the subgrade using a single ring infiltrometer method after it has been scarified. If infiltration of the subgrade is below 0.5 in/hr, scarify perpendicular to previous scarification to a depth of 6 to 8 inches and retest for infiltration.

D. After approval of the subgrade, placement of the planting soil can begin following procedures outlined in Part 3.5 of this Section.

3.4 MIXING OF PLANTING SOIL

A. The planting soil shall be mixed in a ball mill or tub mill fitted with proper screening and paddles. Windrowing the materials is not acceptable, as it does not produce uniform mixing of the components.

B. Mixing of the compost shall be accomplished in the same manner as the other mixing procedures. The compost shall be moist, but not overly wet so as water can be squeezed out by hand or so dry as to by

easily blown by wind.

3.6 PLACEMENT OF PLANTING SOIL

A. Verify the following:

1. Verify that the under drainage systems have been installed and accepted if applicable.
2. Verify that the subgrade passes the minimum water infiltration requirement.
3. Determine that the subgrade is free of debris.
4. Verify that the subgrade meets a soil density requirement of 95 percent of peak density and is the proper depth.
5. Verify that the planting soil mix has below 10 percent moisture at least two days prior to soil placement.
6. Notify the Owner of soil placement operations at least ten calendar days prior to the beginning of work.

B. Preparation and Placement:

1. Scarify the subgrade and test the subgrade's infiltration rate.
2. Place the planting soil in 6" lifts. Compaction of this lift shall consist of light tamping by the installers foot traffic. No mechanical compaction shall be allowed.
3. Compaction of the Planting Soil areas is not allowed.
6. Reducing the amount of compaction to the soils can be accomplished by beginning the work in corners, against walls, or at the center of isolated beds, and progressing out- wards. This limits the amount of traffic needed for installation on the placed soil.
7. Planting soils shall never be moved or worked when wet or frozen.
8. The Contractor shall place barricades as required to prevent any unnecessary compaction of planting soil from vehicles, equipment, or pedestrian traffic.
9. Excavation for tree pits shall be such that care is taken not to damage surrounding pavements.
   a. The depth of the excavation shall be according to the details. Compact only the very bottom of the excavation with a hand tamper to form a dense pedestal of at least 95 percent of peak density to support the tree rootball as shown on the details. Tree planting pits' shape and size shall be according to the details.
   b. The root flair of the tree shall be set to the level shown on the Drawings.
   c. Subgrade material removed to accommodate tree pit depth shall be removed from the area and NOT incorporated in the planting soil profile.

3.6 SITE INSPECTION

A. Prior to beginning the fine grading work, the Contractor shall inspect the site rough grading to ensure its accuracy. Beginning the fine grading work means that the Contractor accepts the rough grading.

3.7 PREPARATION

A. The Contractor shall establish lines and levels, locate and lay out by instrumentation and similar appropriate means, all planting area finish grades.

B. The contractor shall provide additional stakes and string lines as required to achieve smooth finish grades with positive surface drainage.

3.8 TOLERANCES

A. The Contractor shall be required to fine grade all planting areas to within 1/5 foot(.05 foot) of finish grades indicated on the Grading Plans and/or finish grades accepted by the Owner's Representative.

B. Proper allowances shall be made for settlement, spoils from plant pits, and addition of soil amendments.

C. A Pre-seeding survey as built of the field area shall be performed by a New Hampshire licensed surveyor at a grid spacing of spot elevations every 10 feet on center on the entire field surface to verify proper grading of the field of play. This shall be reviewed by the owner's representative prior to seeding of the field.

3.9 FINISH GRADING OPERATIONS

A. Generally, grade with uniform slope between points where elevations are given or between such points and existing grades.

B. Slope finish grades to drain surface water away from buildings, walks, paving, and other structures unless otherwise noted. Slope finish grades to drain surface water to drain inlets as shown on the Drawings.

C. Grade sculptural landform surfaces to achieve the continuity shown on the Drawings and as directed by the Owner's Representative.

D. Inducing Settlement and Melting Clumps.

1. Apply water as required to induce settlement and melt remaining soil clumps;
2. When adequately dry, re-grade or re-screed smooth, adding additional planting soil as required.

E. Use equipment of appropriate size and type to achieve the sculptural forms' profiles, and degree of smoothness required by the Engineer.

F. Fill and compact any depressions and remove all loose material to finish surface true to line and grade, presenting a smooth, compacted, and unyielding surface.

G. Compact planting areas to specified compaction.

H. Areas which become compacted to a degree greater than that specified shall be ripped to the depth of the planting soil, rototilled, and bladed smooth.

I. Settlement that occurs within the warranty period shall be corrected at no cost to the Owner.

3.10 PROTECTION, REPAIRS AND CLEANUP

A. Protect newly graded areas from traffic, freezing and erosion. Keep free of trash, debris or construction materials.

B. Within the installation warranty period repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or compacted due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace material to a depth as directed by the Owner; reshape and re-compact by only hand tamping at the prescribed moisture content.

C. During soil preparation, keep adjacent paving and construction clean and work area in an orderly condition.

3.11 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

3.12 BASIS OF PAYMENT

A. Payment for Planting Soils will be made as a lump sum.

END OF SECTION 32 91 00

TURF AND GRASSES- 329200

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding.
3. Turf Renovation.
4. Erosion-control material(s).

B. Related Sections:

1. Section "Site Clearing" for topsoil stripping and stockpiling.
2. Section "Earth Moving" for excavation, filling and backfilling, and rough grading.
3. Section "Plants" for border edgings.
4. Section 'Planting Soils' for soil.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

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

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. 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.

E. 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.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Seed: From seed vendor for each seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture. Include identification of source and name and telephone number of supplier.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

E. Material Test Reports: For existing in-place surface soil and imported or manufactured topsoil.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf and meadows during a calendar year. Submit before expiration of required initial maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and meadow establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in turf installation.
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, or irrigation specialty area(s), designated CLT-Exterior.
    b. Certified Turfgrass Professional, designated CTP.
    c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.
    d. CNLA Connecticut Accredited Nursery Professional.

5. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
6. Pesticide Applicator: State licensed, commercial.

B. Soil Analysis: As described in Division 32 Section “Planting Soil”.

C. Pre-installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as 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.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion

1. Spring Planting: As indicated on plans.
2. Fall Planting: As indicated on plans.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of Substantial Completion.

a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

B. Initial Meadow Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than 60 days from date of Substantial 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.

PART 2 - PRODUCTS

2.1 SEED MIXES

A. Refer to Plans for seed mix sourcing, makeup, application rate.

2.2 PLANTING SOILS

A. Planting Soil: Refer to “Planting Soils” Specification Section.

2.3 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.

2.4 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.

3.2 PREPARATION

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

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
1. Evenly distribute and thoroughly till additives for pH correction and fertilizers into the top 3” of topsoil. Apply and incorporate each material in separate operation with mechanical equipment. Apply and incorporate by hand only in inaccessible areas.
   a. Apply additive for pH correction at rate recommended by topsoil testing service to adjust pH of topsoil to not less than 6.0 nor more than 7.0.
   b. If otherwise approved by Engineer, apply ground limestone at a rate of 25 lbs. Per 1000 square feet.
   c. Apply starter fertilizer at the rate of 3.6 lbs. Per 1000 square feet.

2. Spread planting soil to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to the soil report and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture

3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare areas Steeper than 3:1 slope for Erosion Control Matting.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate as specified on the plans.

C. Rake seed lightly into top 1/8 inch soil, roll lightly, and water with fine spray.

D. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 70 to 90 lbs of hay per 1000 square feet to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

F. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.6 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.7 TURF RENOVATION

A. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.

2. Install new planting soil as required.

B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

C. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

D. Mow, dethatch, core aerate, and rake existing turf.

E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

H. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

I. Apply seed and protect with straw mulch as required for new turf.

J. Water newly planted areas and keep moist until new turf is established.

3.8 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow perennial ryegrass to a height of 1 to 2 inches.
2. Mow Kentucky bluegrass to a height of 1-1/2 to 2 inches.
3. Mow turf-type tall fescue to a height of 2 to 3 inches.

D. Turf Post-fertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.9 SATISFACTORY TURF (AREAS WITH LAWN SEED MIX)

A. Turf installations shall meet the following criteria as determined by Engineer:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
3. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
4. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.10 MEADOW (AREAS WITH LOW MAINTENANCE SEED MIX AND SWALE (AREAS WITH SWALE SEED MIX)

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

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

B. The seed/inert material mixture shall be uniformly and evenly broadcast over the designated areas at a density that shall achieve a minimum of seventy-five (75) pure live seeds per square foot, as solely determined by the Engineer. Broadcasting may be done by hand-casting, hand-held spreader, gravity drop seeder, cyclone spreader, sling seeding or another type of equipment or method as approved by the Engineer.

C. Brush seed into top 1/16 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

E. Water newly planted areas and keep moist until meadow and swale is established.

3.11 MEADOW MAINTENANCE

A. Maintain and establish meadow by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, regrade, and replant bare or eroded areas. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep meadow and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water meadow with fine spray at a minimum rate of 1/2 inch per week for eight weeks after planting unless rainfall precipitation is adequate.

3.12 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.13 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 32 92 00

PLANTS - 329300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. The provision and installation of all plant materials and products specified, including all supervision, labor, equipment, and materials necessary to complete the project.

2. General maintenance of stored and installed materials until Acceptance.

3. Provision of Landscaping Warranty.

B. Description of Work:

1. Provide all materials and equipment, and do all work required to transplant existing trees and shrubs, and to install new plants, as indicated on the Drawings and as specified.

C. Related Sections:

1. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

a. Section 015639 “Temporary Tree and Plant Protection”
b. Section 311000 “Site Clearing”
c. Section 312000 “Earth Moving”
d. Section 329200 “Turfs and Grasses

1.3 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American National Standards Institute, Inc. (ANSI):

Z60.1 American Standard for Nursery Stock - 2004
(Sponsor: American Nursery & Landscape Association)

2. American Society for Testing and Materials (ASTM):

C 136 Sieve Analysis of Fine and Coarse Aggregates
E 11 Wire-Cloth Sieves for Testing Purposes

3. American Wood Preservers' Association (AWPA):

C2 Lumber, Timbers, Bridge Ties and Mine Ties –
Preservative Treatment By Pressure Processes

4. National Arborist Association, 3537 Stratford Rd., Wantagh, NY 11793 (NAA):

   Ref. 1 Transplanting of Trees and Shrubs in the Northeastern and North Central United States

5. Hortus Third, A Concise Dictionary of Plants Cultivated in the United States and Canada, Cornell University, L.H. Bailey Hortorium, MacMillian Publishing Co., New York, NY.

6. Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses, Michael A. Dirr, Stipes Publishing Company, Champaign, Illinois, 1975, Revised 1998.

7. "A Field Guide: Standards for Urban Forestry Data Collection." 2010. By the USDA Forest Service, ISA and the IUFRO (International Union of Forest Research Organizations.

1.4 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Compaction: A loss of soil aggregates; destroyed aeration pore spaces; crushed or collapsed pore spaces; and, undergone extensive resorting and packing of soil particles.

C. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

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

E. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

F. Planting Media: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. 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.

H. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

I. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

J. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.5 SUBMITTALS

A. Product certificates: Labels from the manufacturer’s container or manufacturer’s cutsheets certifying that the product meets the specified requirements shall be submitted for the following materials:

Anti-desiccant
Chemical Products
Erosion Control Fabric
Fertilizers
Filter Fabric
Inorganic Soil Amendments
Mycorrhizal Fungi
Organic Soil Amendments

Root Control Barrier
Structural Soil

Weed Control Barrier

B. Test Reports: Test reports from an approved testing agency indicating compliance with the specifications shall be submitted for:

Compost
Manufactured soil
Manure
Mulch
Planter Soil

Planting Media
Topsoil
Any other materials designated by the Landscape Architect.

Landscape edging w/ finish as specified

C. Samples* of the following:
Mulch
Compost

Planting Media
Planter soil mix
Root ball stabilization materials

*Bulk materials in quantities sufficient to demonstrate range of color, texture, particle size, etc.

D. List of Plant Materials: Species to be installed, noting any discrepancies with Drawings. This list does NOT imply permission for substitutions unless approved in writing by Landscape Architect.

E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

1.6 QUALITY ASSURANCE

A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project Site when work is in progress.

B. Soil Analysis:

1. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Landscape Architect, to perform the following tests and analyses:

Material	Tests and Analysis Required
Soils	Mechanical analysis of soil indicating the percent passing by weight of the following sieve sizes: 1 in., 1/2 in., No. 4, No. 10, No. 100, and No. 200. Determination of pH, organic content, and nutrient content. Recommendations shall be made by the testing agency as to the type and quantity of soil additives required to bring pH, organic content, and nutrient content to satisfactory levels for planting.

Organic Amendments Determination of moisture absorption capacity, organic matter content, and pH.

2. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.

3. A Solvita test shall be performed to determine the maturity and stability of the compost.

4. Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11.

C. Soil Drainage:

1. Test drainage of adverse soils in three to five plant pit locations chosen by the Landscape Architect. Pits shall be excavated to a size suitable for a large tree, completely filled with water and observed to determine the length of time the soils take to completely drain. Landscape Architect shall then be notified of the time it takes for the pits to drain completely. Planting operations shall not proceed until Landscape Architect has reviewed drainage test results.

D. Plants:

1. The Contractor shall provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

2. The Contractor shall inspect all nursery materials to determine that the materials meet the requirements of this Section. Submit List of Plant Materials to be installed indicating discrepancies with Drawings. No changes or substitutions may be made without prior approval by the Landscape Architect, and municipal authority, if applicable.

3. When requested by the Landscape Architect, the Contractor shall submit the names and locations of nurseries proposed as sources of acceptable plant material.

4. Proposed materials shall be flagged at the nurseries by the Contractor prior to viewing by the Landscape Architect, when requested by the Landscape Architect.

5. When requested by the Landscape Architect, deliver photographs of plant material or representative samples of plants.

6. Schedule time with the Landscape Architect for viewing plant material at the source(s). Time spent at the nursery shall occur prior to the anticipated delivery time.

7. Viewing and/or sealing of plant materials by the Landscape Architect at the nursery does not preclude the Landscape Architect's right to reject material at the site of planting.

8. Identification of plant names shall be as listed in Hortus Third or M. Dirr's Manual of Woody Landscape Plants.

9. All plants shall be delivered to site with identifying tags that shall not be removed until Substantial Completion acceptance.

E. Owner's Inspection and Testing:

Work may be subject to inspection at any time by the Landscape Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 140000 – QUALITY CONTROL to analyze and test materials used in the construction of the work. Where directed by the Landscape Architect, the testing laboratory will make material analyses and will report to the Landscape Architect whether materials conform to the requirements of this specification.

1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification and by the Contractor when they indicate non-compliance.

2. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Landscape Architect or Owner, the Contractor shall provide such auxiliary personnel and services needed to accomplish the testing work and to repair damage caused thereto by the permanent work.

F. Contractor's Inspection and Testing:

1. Testing, analyses, and inspection required by the Contractor for his own information or guidance shall be at his own expense.

2. Materials shall not be used in construction until the test results have been reviewed by the Landscape Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage.

B. Digging Plant Material: Plants shall not be dug at the nursery or approved source until the Contractor is ready to transport them from their original locations to the site of the work or acceptable storage location.

C. Handling of Plant Materials: Exercise care in handling plant materials to avoid damage or stress. Handle planting stock by root ball or container. 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.

D. 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.

E. Deliver plants after preparations for planting have been completed, and install immediately.

F. Plants that are not planted immediately shall be protected as follows:

1. If planting is delayed more than six hours after delivery, set plants and trees in shade, protect from weather and mechanical damage, and keep roots moist. Plants shall not be allowed to dry out or freeze.

2. Bareroot plants shall be installed on the same day of delivery or placed in storage until installed. Injury and desiccation of plants on-site shall be prevented.

3. Earth balls shall be kept intact and moist.

4. Store bulbs, corms, and tubers in a dry place at 60° to 65°F (16° to 18°C) until planting.

5. Both the duration and method of storage of plant materials shall be subject to the approval of the Landscape Architect.

6. Extended storage at site: Plants shall then be protected and kept moist by "heeling-in" the roots or by placing the plant in a cool moist storage building. The "heeling-in" procedure shall require the plants to be separated and the roots heeled in a suitable moist soil. If plants are stored in a building, the roots shall be covered with suitable moist mulch.

G. In certain situations, and depending on plant species, apply anti-desiccant to trees and shrubs as needed to protect plant material.

H. The following shall be cause for rejection of materials by the Landscape Contractor or Landscape Architect:

1. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage, shall be cause for rejection.

2. Upon arrival at the temporary storage location or the site of the work, plants shall be inspected for proper shipping procedures. Should the roots be dried out, large branches be broken, balls of earth broken or loosened, or areas of bark be torn, the Landscape Architect will reject the injured plant.

3. When a plant has been rejected, remove it from the area of the work and replace it with one of the required size and quality.

1.8 PLANTING SEASONS AND CONDITIONS

A. Planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.

B. No planting shall occur if said activity results in permanent compaction of soil.

1.9 MAINTENANCE

A. Plant material shall be maintained by the Contractor until Substantial Completion, as described in Part 3 of this Section.

B. Following Substantial Completion until the completion of the warranty period and Final Acceptance, maintenance of the plant material shall become the Owner's responsibility.
Provide instructions and service as follows.

1. The Contractor shall provide the Owner with written recommended maintenance program at time of Substantial Completion.

2. The Contractor may make as many periodic inspections as necessary during the guarantee period, at no additional cost to the Owner, to inspect the condition of all plant materials. Submit written report of each inspection to the Landscape Architect and Owner outlining corrective measures required to keep the guarantee valid.

1.10 ACCEPTANCE

A. The Landscape Architect will inspect all work for Substantial Completion upon written notice of completion. The request shall be received at least ten calendar days before the anticipated date of inspection.

B. Acceptance of plant material by the Landscape Architect will be for general conformance to specified size, character, and quality, and shall not diminish responsibility for full conformance to the Contract Documents.

C. Upon satisfactory completion and re-inspection of all repairs or renewals necessary in the judgment of the Landscape Architect, the Landscape Architect will recommend to the Owner that acceptance of the work of this Section be given.

D. Acceptance in Part

1. The work may be accepted in parts when it is deemed to be in the Owner's best interest to do so, and when permission is given to the Contractor in writing to complete the work in parts.

2. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

1.11 WARRANTY

A. Plants shall be guaranteed for a period of one year after the date of Acceptance by the Owner and Landscape Architect.

1. When the work is accepted in parts, the guarantee periods shall extend from each of the partial acceptances to the terminal date of the last guarantee period. Thus, all guarantee periods terminate at one time.

B. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size, and color.

C. Replace dead plants and all plants not in a vigorous, thriving condition, as determined by the Landscape Architect during and at the end of the guarantee period, without cost to the Owner, as soon as weather conditions permit and within the specified planting period.

1. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification.

2. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.

3. The guarantee of all replacement plants shall extend for an additional one-year period from the date of their acceptance after replacement.

D. Guarantee does not cover defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.

E. At the end of the guarantee period, and no less than five days prior to final inspection, staking and guying materials shall be removed from the site.

1.12 FINAL INSPECTION AND FINAL ACCEPTANCE

A. At the end of the guarantee period, the Landscape Architect will, upon written notice of end of guarantee period, inspect the work for Final Acceptance. Request shall be received at least ten calendar days before the anticipated date for Final Inspection.

B. Upon completion and re-inspection of full repairs or replacements necessary in the judgment of the Landscape Architect. At that time, the Landscape Architect will recommend to the Owner that Final Acceptance of the Work of this Section be given.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. Except as otherwise specified, form, size, and grade of plant materials shall conform to ANSI Z60.1.

B. 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. Plants shall have, at a minimum, an acceptable form typical of species.

C. The Landscape Architect will be the final arbiter of plant form acceptability.

1. Trunk(s), Canes and Branches:

a. Well-formed and sturdy with a straight, distinct leader where this is characteristic of species.
b. Branching plentiful and uniformly distributed to form a well-balanced plant.
c. Trees with leaders that are damaged, crooked, or crossed shall be rejected.
d. Trees with multiple leaders shall be rejected, unless form is typical for the species or specifically indicated in the Drawings.
e. Multiple leaders with narrow crotches (included bark) shall not be acceptable.
f. Scars shall be free of rot and not exceed 1/4 the diameter of the wood beneath in greatest dimension unless completely healed (except pruning scars).
g. Pruning scars clean cut leaving little or no protrusion from the trunk or branch.
h. Graft union completely healed.
i. No mechanical or pest damage.
j. No excessive succulence or suckering atypical of species.

2. Foliage:

a. Densely supplied with healthy, vigorous leaves of normal size, shape, color, and texture (except shrubs moved bare-root or deciduous shrubs when dormant).
b. No chlorosis.
c. Minimally perceptible pest or mechanical damage, affecting no more than 5 percent of foliage.

3. Root System:

a. Plants shall have a well-developed fibrous root system.
b. Sturdily established in container but shall not be excessively root bound except plants deliberately grown root bound to produce a dwarf plant.
c. No stem girdling roots.
d. No weeds.

D. Plants shall be healthy and vigorous, free of disease, insect pests and their eggs and larvae.

E. Plants shall be free of physical damage such as scrapes, broken or split branches, large scars, bark abrasions, sunscalds, fresh limb cuts, disfiguring knots, or other defects.

F. Plants shall not be pruned for form (if needed to improve aesthetic appearance and/or growth habit) until Substantial Completion Acceptance.

G. Plants shall meet the sizes indicated on the Plant List or Schedule. Plants larger or smaller than specified may be used only if accepted by the Landscape Architect.

H. To the greatest extent practicable, plant material shall be obtained from sources located in similar climatic zones to the Project site.

I. Plants indicated as “B&B” shall be balled and burlapped.

1. Unless otherwise permitted by the Landscape Architect, plants shall be nursery grown.

2. Nursery grown plants shall be freshly dug or heeled-in. No plants from cold storage will be accepted unless permitted by the Landscape Architect.

J. Container stock, where specified or approved by Landscape Architect, shall meet the standards of ANSI Z60.1 and the following:

1. Container stock shall have a heavy fibrous root system that has been developed by proper cultural treatment, transplanting, and root pruning.

2. Container stock shall be sturdy, healthy and sufficiently vigorous to ensure plant growth.

K. Herbaceous Plants: Including, but not limited to, annuals, biennials, perennials, wetland or water plants, bulbs, tubers, and corms: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems or well-formed root forms. Provide only plants that are acclimated to outdoor conditions before delivery.

L. Bareroot stock, where specified or approved by Landscape Architect, shall meet the standards of ANSI Z60.1 and the following:

1. Bareroot stock shall have a heavy fibrous root system that has been developed by proper cultural treatment, transplanting, and root pruning.

2. Bareroot stock shall be sturdy, healthy and sufficiently vigorous to ensure plant growth.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent, by weight. Class T is more finely ground and quicker acting but dustier than Class O.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.

G. Sand: Clean, washed, natural or manufactured angular grains, free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and substantially weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; soluble salt content of <3 mmhos/cm or <3 decisiemens/m and free of substances toxic to plantings; and as follows:

1. The compost stock must mature for a minimum of 90 days. During this time, the compost stock shall achieve thermophilic temperatures (175° to 180°F, 79° to 82°C) for 15 days; multiple turnings may be required for the entire stockpile. A Solvita test may be requested to determine the maturity and stability of the compost.

2. Frozen or muddy compost shall be unacceptable for use.

B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

C. Mycorrhizal Fungi: Dry, organic, granular root stimulant/inoculant containing at least 5300 spores per pound (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per pound (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

1. Mycorrhizal fungi amendment shall be manufactured by one of the following, or approved equivalent:
   a. Roots
   b. Plant Health Care
   c. Mycorrhizal Applications of Oregon

D. Hydrogel: Shall be water absorbant crystals or granules manufactured by one of the following, or approved equal: Plant Health Care, Terra-Sorb, Viterra Gelscape.

2.4 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde. Nitrogen (N), Phosphorus (P) and Potassium (K) in amounts recommended in soil test results.

B. Controlled-release fertilizer:

1. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium of equal proportions.

2. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots. Nutrient composition: nitrogen, phosphorous, potassium and micronutrients.

3. Controlled-release fertilizer shall be equal to the following:

Product	Manufacturer
Osmocote	Scotts Miracle-Gro Company
Agriform 20-10-5	Sierra Chemical Co.
Planting Tablets	Milpitas, CA 95035
EZY-Grow Fertilizer Packet	EZY-Grow - Landscape Specialties

2.5 PLANTING MEDIA

A. Topsoil

1. Topsoil shall be obtained from a previously established stockpile on the site, to the extent that suitable material is available. Additional topsoil required shall be obtained from off-site sources.

2. Topsoil, whether stripped from site or supplied from off-site, shall be a sandy loam as defined by the USDA Soil Conservation Service, Soil Classification System, and shall have the following mechanical analysis:

Textural Class	% of Total Weight	Average %
Sand (0.05-2.0 mm dia. range)	45 to 75	60
Silt (0.002-0.05 mm dia. range)	15 to 35	25
Clay (less than 0.002 mm dia. range)	5 to 25	15

   a. 95 percent of topsoil shall pass a No. 8 (2.0 mm) sieve.
   b. Topsoil shall be free of stones >1 inch (25 mm) in longest dimension, earth clods or clay, plant parts, weeds, debris, and other extraneous materials harmful to plant growth.

c. Organic matter content shall be 4 to 12 percent of total dry weight.
d. Range of pH: 5.5 to 7.

B. Compost Manufactured Topsoil: Uniform mixture of compost and base soil to achieve the compost manufactured topsoil product consisting of the following ingredients:

1. Compost: An organic substance produced by the biological and biochemical decomposition of source separated organic materials that may include leaves and lawn trimmings, food or industrial residuals, and/or municipal biosolids. The product shall not contain levels of substances toxic to plants and shall be reasonably free (< 1 percent by dry weight) of man-made foreign matter. Compost shall meet USEPA 40 CFR Part 503 standards for Class A, Exceptional Quality compost, as well as all applicable state standards for its intended use.

2. Base soil: Topsoil and/or other soils (clay, silt, sand sand, sandy loam, or loamy sand in texture according to USDA soil classification. It shall be free of stones, clods, plant parts, weeds, and other debris >2 inches (50 mm) in any dimension. It shall not contain levels of substances that shall inhibit or be harmful to plant growth.

3. Product Parameters:

Parameter	Compost	Base Soil	Compost Manufactured Topsoil
pH	6.0-8.5	5.0-8.0	6.0-7.8
% Organic Matter	<40%	0-5%	6-20%
Particle Size	<1” (25 mm)	<2” (50 mm), USDA Class: sand, sandy loam, loamy sand	<2” (50 mm), USDA Class: sand, sandy loam, loamy sand
Salts/conductivity	Varies; must be reported	<2mmhos/cm after handling, placement & rainfall	<2mmhos/cm after handling, placement & rainfall
Carbon: Nitrogen Ratio	15-25:1	N/A	N/A

C. Plant bed media: Verify site conditions and suitability of native surface topsoil to produce viable planting soil. Modify and fertilize soil types to create acceptable planting media for specific site conditions, plant species, and proposed use in accordance with soil test reports. <**Select applicable options below**>

1. Plant bed media for largely unchanged site conditions, reusing on-site topsoil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and retained in-place or stockpiled on site. Supplement with standardized topsoil or imported topsoil if quantities are insufficient. Mix native topsoil with loose compost in the following quantities to produce plant bed media: Ratio of loose compost to topsoil by volume: 1:4 Ratio.

2. Plant bed media using imported topsoil from off-site sources if existing surface soil is not of suitable quality or quantity. Obtain topsoil from naturally well-drained construction or mining sites with topsoil at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes. Mix imported topsoil with loose compost in the following quantities to produce plant bed media: Ratio of loose compost to topsoil by volume: 1:4 Ratio. Plant bed media using standardized topsoil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, and minimum 6 percent organic material content. Mix ASTM D 5268 topsoil with loose compost in the following quantities to produce plant bed media: Ratio of loose compost to topsoil by volume: 1:4 Ratio

D. Skeletal or Structural Soil: Patented and licensed, CU-Structural Soil™ or CU-Soil™ as developed by Cornell University and distributed by Amereq, Inc. licensed producers.

E. Container Plant Mix: Project specific. Designer to specify.

F. Lightweight Planting Soil: Project specific. Designer to specify.

2.6 WATER

A. Water shall be suitable for irrigation and free from ingredients harmful to seeded or sodded areas.

2.7 WEED-CONTROL BARRIERS

A. Weed control barriers are not recommended for planted areas as the materials prevent or slow water penetration required for plant growth. They may be beneficial for largely unplanted, mulched areas.

B. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. (101g/sq.m) minimum.

C. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd. (162g/sq.m).

2.8 MULCHES

A. Organic Mulch: Mulch shall be 100 percent fine-shredded pine of uniform size and free from rot, leaves, twigs, noxious weeds, debris, stones, or any material harmful to plant growth.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content less than 3 decisiemens/m or 3 mmhos/cm as measured for soil mixture electrical conductivity; not exceed 0.5 percent inert contaminants and free of substances toxic to plantings. Product must be cured for a minimum of 90 days and produce minimal heat or odor to be considered a stable, mature product suitable for use with plants.

2.9 CHEMICAL PRODUCTS

A. General: Pesticides, herbicides, fungicides, bactericides or any other chemical compounds shall be 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.

1. 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.

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

3. Anti-desiccant: Shall be an emulsion specifically manufactured for plant protection which provides a protective film over plant surfaces which is permeable enough to permit transpiration. Anti-desiccant shall be delivered in manufacturer's sealed containers and shall contain manufacturer's printed instructions for use. Anti-desiccant shall be
Wilt-Pruf as manufactured by Wilt-Pruf Products, Inc. P.O. Box 469 Essex, CT 06426, or approved equal.

4. Fungicide: Shall be zinc ethylene bisdithiocarbonate (Zineb), or equal, appled at manufacturer’s suggested rates.

5. Chemical Root Control Barrier: Chemical compounds or fabric impregnated with growth-regulating chemicals designed to modify root growth. Manufacturers shall be Plant Health Care or Typar Biobarrier, or approved equal.

2.10 FILTER FABRIC OR SOIL SEPARATION FABRIC

A. Nonwoven geotextile made of polypropylene, polyolefin, or polyester fibers, or combination, 101 g/sq. m (3 oz./sq. yd.) minimum, Mirafi 140-N, or approved equal.

2.11 TREE SUPPORT MATERIALS

A. Install tree support materials only when conditions warrant. See Part 3. Rootball stabilization is preferred method.

B. Rootball Stabilization Materials:

1. At-grade or below-grade stabilization systems to secure each new tree planting by its rootball; sized per manufacturer's written recommendations unless otherwise indicated. Provide one of the following products, or approved equal:
   a. Tomahawk Tree Stabilizers by Border Concepts, Inc.
   b. Duckbill Rootball Fixing System by Foresight Products, LLC
   c. Tree Staples by Tree Staple, Inc.

C. Wood Stakes: For trees under 10 feet (3.05 m) in height, straight, sound, rough sawn lumber not less than 2 x 2 inch (50 mm x 50 mm), if square, or 2-1/2 inch (62 mm) diameter, if round. Wire for staking shall be 12-gauge steel.

D. Wire for Guying: Galvanized steel 1 x 19 preformed 3/16 inch (4.76 mm) diameter.

E. Turnbuckles: Galvanized steel fitted with locking eyebolts.

F. Deadman: Sound, rough sawn lumber 2 x 4 inch (50 mm x 100 mm) triangular galvanized steel plates, or other material approved by the Landscape Architect.

G. Hose: High quality braided rubber hose, 3/4 inch (19 mm) diameter and suitable length, black in color.

H. Polyethylene tie strapping may be used with 2 x 2 inch (50 mm x 50 mm) wood stakes.

PART 3 - EXECUTION

3.1 APPROVAL OF EXISTING CONDITIONS

A. Prior to commencing installation, the Contractor shall be responsible for immediately notifying the Landscape Architect if any existing site or job conditions are observed which would negatively affect the character of the finished work, its future performance, or that would in any way be to the detriment of job progress and completion. If unobservable, substandard or unacceptable conditions are encountered during the course of work, the Contractor shall alert the Landscape Architect.

3.2 PLANT BED PREPARATION

A. Loosen subgrade of planting areas to a minimum depth of 12 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread on rough grade, a thoroughly blended planting media consisting of a combination of compost, topsoil, inorganic soil amendments and fertilizer, as recommended by soil test results.

2. Spread planting media to a depth of 12 inches.

   a. Do not spread if planting media or subgrade is frozen, muddy, or excessively wet.

   b. Finish grade (below mulch, after settling) for planted areas shall be 3½ inches (87 mm) below adjacent pavement surfaces.

   c. Finish grade after settling for seeded areas shall be ½ inch (12 mm) below adjacent pavement surfaces and 1 inch (25 mm) for sodded areas.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Restore planting areas if eroded or disturbed after finish grading.

C. Application of Mychorrhizal Fungi, if specified: Broadcast dry product uniformly over prepared soil at the application rate suggested by the manufacturer. Mychorrhizal fungi shall not be used on herbaceous materials or in compacted soils.

3.3 LAYOUT OF PLANTING AREAS

A. Protect structures, utilities, sidewalks, pavements, other facilities, work by others, grassed areas, and existing plants from damage caused by planting operations. All damage caused by the Contractor, or his work shall be the responsibility of the Contractor to repair or rectify at no additional cost to the Owner.

B. Lay out individual tree and shrub locations and areas for multiple or mass plantings. Stake locations, outline plant bed areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make subsequent adjustments as required.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with tapered sides. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit sheared or smoothed during excavation.

   1. Excavate two times as wide as ball diameter.

   2. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.

   3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

B. Subsoil and topsoil removed from excavations [**may**] [**may not**] be used as planting media.

3.5 WOODY PLANT INSTALLATION

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. Remove excess soil from root ball to expose root flare as necessary.

B. Remove injured roots by cutting cleanly; do not break.

C. Remove only dead, dying, or damaged branches. Pruning intent and procedure shall be reviewed with the Landscape Architect before proceeding.

D. Set stock plumb and in center of planting pit or trench with root flare a maximum of 2 inches (50 mm) above adjacent finish grades.

1. Use planting media as specified in Part 2 for backfill.

2. Add fertilizer and soil amendments in accordance with soil test recommendations and per manufacturers' recommendations.

3. If specified, add mycorrhizal fungi per manufacturer's recommendations if not incorporated during plant bed preparation.

4. Add water absorbent crystals or granules to backfill at rates recommended by the product manufacturer.

5. Balled and Burlapped Plants: After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, wire baskets, and ties from at least the top 1/3 of root balls and as much as possible without comprising the integrity of the root ball. Non-biodegradable wrappings and ties shall be totally removed from root ball and plant pit.

6. Container-Grown Plants: Carefully remove root ball from container without damaging root ball or plant.

7. Fabric Bag-Grown Stock: Carefully remove root ball from fabric bag without damaging root ball or plant.

8. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When plant pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

9. Continue backfilling process. Form water saucer around perimeter of plant pits of trees and large shrubs. Water again after placing and tamping final layer of soil.

E. Bare-Root Stock: Set and support bare-root stock in center of planting pit or trench with root a maximum of 2 inches (50 mm) above adjacent finish grade.

1. Use planting media as specified in Part 2 for backfill.

2. Add fertilizer and soil amendments in accordance with soil test recommendations and per manufacturers' recommendations.

3. If specified, add mycorrhizal fungi per manufacturer's recommendations if not incorporated during plant bed preparation.

4. 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.

5. 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.

3.6 GROUND COVER AND HERBACEOUS PLANTS INSTALLATION

A. Use planting media as specified in Part 2 for backfill.

B. Excavate and place planting media to a depth of 18 inches (450 mm). Add fertilizer and soil amendments as recommended by soils test, and per manufacturers' recommendations.

C. If specified, add mycorrhizal fungi per manufacturer's recommendations if not incorporated during plant bed preparation.

   a. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.7 TRANSPLANTING – GENERAL

A. Condition: Deciduous trees 4-inch (100 mm) caliper and larger shall be moved by boxing, be balled and burlapped, or with a tree spade during dormant periods. Deciduous trees smaller than 4-inch caliper (100 mm) shall be moved balled and burlapped, or moved with a tree spade during dormant periods. The size of the tree spade shall be no less than 11 inches (275 mm)
diameter per inch (25 mm) of tree caliper.

B. Digging, Wrapping, and Handling: Plants shall be dug and prepared for moving in a manner that will not cause damage to branches, shape, root system, and development during storage.

C. Balled and Burlapped Plants: Balls shall be firmly wrapped with burlap or approved cloth
substitute. No balled plant will be acceptable if the ball is cracked or broken, or if the stem is loose in the ball, either before or during transplanting. Balled plants shall be lifted and handled from the bottom of the ball. Protect ball and deliver to the relocation site, plant immediately, and water thoroughly. Ball sizes shall be as recommended in ANSI Z60.1.

D. Bare Root Plants: Plants shall be dug and prepared in such a manner as to provide optimum root mass. Material shall be dormant when dug and root systems shall be kept covered and moist at all times. Upon delivery to relocation site, plant immediately, and water thoroughly. Root spread shall be as recommended in ANSI Z60.1.

3.8 TRANSPLANTING WITH MECHANICAL TREE SPADE

A. Dig hole for tree with same sized equipment as will dig the plant material and transport it to site.

B. Thoroughly mix a slurry mix of the following in the tree pit:*

Material	Quantity*
Planting media	5 cu. ft. (0.14 cu. m.) as specified in Part 2 for backfill
Fertilizer	Per soil test recommendation and standard nursery practices for tree caliper
Water	Enough to fill bottom third of tree pit

* Quantities listed are for 66-inch (1.67 m) tree spade. For larger or smaller units, quantities shall be adjusted accordingly.

C. Prior to digging the plant material, all lower branches shall be tied up so that the machine will not damage any limbs during digging.

D. Tree trunk shall be centered in the unit prior to digging.

E. After digging plant material, and prior to transporting, tie tree limbs down and protect tree from drying out during transport. Trees shall be protected by anti-desiccant spray and/or a plastic or fabric cover.

F. Position tree in hole as directed by Landscape Architect or Owner and remove tree spade.

G. Immediately after removal of tree spade, the tree shall be watered completely; all air gaps in slurry mixture shall be filled by working a spade handle or other tool around the entire perimeter of the ball.

3.9 APPLICATION OF FERTILIZER

A. Provide supplements at application rates as recommended by soil test reports from a qualified soil-testing laboratory.

B. Fertilizer shall be applied when planting pits are backfilled two-thirds full. Fertilizer application shall be of the type, rate, and timing recommended by the testing agency for each plant type and in accordance with ANSI A300 (Part 2) standards for application.

C. Slow-release fertilizer:

1. Fertilization schedule for trees and shrubs using slow release 4-ounce (118 ml) packet system shall be per manufacturer's recommendations.

2. Fertilizer packets shall be placed 6 to 8 inches (150 to 200 mm) deep below top of planting soil around root balls of plants. Packets shall be spaced evenly depending on the number of packets required.

3.10 MULCHING

A. Mulch surfaces of plant beds, plant water saucers, and other areas indicated.

1. Trees and Shrubs in Grassed Areas and planters: Create mulched rings 3 inches in depth to encompass plant pits, water saucers, and tree support systems. Do not place mulch within 3 inches of trunks or stems. A continuous, linear mulched area shall be formed if plants are closely spaced to avoid grassed strips less than 2 feet wide or scallops of grass that are difficult to maintain.

2. Shredded pine bark mulch in planting areas: Apply mulch to 3 inches depth throughout planting area extending to bedline indicated in Drawings, and at least 12 inches beyond edge of individual plant pit or trench. Do not place mulch within 3 inches of trunks or stems. Finished surface of settled mulch shall be ½ -1 inches below adjacent pavement or curb surfaces and flush with adjacent grassed areas.

3.11 CHEMICAL APPLICATIONS

A. In areas designated for plantings, remedial and preventative measures shall be taken well in advance of planting to eliminate competitive weed growth, to provide a weed-free and safe, non-toxic media for planting and as a finished landscape product.

B. If necessary, a systemic post-emergent herbicide shall be applied to existing and emergent weeds in prepared planting beds.

C. Pre-emergent herbicides are recommended for preventative use in areas not seeded.

3.12 FILTER FABRIC OR SOIL SEPARATION FABRIC

A. Soil separation fabric shall be installed where indicated on the Drawings. Unless otherwise indicated on the Drawings, soil separation fabric shall be overlapped 6 inches (150 mm) along all edges.

3.13 TREE SUPPORT

A. Trees shall not be staked or guyed except when absolutely necessary or under special conditions that warrant precautions be taken. Examples of special conditions that may pose a risk to public safety if trees were unsecured or unsupported include, and are not limited to:

1. High winds
2. Exceptional size and value
3. Steep slope locations (on slopes exceeding 3 Horizontal:1 Vertical)
4. High vandalism areas

B. When warranted, each tree shall be staked, guyed, or stabilized immediately following planting and in accordance with ANSI A300 (Part 3) standards for guying.

C. Root stabilization is preferred method, installed per manufacturer's instructions.

D. Plants shall stand plumb after staking, guying, or stabilizing.

E. Above-ground support systems shall be removed after one year if tree root system is established.

F. Duckbill Tree Support Systems and Duckbill Root Ball Fixing Systems shall be installed in strict conformance with manufacturer's published installation instructions.

3.14 MAINTENANCE OF PLANTINGS

A. Maintenance shall begin immediately after each plant is planted and shall continue until Substantial Completion Acceptance. The Contractor shall provide water for irrigation if none is available on site.

B. Note: Extend maintenance beyond Substantial Completion or Final Acceptance of Project if necessary to meet above requirements. Landscape Architect may withhold funds from Substantial and Final Completion payments as necessary to assure proper performance of maintenance operations.

C. Maintenance required:

1. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring water saucers, resetting to proper grade or vertical position, and performing other operations as required to establish healthy, viable plantings.

2. Planting areas shall be kept free of weeds, grass, and other undesired vegetative growth.

3. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of settling. Do not place mulch within 3 inches (75 mm) of trunks or stems. A continuous, linear mulched area shall be maintained between closely spaced plants to avoid grassed strips less than 2 feet (600 mm) wide or scallops of grass that are difficult to maintain.

4. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use practices to minimize the use of chemicals and pesticides and reduce hazards.

5. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

6. 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 without additional cost to the Owner.

7. Prune, thin, and shape woody materials according to standard professional horticultural and arboricultural practices and in accordance with ANSI A300 (Part 3) Pruning Standards. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs. Prune to retain natural character.

8. Pruning shall be done with clean, sharp tools. Cuts shall be made at branch collars, leaving no stubs. No tree paint shall be used.

END OF SECTION 32 93 00