SECTION010100 – SUMMARY OF WORK

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. RELATED SECTIONS
		1. Section 00 2113 – Bid Instructions
		2. Section 01 3114 – Conduct of the Work
		3. Section 02 2113 – Existing Conditions
	3. GENERAL SCOPE OF WORK
		1. The work under the Contract consists generally of the reconstruction of one bank of two tennis courts at two different schools for the Barnstable School District:
			1. At Cotuit (aka Waldorf School) Elementary School, Old Oyster Road, Cotuit, MA: Reconstruct two tennis courts in-place, Including new gravel Subbase, Asphalt base, color / level coating, fencing, nets and posts.
			2. At Barnstable – Barnstable West Barnstable Elementary School, Route 6A, West Barnstable, MA.: Remove two existing tennis courts and construct a new bank of two courts in another location. Work includes demolition of existing fencing and asphalt, clearing and grubbing, rough grading, segmental concrete retaining wall, installation of new gravel subbase, asphalt base, tennis color coating, fencing, nets and posts.
		2. In addition, the Work under the Contract includes:
			1. The restoration of any items or areas damaged or destroyed by construction activities.
			2. Providing and restoring, where appropriate, all temporary facilities.
			3. All work described in the plans or specifications.
		3. Excess topsoil, sod and soil materials shall become property of the Contractor:
	4. SITE ACCESS
		1. During days when school is in session the contractor's access to the site shall be restricted as follows:
			1. **Cotuit Elementary:**
			2. **Barnstable - West Barnstable Elementary**
		2. Refer to Section 01 3114 - Conduct of the Work, for hours of operation and additional site access requirements.
	5. TIME OF COMPLETION
		1. All physical construction related to Base Bid work shall commence as early as weather permits.

		Final Completion of both sets of courts, including the complete submission of close-out documents, shall occur by **August 21, 2015**.
	6. LIQUIDATED DAMAGES (reserved – not applicable)
	7. TESTING
		1. The Contractor will retain and pay for the services of a certified independent testing laboratory in good standing to perform inspections, tests and other services required by the Specification including the expense of all failed tests, including retests as required to obtain approval. Contractor shall submit testing lab certifications and qualifications to the Owner for approval.
	8. MEETINGS
		1. A competent representative of the Contractor who is familiar with the site and progress of the work is required to attend weekly jobsite meeting during the period of construction.
	9. PERMITS
		1. The contractor is responsible for all coordination and permitting fees for electrical, sanitary and water connections appurtenant to the project.
		2. The Contractor is responsible for coordination and execution of all conditions of the town approvals and conditions for this project that apply to his work. Refer to appendix.
2. PRODUCTS (Not Used)
3. EXECUTION (Not Used)

END OF SECTION

SECTION012300 - ALTERNATES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

* + 1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.

1.2 SCOPE

A. This section lists the Alternates which appear in the Contract Documents.

* + 1. Prices for each Alternate shall include overhead, bonding, profit, and all other expenses incidental to the Work under each Alternate.
		2. The Contractor and Subcontractors shall be responsible for examining the scope of each Alternate generally defined herein and for recognizing modifications to the Work caused by the Alternates and including the cost thereof in the bid price.

1.3 ALTERNATES

A. Alternate No. 1 **-** Provide a lump sum amount to provide all labor and materials to furnish and install new tennis courts at West Barnstable Elementary by grading in lieu of retaining wall as shown on Alternate 1 Layout and Materials Plan, Sheet C102A.

1. PRODUCTS (Not Used)
2. EXECUTION (Not Used)

END OF SECTION

SECTION 013114 **–** CONDUCT OF THE WORK

1. - GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. RELATED SECTIONS
		1. Section 00 2113 – Bid Instructions
		2. Section 01 0100 – Summary of Work
		3. Section 02 2113 – Existing Conditions
	3. PROJECT MANAGEMENT
		1. All adjacent school buildings proximate to the project sites will be occupied during construction. The Contractor will take all necessary precautions to ensure the public safety and convenience of the occupants during construction. Use of any on-sites structures by the Contractor, proximate to the work site as a construction office, will not be allowed unless the Owner gives express written consent.
		2. The work must be completed in a continuous uninterrupted operation. The Contractor must use sufficient personnel and adequate equipment to complete all the necessary work requirements within a minimum period of time.
		3. **Unless specifically authorized by the Owner, in writing, the work must be conducted between the hours of 7:00 A.M. and 6:00 P.M., Monday through Friday.** No work is to be done on holidays, other than for emergencies or as approved by the Owner. Work may be allowed on Saturdays and Sundays, provided the Contractor obtains the Owner’s written approval at least one week prior to the date of such work.
		4. The Contractor is responsible for the security of partially completed work until the Owner accepts the project.
		5. There will be no storage of materials, tools, and/or equipment within any of the adjacent buildings. The Owner, in writing, must authorize any storage within the school facilities.
		6. Only materials and/or equipment intended and necessary for immediate use will be brought onto the sites. At the end of each workday and at the completion of each phase of work, equipment and leftover or unused materials will be removed from the sites.
	4. SHUTDOWN OF SERVICES
		1. The Contractor's attention is especially called to the fact that the continuous operation of services for the Owner is mandatory. The work cannot result in the shutdown of any major utilities in adjacent facilities without the Owner’s consent, in writing. If the Owner will not allow this shutdown, but wants instead a temporary means of supplying said services, the Contractor will supply all labor, materials or whatever may be required to supply said temporary services, at no extra cost to the Owner and in accordance with the state and local regulations on health and safety.
	5. COORDINATION
		1. At the pre-construction conference, the Contractor will submit to the Owner for approval, a detailed operational schedule showing the sequence of operations prior to the commencement of any work at the sites. The Owner must approve any changes to this operational plan.
		2. The Contractor must retain on the worksites, during the work’s progress, a competent, full-time representative, satisfactory to the Owner. This representative will not be changed, except with the consent of the Owner. The representative will be in full charge of the work and all instructions given to this person by the Engineer will be binding.
		3. The Contractor must supply to the Owner the home telephone number of responsible persons who may be contacted during non-work-hours for emergencies on the Project.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not Used)

END OF SECTION

SECTION 013302 **–** SUBMITTAL REQUIREMENTS

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. RELATED DOCUMENTS
		1. Consult the individual sections of the specifications for the specific submittals required under those sections and for further details and descriptions of the requirements.
	3. GENERAL PROCEDURES FOR SUBMITTALS
		1. Submittal Register: Within seven (7) days of receipt of a Notice to Proceed, the Contractor will furnish to the Engineer a complete listing of all submittals (Shop Drawings, Manufacturer’s Data, Samples, etc.) required by these specifications in tabular form. This form will include columns sufficient to manage and track the submission and action for each submission. The Contractor will revise and update this form upon request of the Engineer.
		2. Schedule of Values: Within seven (7) days of receipt of a Notice to Proceed, the Contractor will furnish to the Engineer a Schedule of Values for review and approval. The Contractor will revise and update this form upon request of the Engineer.
		3. Timeliness: The Contractor will transmit each submittal to the Engineer sufficiently in advance of performing related Work or other applicable activities so that the installation is not delayed by processing times, including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery, and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Engineer in advance of the Work.
		4. Sequence: The Contractor will transmit each submittal in a sequence which will not result in the Engineer’s approval having to be later modified or rescinded by reason of subsequent submittals which should have been processed earlier or concurrently for coordination.
		5. Contractor's Review and Approval: Only submittals received from and bearing the stamp of approval of the Contractor will be considered for review by the Engineer. Submittals will be accompanied by a transmittal notice stating name of Project, date of submittal, "To", "From" (Contractor, Subcontractor, Installer, Manufacturer, Supplier), Specification Section, or Drawing No. to which the submittal refers, purpose (first submittal, resubmittal), description, remarks, distribution record, and signature of transmitter.
		6. Engineer’s Action: The Engineer will review the Contractor's submittals and return them with one of the following actions recorded thereon by appropriate markings:
			1. Final Unrestricted Release: Where marked "Approved" the Work covered by the submittal may proceed provided it complies with the requirements of the Contract Documents.
			2. Final-But-Restricted Release: When marked “Approved As Noted” the Work may proceed provided it complies with the Engineer’ s notations or corrections on the submittal and complies with the requirements of the Contract Documents. Acceptance of the Work will depend on these compliance’s.
			3. Returned for Resubmittal: When marked "Revise and Resubmit" or "Disapproved", the Work covered by the submittal (such as purchasing, fabrication, delivery, or other activity) should not proceed. The submittal should be revised or a new submittal resubmitted without delay, in accordance with the Engineer's notations stating the reasons for returning the submittal.
		7. Processing: All costs for printing, preparing, packaging, submitting, resubmitting, and mailing, or delivering submittals required by this contract will be included in the Contract Sum.
	4. OR EQUALS
		1. Definition: Whenever a specification section names one or more brands for a given item, and the Contractor wishes to submit, for consideration, another brand, the submission will be considered an "or-equal" or a "material substitution". For the purposes of this Contract, the terms "or-equal" and "material substitution" will be considered synonymous.
		2. In no case may an item be furnished on the Work other than the item named or described, unless the Engineer, will consider the item equal to the item so named or described.
		3. The equality of items offered as "equal" to items named or described will be proved to the satisfaction of the Engineer at the expense of the Contractor submitting the substitution.
		4. The Engineer and/or the Owner may require that full size samples of both the specified and proposed products be submitted for review and evaluation. The Contractor will bear full cost for providing, delivering, and disposal of all such samples.
		5. The Contractor will assume full responsibility for the performance of any item submitted as an "Or-Equal" and assume the costs of any changes in any Work which may be caused by such substitution.
		6. Or Equal Approval Process: On the transmittal, or on a separate sheet attached to the submission, the Contractor will direct attention to any deviations, including minor limitations and variations, from the Contract Documents.
			1. The Contractor will submit to the Engineers for consideration of any or-equal substitution a written point-by-point comparison containing the name and full particulars of the proposed product and the product named or described in the Contract Documents.
			2. Such submittal will in no event be made later than 10 calendar days prior to the incorporation of the item into the Work. This requirement may be waived by the Engineer upon written request.
			3. Upon receipt of a written request for approval of an or-equal substitution, the Engineer will investigate whether the proposed item will be considered equal to the item named or described in the Contract Documents. Upon conclusion of the investigation, the Engineer will promptly advise the Contractor that the item is, or is not, considered acceptable as on Or-Equal substitution. Such written notice must have the concurrence of the Owner.
	5. SUBMISSION OF SHOP DRAWINGS
		1. Shop Drawings will be complete and to scale, giving all information necessary or requested in the individual section of the specifications. They will also show adjoining Work and details of connection thereto.
		2. Shop Drawings will be for whole systems. Partial submissions will not be accepted.
		3. The Engineer reserves the right to review and approve shop drawings only after approval of related product data and samples.
		4. Shop drawings will be properly identified and contain the name of the project, name of the firm submitting the shop drawings, shop drawing number, date of shop drawings and revisions, Contractor's stamp of approval, and sufficient spaces near the title block for the Engineer's stamp.
		5. The Contractor will submit to the Engineer one legible, reproducible transparency and four (4) black line prints of each shop drawing. Transparency and prints will be mailed or delivered in roll form. Each submittal will be accompanied by a transmittal notice.
		6. When the transparency is returned by the Engineer with the stamp "Revise and Resubmit", “Submit Specified Items” or "Rejected", the Contractor will correct the original drawing or prepare a new drawing and resubmit a transparency and four (4) prints thereof to the Engineer for approval. This procedure will be repeated until the Engineer’s approval is obtained.
		7. When the transparency is returned by the Engineer with the stamp "Approved" or "Make Corrections Noted", the Contractor will provide and distribute the prints for all Contractors and Subcontractors use.
		8. The Contractor will maintain one full set of approved shop drawings at the site. The Contractor will produce a set of coordination drawings before the installation of any electrical work.
		9. Changes on the submitted shop drawings that deviate from the Design Drawings must be brought to the Owners and Designers attention in writing prior to review. Changes must be clearly visible on the shop drawings in the form of written notation, ballooning or highlighting the intended change. A written description for the proposed change must also be included and submitted on company letterhead. Changes to drawings and details not submitted in accordance with these requirements will not be recognized as an approved deviation from the Design of Record. Construction repairs, renovations or replacements required as a result of shop drawing and submittal deviations that are not documented in accordance with these requirements are subject to removal and/or replacement by the Contractor, at the sole cost of the Contractor.
	6. SUBMISSION OF PRODUCT DATA
		1. The Contractor will submit five (5) copies of Product Data to the Engineer. All such data will be specific and identification of material or equipment submitted will be clearly marked in ink. Data of general nature will not be accepted.
		2. Product Data will be accompanied by a transmittal notice. The Contractor's stamp of approval will appear on the printed information itself, in a location which will not impair legibility.
		3. Product Data returned by the Engineer as "Rejected" will be resubmitted in five (5) copies until the Engineers approval is obtained.
		4. When the Product Data is acceptable, the Engineer will stamp them "Approved" or "Make Corrections Noted", retain two (2) copies, and return three (3) copies to the Contractor. The Contractor will provide and distribute additional copies as may be required to complete the Work.
		5. The Contractor will maintain one full set of approved, original, Product Data at the site.
	7. SUBMISSION OF SAMPLES
		1. Unless otherwise specified in the individual section, the Contractor will submit two (2) specimens of each sample required for submission.
		2. Samples will be of adequate size to permit proper evaluation of materials. Where variations in color or in other characteristics are to be expected, samples will show the maximum range of variation. Materials exceeding the variation of approved samples will not be approved on the Work.
		3. Samples which can be conveniently mailed will be sent directly to the Engineer, accompanied by a transmittal notice. All transmittals will be stamped with the Contractor's approval stamp of the material submitted.
		4. All other samples will be delivered at the field office of the Project Representative with sample identification tag attached and properly filled in. Transmittal notice of samples so delivered with the Contractor's stamp of approval will be mailed to the Engineer.
		5. If a sample is rejected by the Engineer, a new sample will be resubmitted in the manner specified herein above. This procedure will be repeated until the sample is approved by the Engineer.
		6. Samples will not be returned unless return is requested at the time of submission. The right is reserved to require submission of samples whether or not particular mention is made in the specifications, at no additional cost to the Owner.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not used)

END OF SECTION

SECTION 015000 – TEMPORARY FACILITIES

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. GENERAL REQUIREMENTS
		1. The Contractor will be responsible for providing and maintaining all temporary facilities until Substantial Completion. Removal of such, prior to Substantial Completion, must be with the concurrence of the Engineer. The Contractor bears full responsibility for providing any facility removed prior to Substantial Completion
		2. Removal of all temporary facilities will be a condition precedent to Substantial Completion unless directed otherwise by the Engineer or specifically noted in the Specifications.
		3. The Contractor must comply with all safety laws and regulations of the State of Rhode Island, the United States Government, and local government agencies applicable to Work under this contract. The Contractor's attention is directed to the state of Rhode Island, Department of Labor and Industries Regulations.
		4. Submittals:
			1. Within seven (7) days from a Notice to Proceed, the Contractor will submit for the approval of the Engineer a site layout plan indicating the location of all temporary facilities described within this Specification.
			2. Shop drawings showing proposed project sign (if applicable).
			3. Manufacturer’s Data for proposed field offices (if applicable).
	3. FIELD OFFICES
		1. A field office/job trailer is required for this project.
	4. TEMPORARY TELEPHONES
		1. The Contractor will provide a cell phone on site at all times with the same phone number. This will be the number that the Engineer or Owner may contact in times of emergency.
	5. TEMPORARY TOILETS
		1. The Contractor will provide and service an adequate number of toilet booths, with chemical type toilets.
		2. The toilets will be maintained by the Contractor in a clean and orderly condition, in compliance with all local and state health requirements.
		3. Under no circumstances will the Contractor’s personnel be allowed to use Owner’s toilets.
	6. TEMPORARY CONSTRUCTION FENCE
		1. The Contractor will be responsible for providing and maintaining temporary fencing or barricades around the construction site, as may be necessary to ensure the safety of all persons authorized or unauthorized. Such protective measures will be located and constructed as required by local, state and federal ordinances, laws, codes, or regulations and as required by the Engineer or Owner. The contractor will provide at the pre-construction conference a site operation plan that indicates construction entrance, lay down areas, stock pile areas, and construction fencing locations for Owner review.
	7. TEMPORARY STRUCTURES AND MATERIAL HANDLING
		1. The Contractor will provide such storage sheds, temporary buildings or trailers, as required for the performance of the Contract. Subcontractors will provide their own temporary buildings and trailers. The locations of such items are to be approved by the Engineer.
		2. Materials will be handled, stored, installed, cleaned and protected in accordance with the best practice in the industry and, except where otherwise specified in the Contract Documents, in accordance with manufacturer's specifications and directions.
		3. The Contractor must obtain the permission of the Owner for the use of any storage facilities available on site, but the Owner assumes no responsibility for articles stored.
	8. HOISTING FACILTIIES
		1. Except as otherwise specified, the Contractor will provide, operate, and remove material hoists, cranes and other hoisting, as required for the performance of the Work by all trades. All such hoisting service will be without cost to the Subcontractors.
	9. TEMPORARY WATER
		1. The Contractor may make use of the available water supply at the site for construction purposes, provided the permission of the Owner is obtained beforehand and only as long as the water is not used wastefully. The Owner requires the use of a water meter and backflow preventer in the event temporary water is needed.
		2. The Contractor will provide all necessary piping and hoses to utilize the available sources of water.
		3. The Contractor will provide an adequate supply of cool drinking water, with individual drinking cups, for personnel on the job.
	10. TEMPORARY ELECTRICITY
		1. The Contractor may make use of the electricity as available at the site, metered and paid for by the Owner, provided that the Contractor will supply proper adapters and extension cords. Power requirements that cannot be met locally by the Owner will be the responsibility of the Contractor.
			1. Where heavy duty electric equipment drawing current in excess of 15 amperes is involved, the Contractor will provide temporary service to supply the power.
			2. The temporary electric service will include, but not be limited to, labor, materials and equipment necessary to supply temporary power of adequate capacity for the project.
			3. Transformers and meters, when required by the power company, will be furnished by the power company and the Contractor will pay the costs thereof.
		2. Temporary electrical Work will be performed under the direct supervision of at least one master electrician, who will be present on the project at all times when such work is being performed.
		3. All temporary work will be provided in conformity with the National Electric Code, state and local laws, and the requirements of the power company.
		4. Dismantle and completely remove from the project site all temporary electrical facilities, only when the permanent electrical system is operational and accepted by the Engineer.
		5. Building permits will be the responsibility of the Contractor to obtain.
	11. WEATHER PROTECTION
		1. It is to be specifically understood that the Contractor shall do no work under any conditions deemed unsuitable by the manufacturer of various materials to be installed or the Owner for the execution of the Work. This provision will not constitute any waiver, release, or lessening of the Contractor's obligation to bring the Work to Substantial Completion within the period of time set forth in the Contract Documents.

PART -2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not Used)

END OF SECTION

SECTION015639 **–** TEMPORARY TREE AND PLANT PROTECTION

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. SUMMARY
		1. This Section includes the protection and trimming of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction. It also covers tree pruning indicated in the vicinity of the project, as may be indicated on the Demolition Plan or the Layout and Materials Plan.
	3. RELATED WORK
		1. Related Sections include the following:
			1. Section 31 10 00 – Site Clearing.
	4. SUBMITTALS
		1. Product Data: For each type of product indicated.
		2. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects, with project names and addresses, names and addresses of Engineers and Owners, and other information specified.
		3. Certification: From a qualified arborist that trees indicated to remain have been protected during construction according to recognized standards and that the trees were promptly and properly treated and repaired when damaged.
	5. QUALITY ASSURANCE
		1. Tree Service Qualifications: An experienced tree service firm to be consulted, as necessary.
		2. Arborist Qualifications: An arborist certified by the International Society of Arboriculture or licensed in the jurisdiction where Project is located, to be consulted, as necessary.
		3. Tree Pruning Standards: Comply with ANSI A300, "Trees, Shrubs and Other Woody Plant Maintenance - Standard Practices", unless more stringent requirements are indicated.
		4. Pre-construction Conference: Conduct conference at Project site, prior to the start of work.
			1. Before starting tree pruning, protection and trimming, meet with representatives of the authorities having jurisdiction, the Owner, the Engineer, consultants and other concerned entities. Review tree pruning protection and trimming procedures and responsibilities. Notify the participants at least three working days before convening the conference. Record discussions and agreements and furnish a copy to each participant.

PART -2 PRODUCTS

2.1 MATERIALS

* + 1. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch (63-mm) sieve and not more than 10 percent passing a 3/4-inch (19-mm) sieve.
		2. Topsoil: Shall conform to the requirements of specification Section 32 92 50.
		3. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon or polyester fibers.

PART - 3 EXECUTION

3.1 PREPARATION

* + 1. Temporary Fencing: Install temporary fencing, located as indicated or outside the drip line of trees, to protect remaining vegetation from construction damage.
			1. Install fence according to ASTM F 567 and manufacturer's written instructions.
		2. Protect tree root systems from damage due to noxious materials caused by runoff or spillage while mixing, placing or storing construction materials. Protect root systems from flooding, eroding or excessive wetting caused by dewatering operations.
		3. Do not store construction materials, debris, or excavated material within the drip line of the remaining trees. Do not permit vehicles or foot traffic within the drip line; prevent soil compaction over root systems.
		4. Do not allow fires under or adjacent to remaining trees or other plants.

3.2 EXCAVATION

* + 1. Install shoring or other protective support systems to minimize the sloping or benching of excavations.
		2. Do not excavate within the drip line of trees, unless otherwise indicated.
		3. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb the soil to expose the roots.
			1. Relocate roots in backfill areas, where possible. If encountering large, main lateral roots, expose the roots beyond excavation limits, as required, to bend and relocate them without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches (75 mm) back from the new construction.
			2. 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.
		4. Where utility trenches are required, root pruning may be necessary.
			1. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with work. Cut roots with sharp pruning instruments; do not break or chop.

3.3 REGRADING

* + 1. Grade Lowering: Where the new finish grade is indicated below the existing grade around trees, slope the grade beyond the drip line of the trees.
		2. Grade Lowering: Where the new finish grade is indicated below the existing grade around trees, slope the grade away from the trees, as recommended by qualified arborist, unless otherwise indicated.
			1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.
		3. Minor Fill: Where the existing grade is 6 inches (150 mm) or less below the elevation of the finish grade, fill with topsoil. Place topsoil in a single, uncompacted layer and hand grade to the required finish elevations.
		4. Moderate Fill: Where the existing grade is more than 6 inches (150 mm), but less than 12 inches (300 mm), below the elevation of the finish grade, place drainage fill, filter fabric and topsoil on the existing grade, as follows:
			1. Carefully place drainage fill against the tree trunk, approximately 2 inches (50 mm) above the elevation of the finish grade, and extend it not less than 18 inches (450 mm) from the tree trunk on all sides. For balance of the area within the drip-line perimeter, place the drainage fill up to 6 inches (150 mm) below the elevation of the grade.
			2. Place the filter fabric with its edges overlapping, 6 inches (150 mm) minimum.
			3. Place the fill layer of topsoil to finish the grade. Do not compact drainage fill or topsoil. Hand grade to the required finish elevations.

3.4 TREE PRUNING

* + 1. Prune the remaining trees affected by temporary and new construction, as indicated in the plans.
		2. Prune the remaining trees, if any, to compensate for root loss caused by damaging or cutting the root system. Provide subsequent maintenance during the Contract Period, as recommended by a qualified arborist.
		3. Pruning Standards: Prune trees according to ANSI A300.
		4. Cut branches with sharp pruning instruments; do not break or chop.

3.5 TREE REPAIR AND REPLACEMENT

* + 1. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs and roots according to the written instructions of the qualified arborist.
		2. Remove and replace dead and damaged trees that the qualified arborist determines to be incapable of restoring to a normal growth pattern.
			1. Provide new trees of the same size and species as those being replaced; plant and maintain, as specified.
			2. Provide new trees of 6-inch (150-mm) caliper size and of a species selected by the Engineer, when trees more than 6 inches (150 mm) in caliper size, measured 12 inches (300 mm) above grade, are required to be replaced.
		3. Aerate surface soil compacted during construction to 10 feet (3 m) beyond the drip line and no closer than 36 inches (900 mm) to the tree trunk. Drill 2-inch- (50-mm-) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) o.c. Backfill the holes with an equal mix of augured soil and sand.

3.6 DISPOSAL OF WASTE MATERIALS

* + 1. Burning is not permitted.
		2. Disposal: Remove excess excavated material, displaced trees, roots, stumps and excess chips from the Owner's property.

END OF SECTION

SECTION 017000 **–** PROJECT CLOSEOUT

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. RELATED DOCUMENTS
		1. Consult the individual Sections of the Specifications for specific items required under those Sections.
	3. PERMITS
		1. The Contractor will coordinate the efforts of all Subcontractors and obtain any final permits that may be required.
	4. SUBSTANTIAL COMPLETION
		1. Prior to requesting Substantial Completion, the Contractor will make a thorough inspection of the Work. During this inspection, the Contractor will prepare a comprehensive list of all items remaining to be completed or corrected. This list will include all remaining Contractor and Subcontractor items to be provided under the Contract Documents.
		2. Upon completion of the items noted on the Contractor's list, the Contractor will notify the Engineer that the Work is Substantially Complete. The Engineer will then conduct a similar, thorough inspection. If the Engineer agrees that the Work is Substantially Complete, the Engineer will promptly make a thorough inspection and prepare a punch list, setting forth in accurate detail any items on the Contractor's list and additional items that are not acceptable or incomplete. The Contractor will coordinate all Subcontractors to achieve prompt completion of the punch list.
		3. The Contractor will not be relieved of the responsibility to provide Contract items left off the Engineer's punch list.
		4. If the Engineer determines that the Work is not Substantially Complete, the Engineer will inform the Contractor of those items that must be completed before the Engineer will prepare a punch list. Upon completion of those items, the Contractor will again request the Engineer to prepare a punch list.
		5. When the punch list has been prepared, the Engineer will arrange a meeting with the Contractor and Subcontractors to identify and explain all punch list items and answer questions about work which must be done before final acceptance.
		6. The Engineer may revise the punch list, from time to time, to ensure that all items of the work are properly completed.
		7. The Engineer will prepare the Certificate of Substantial Completion.
	5. RECORD DRAWINGS
		1. See Section 01723 – Surveys and Record Drawings
	6. OPERATING AND MAINTENANCE INSTRUCTIONS
		1. Consult the individual sections of the specifications for the specific requirements for those sections and for further details and descriptions of the requirements
		2. Prior to final payment and completion, the Contractor will provide all Operating Manuals and Maintenance Instructions, as required by the Contract Documents. At a minimum, operating and maintenance manuals will be provided for the court surface and related equipment, and for all other components and systems, as specified.
		3. Operating Instructions and Manuals
			1. Subcontractors, installers, and suppliers will furnish to the Contractor two sets of operating and maintenance instructions of all mechanical, electrical and manually operated equipment furnished and installed by them. Mechanical and electrical subcontractors will furnish instructions, as specified in their respective sections.
			2. The Contractor will collect all of the above instructions, bind them into two complete sets, and submit them to the Engineer who will deliver them to the Owner.
			3. Submission of operating and maintenance instructions will be a condition precedent to final payment.
		4. Instruction of Owner's Personnel
			1. Where specified in the individual sections of the specifications, the Contractor and Subcontractor will instruct the Owner's personnel at the site in the use and maintenance of equipment installed under the Contract.
			2. Submission to the Engineer of a Certificate of Compliance to this requirement, signed by the Contractor and the Owner's Representative, will be a condition precedent to final payment.
	7. FINAL COMPLETION
		1. Full Release of Retainage
			1. Upon completion of all work, and after receipt of all appropriate marked-up As-Built Drawings, Operating Manuals, Warranties, Guarantees and Spare Parts required by the Contract Documents, the Engineer will prepare the Certificate of Final Completion.
			2. The Contractor's signature on this Certificate will be notarized.
			3. The Contractor will provide a final Application for Payment to complement the close-out process.
		2. Partial Release of Retainage
			1. If, within 60 days after Substantial Completion, any of the items on the Engineers punch list are not complete or if the Contractor has not provided the appropriate marked-up As-Built Drawings, Operating Manuals, Warranties, Guarantees or Spare Parts, the Engineer will assign a monetary value for each incomplete item, as well as any other items, and the Engineer will prepare a Certificate for Partial Release of Retainage
			2. If the Engineer is required to prepare a Certificate for Partial Release of Retainage, the Contractor will still complete all remaining Work.
			3. The Contractor's signature on this Certificate will be notarized.
			4. The Contractor may make a request for additional releases of retainage when portions of the Work listed on the Engineer's punch list have been satisfactorily completed. Each request will be accompanied by a new application for payment and a new, signed and notarized Certificate for Partial Release of Retainage.
			5. Upon completion of all remaining items, the Final Release of Retainage will be processed in accordance with Paragraph A above.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not Used)

END OF SECTION

SECTION 017123 **–** SURVEYS AND RECORD DRAWINGS

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. RECORD DRAWINGS
		1. Prior to final payment the Contractor will provide an As-Built Plan of the facilities, stamped by a Professional Land Surveyor registered in Massachusetts, demonstrating compliance with all Massachusetts Athletic Association (MIAA) (or as modified in the contract plans), American Sports Builders Association (ASBA) (or as modified in the contract plans), US Tennis Association (USTA), and Americans with Disabilities Act (ADA) requirements for layout, geometry, striping and slope requirements. An electronic version of the As-Built Plan, in AutoCAD 2012 format, will also be provided.
		2. Record Drawings will consist of all the Contract Drawings.
		3. From the sets of drawings furnished by the Owner, the Contractor will reserve one set for record purposes. From this set, the Contractor will detach and furnish, at no charge to the Mechanical and Electrical Subcontractors if applicable, the drawings of their portion of the Work for the same purpose.
		4. The Contractor and the above Subcontractors will keep their marked-up As-Built set on the site at all times and note on it, in colored ink or pencil, neatly and accurately, at the end of each working day, the exact location of their work as actually installed. This will include the location and dimensions of underground and concealed Work, and any architectural, mechanical or electrical variations from the Contract Drawings. All changes, including those issued by Addendum, Change Order or instructions by the Engineer, will be recorded. Marked-up As-Built Drawings will be prepared for the entire project and include all work, including, but not limited to:
			1. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically, at ten (10) foot intervals and at all changes of direction.
				1. The location of these items will be shown by offsets to structure and drawing grid lines.
				2. The tolerance for the actual location of these items on the marked-up As-Built Drawings will be plus or minus two (2) inches.
				3. Each item will be referenced by showing a tag number, the areas served, and function on the marked-up As-Built Drawing.
		5. The Engineer may periodically inspect the marked-up As-Built Drawings at the site. The proper and current maintenance of the information required on these drawings will be a condition precedent to approval of the monthly applications for payment.
		6. At Substantial Completion, the Contractor will submit the complete set of marked-up As-Built Drawings to the Engineer. The Contractor will check all marked-up As-Builts prepared by subcontractors and certify, in writing on the title sheet of the drawings, that they are complete and correct prior to submission to the Engineer.
		7. The Engineer will review the marked-up As-Built Drawings and verify, by letter to the Portsmouth School District, that the work is complete. The Contractor will incorporate any and all changes onto the original drawings.
		8. The Contractor may make a written request for copies of the completed Record Drawings. The Contractor will reimburse the Portsmouth School District directly for the cost of printing of any requested Record Drawings.
		9. Submission of accurate marked-up As-Built Drawings and their approval by the Engineer will be a condition precedent to final payment.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not Used)

END OF SECTION

SECTION 017419 **–** CLEANING UP

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. RELATED DOCUMENTS
		1. Consult the individual Sections of the Specifications for cleaning of work installed under those Sections.
	3. CLEANING DURING CONSTRUCTION
		1. Conduct cleaning and disposal operations to comply with local ordinances, anti-pollution laws, and the Owner.
			1. Do not burn or bury rubbish and waste materials on the site.
			2. Do not dispose of volatile wastes, such as mineral spirits, oil or paint thinner in storm or sanitary drains.
			3. Do not dispose of wastes into streams or waterways.
		2. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
		3. Maintain the site, free from accumulations of waste, debris and rubbish.
		4. Provide on-site containers for the collection of waste materials and rubbish.
		5. At the end of each day, remove and legally dispose waste materials and rubbish from the site.
		6. Schedule cleaning operations so that dust and other contaminants resulting from cleaning processes will not fall on wet, newly painted or applied surfaces.
		7. Disposal of materials will be in compliance with all applicable laws, ordinances, codes and by-laws.
	4. FINAL CLEANING
		1. Prior to submitting a request to the Engineer to certify Substantial Completion of the work, the Contractor will inspect all interior and exterior spaces and verify that all waste materials, rubbish, tools, equipment, machinery and surplus materials have been removed, and that all sight-exposed surfaces are clean. Leave the Project clean and ready for occupancy.
		2. Unless otherwise specified under other Sections of the Specifications, the Contractor will perform final cleaning operations, as herein specified, prior to final inspection.
		3. Cleaning will include all surfaces, interior and exterior, which the Contractor has had access to, whether new or existing.
		4. Employ experienced workmen or professional cleaners for final cleaning.
		5. Use only cleaning materials recommended by the manufacturer of the surface to be cleaned.
		6. Use cleaning materials which will not create a hazard to health or property and which will not damage surfaces.
		7. Remove grease, mastic, adhesive, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior surfaces. This includes cleaning of the work of all finishing trades where needed, whether or not cleaning by such trades is included in their respective specifications.
		8. Repair, patch and touch-up marred surfaces to the specified finish, to match adjacent surfaces.
		9. In cleaning items with a manufacturer's finish or items previously finished by a Subcontractor, care will be taken not to damage such manufacturer's or Subcontractor's finish. Any damage to finishes caused by cleaning operations will be repaired at the Contractor's expense.
		10. Broom clean exposed concrete surfaces and paved surfaces. Rake clean other surfaces of the grounds.
		11. The School's responsibility for cleaning commences at Substantial Completion and transfer of occupancy from the Contractor.
		12. Contractor will clean all drainage structures at Substantial Completion.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not Used)

END OF SECTION

SECTION 017600 **–** PROTECTION

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. PROTECTION OF PERSONS & PROPERTIES
		1. All Owner facilities may be occupied during construction. The Contractor will take all necessary precautions to ensure the public safety and convenience of the occupants during construction.
		2. Any damage to buildings, roads, (public and private), bituminous concrete areas, fences, lawn areas, trees, shrubbery, poles, underground utilities, etc. will be made good by and at the Contractor's own expense, all to the satisfaction of the Owner.
		3. The Contractor will patch, repair and/or replace all adjacent materials and surfaces damaged after the installation of new work, at no expense to the Owner. All repair and replacement work will match the existing in kind and appearance.
		4. See Section 5.01 regarding noise and dust control.
	3. TEMPORARY PROTECTION
		1. The Contractor shall:
			1. Protect excavations, trenches, buildings and materials at all times from rain water, ground water, backing up, or leakage of sewers, drains or other piping, or from water damage of any origin. Provide all pumps, piping, coverings, other materials and equipment, as required by job conditions to accomplish this requirement.
			2. Protect pavement and slabs to receive work by other trades from any soiling which will prevent proper adhesion of subsequent work. Pavement and slabs will be left clean and free of blemishes at the time other trades begin the application of their work.
			3. Protect all surfaces to receive work by other trades from any soiling which will prevent proper execution of subsequent work.
			4. Protect all existing vegetation to remain in proximity to the site work, as required for completion of the construction project.
			5. Protect the private property of the Owner. Any areas damaged by the Contractor will be restored to the original condition or compensated at the Contractor's expense.
		2. After the installation of work by any Subcontractor is completed, the Contractor will be responsible for its protection and for repairing, replacing or cleaning any such work which has been damaged by other trades, or by any other cause, so that all work is in first class condition at the time of Substantial Completion.
	4. ACCESS
		1. The Contractor will, at all times, leave an unobstructed way along walks, parking lots and roadways outside the indicated limit of work, and will maintain barriers and lights for the protection of all persons and property in all locations where materials are stored or work is in progress.
	5. SECURITY
		1. The Contractor will be responsible for providing all security precautions necessary to protect the Contractor's and Owner's interests.
		2. Where excavation is involved, the Contractor will be responsible for providing continuous watchmen service, as necessary, to insure adequate protection of the general public.
	6. NOISE AND DUST CONTROL
		1. The Contractor will take special measures to protect the neighbors and general public from noise, dust and other disturbances, as needed and/or directed by the Owner, throughout construction by:
			1. Keeping common pedestrian and vehicular circulation areas clean and unobstructed.
			2. Applying water or other dust palliatives, as needed for dust mitigation.
			3. Keeping all loose trash picked up and prevent it from blowing outside the limit of the work.
	7. FIRE PROTECTION
		1. The Contractor will take necessary precautions to insure against fire during construction. The Contractor will be responsible to ensure that the area within contract limits is kept orderly and clean and that combustible rubbish and construction debris is promptly removed from the site.
		2. Installation of equipment suitable for fire protection will be done as soon as possible after commencement of the work.
	8. WIND PROTECTION
		1. Should high wind or severe weather warnings be issued by the U.S. Weather Bureau, the Contractor will take every precaution to minimize danger to persons, to the Work, and to the adjacent property.
	9. WEATHER PROTECTION
		1. The Contractor will provide Weather Protection as required by Specification Section 01 5000, Temporary Facilities, and any other specific requirements of the Contract Documents.
	10. COORDINATION – NOTIFICATIONS
		1. The Contractor will coordinate all work activities with the Owner.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not Used)

END OF SECTION

SECTION 022113 **–** EXISTING CONDITIONS

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. RELATED SECTIONS
		1. Section 00 2113 – Bid Instructions
		2. Section 01 0100 – Summary of Work
		3. Section 01 3114 – Conduct of the Work
	3. EXISTING CONDITIONS
		1. Before submitting a bid, the Contractor will make a thorough examination of the conditions at the site, checking the requirements of the Plans and Specifications with the existing conditions.
		2. The Contractor will be provided an electronic copy of all drawings (if requested in writing) for purposes of laying out their work. No claim for extra compensation or extension of time will be allowed on account of the Contractor's failure to estimate properly the quantities, locations and measurements of all items required to complete the work, which could be discerned from visiting the site and a thorough review of the Bid Documents, Drawings and Specifications.
		3. The Contractor will report any discrepancies to the Engineer and request an interpretation prior to bid submission. Discrepancies discovered after award of Contract will be handled as detailed in the General Conditions.
		4. The Specifications include Test Pit Logs provided for information only. The Contractor shall remove all topsoil and organic material from beneath areas to receive pavements, structures and synthetic turf. The Contractor assumes any risk associated with conclusions drawn from this information. If additional investigation is required, the Contractor shall contact the Engineer to obtain permission to perform site investigations prior to start of construction.
		5. Existing Utilities exist on site and are shown on the drawings for reference only. Locations shown do not relieve the Contractor from the responsibility for accurately locating and protecting utilities in place. The Contractor is responsible for repair and replacement of all utilities to remain that are damaged by his work.
		6. Existing Irrigation piping and wiring exists on site. Locations are approximate. The Contractor shall field locate all existing irrigation components prior to start of construction, and notify the Engineer of findings.
	4. SUBMITTALS
		1. The Contractor will submit a field verification plan of all utilities within limit of work and submit to Engineer for review and approval.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not Used)

END OF SECTION

SECTION 023000 – SUBSURFACE INVESTIGATION

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR) which are hereby made a part of this Section of the Specifications.
	2. SUBSURFACE INVESTIGATION
		1. Information Not Guaranteed: Information on the Drawings and in the Project Manual relating to subsurface conditions, natural phenomena, and existing utilities and structures is from the best sources presently available. Such information is furnished only for the information and convenience of the Contractor, and the accuracy or completeness of this information is not guaranteed. The Contractor shall field verify and locate existing utilities prior to construction. The Contractor shall utilize a third party utility locator as necessary. The Contractor shall coordinate with DIG SAFE (888-DIG-SAFE) at least 72-hours prior to excavation.
		2. The Contractor may refer to the Test Pit Logs in the Appendices, as described in Section 02 2113.
	3. CONFIRMATION OF GRADES AND UTILITIES
		1. Prior to commencement of site excavating operations, the Contractor shall compare existing site grading and proposed new site grading. Where existing utilities are indicated but their inverts or depths are not, exploratory excavating shall be performed to assure that sufficient earth coverage will be attained during the course of new site grading.
			1. Utilities existing on the site shall be carefully protected from damage and relocated or removed as required by the work. When an active utility line is exposed during construction, its location and elevation shall be plotted on the record drawings and the Engineer, and the utility Owner notified in writing.
			2. If exploratory excavating confirms that the depth of existing utilities will be negatively impacted by proposed new grades (i.e., will be too shallow or become exposed), immediately notify the Engineer. Do not proceed with work in such areas until instructions are issued by the Engineer. Continue work in other areas.
	4. CONFIRMATION OF INTEGRITY OF ADJACENT STRUCTURES
		1. Prior to commencement of site excavating operations, the Contractor shall compare depths of existing structures and proposed depths of new utilities. Where existing structures are indicated but their depths are not, exploratory excavating shall be performed to assure that proposed new excavations adjacent to them, or in near proximity of them, will not undermine the structural integrity of the existing structures. The Contractor shall be responsible for providing shoring as necessary to protect existing site appurtenances.
		2. If exploratory excavating confirms that the depths of existing structures may be negatively impacted or undermined by proposed new excavations, immediately notify the Engineer. Do not proceed with work in such areas until instructions are issued by the Engineer. Continue work in other areas.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION (Not Used)

END OF SECTION

SECTION024113 **–** SELECTIVE SITE DEMOLITION

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. SUMMARY
		1. Work is to include the demolition of indicated existing utilities, structures and bituminous concrete pavement.
		2. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials will become the Contractor's property and will be removed from the site with further disposition at the Contractor's option, and in full compliance with all applicable disposal regulations.
	3. DEFINITIONS
		1. Remove and Dispose: Remove and legally dispose of items, except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
		2. Salvage and Protect: Items indicated to be salvaged remain the Owner's property. Remove, clean and store such items to protect against damage. Stockpile in Owner's designated storage area.
		3. Remove and Reinstall: Remove items indicated; clean, service, repair and otherwise prepare them for reuse; store and protect against damage. Make available for Engineer's inspection. Reinstall items in locations indicated.
		4. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Engineer, items may be removed to a suitable, protected storage location during selective demolition, cleaned and reinstalled in their original locations.
	4. SUBMITTAL
		1. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations, if any.
	5. REGULATORY REQUIREMENTS
		1. Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
		2. Owner may occupy portions of the building immediately adjacent to selective demolition areas. Conduct selective demolition so that the Owner's operations will not be disrupted. Provide not less than seventy-two (72) hours notice to the Owner of activities (if any) that may affect the Owner's operations.
		3. Owner assumes no responsibility for actual condition of facilities or items to be selectively demolished, or removed and reused.
		4. Storage or sale of removed items or materials on-site will not be permitted.

PART -2 PRODUCTS (Not Used)

PART -3 EXECUTION

3.1 SELECTIVE DEMOLITION ITEMS

* + 1. Survey the condition of the site to determine whether removing any element might result in undesirable damage of any portion of the adjacent facilities during selective demolition.
		2. Perform surveys, as the Work progresses, to detect hazards resulting from selective demolition activities.
		3. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
		4. Utility Requirements: Locate, identify, shut off, disconnect, and seal or cap off indicated utility services serving facilities to be selectively demolished.
			1. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the site before proceeding with selective demolition.
		5. Drain, purge, or otherwise remove, collect and dispose of chemicals, gases, explosives, acids, flammables or other dangerous materials (if any) before proceeding with selective demolition operations.
		6. If directed by the Engineer, employ a certified, licensed exterminator to treat the site and to control rodents and vermin before and during selective demolition operations.
		7. Conduct demolition operations and remove debris to ensure minimum interference with roads, parking lots, streets, walks and other adjacent occupied and used facilities.
		8. Conduct demolition operations to prevent injury to people and damage to adjacent buildings, facilities and site improvements to remain. Ensure safe passage of people around the selective demolition area.
		9. Use water mist and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
		10. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
		11. Clean adjacent structures and improvements of dust, dirt and debris caused by selective demolition operations. Return adjacent areas to the condition existing before the start of selective demolition.
		12. Demolish and remove existing construction only to the extent required by new construction and as indicated. Contractor is to be responsible for any cutting and patching that is required.
		13. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.
		14. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
		15. 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.
		16. Disposal: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
			1. Do not burn demolished materials.
			2. Transport demolished materials off of the Owner's property and legally dispose of them, if they are not designated for salvage by the Owner or reuse.
		17. In areas where bituminous concrete is to be removed, the edge of any bituminous concrete to remain must be a sawcut edge.
		18. Items to be removed and reset may be stored on site at a location approved by the Owner.

END OF SECTION

SECTION116833 **–** ATHLETIC EQUIPMENT

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. WORK INCLUDED
		1. Provide all equipment and materials, and do all Work necessary to furnish, assemble and install the athletic field equipment, (fixed and non-fixed), as indicated on the Drawings and as specified herein.
		2. All equipment and materials shall meet or exceed Massachusetts Interscholastic Athletic Association (MIAA) and American Sports Builders Association (ASBA) Rules and Regulations.
	3. RELATED WORK
		1. Examine the Contract Documents for requirements that affect the Work of this Section.
	4. SUBMITTALS
		1. Shop Drawings of each equipment item, including foundations and footings to be installed will be submitted for the Engineer’s approval. Indicate methods for allowing each item to properly drain.
		2. Catalog Cuts, manufacturer’s data and manufacturer’s installation instructions will be submitted on each item of non-fixed and fixed field equipment to be provided in accordance with this Specification.
	5. PRODUCT DELIVERY AND STORAGE
		1. Materials, when delivered to site, will be stacked and stored above the ground and under protective coverings, or indoors, in such a manner as to insure proper drainage, ventilation and protection.
		2. Non-fixed equipment will be delivered to the site and stored local to the project site, as directed by the Owner and/or the Engineer.

PART - 2 PRODUCTS

2.1 TENNIS COURTS POSTS AND NETTING

* + 1. Tennis court posts shall be RTP-300 Deluxe round internal wind tennis posts as manufactured by Jaypro, Waterford, CT or approved equal. Posts shall be 3” round, 11 gage powder coated steel (green), with solid stainless steel internal worm gear winch with self-locking gear mechanism, removable winch handles and welded lacing rods. Provide ground sleeves manufactured for specified posts. Provide 1 pair of posts for each court. Contractor will install in ground sleeve and center tie down anchor.
		2. Tennis court nets will be model #CCPTN42 Country Club Pro Tennis Net 42’ long x 42” high heavy duty black 3.6mm braided polyethylene net with 38 oz. reinforced vinyl headband, as manufactured by Jaypro, Waterford, CT or approved equal. Net shall include heavy duty vinyl coated side and bottom tapes-side pockets and metal dowels.

PART - 3 EXECUTION

3.1 ATHLETIC FIELD EQUIPMENT

* + 1. Establishment of subgrade will be completed under Division 31 – Earth Moving.
		2. Install equipment at the locations indicated on the Drawings and in strict accordance with the manufacturer’s printed instructions. All non-fixed equipment will be assembled by the Contractor.
		3. Equipment footings shall be installed prior to installation of surrounding pavement base or turf base stone, and any finished paving or turf.
		4. For Concrete footing requirements refer to Division 3 of this specification and Manufacturers installation instructions.

3.2 CLEANING

* + 1. Upon completion of the Work in any given area, remove all rubbish and debris from the Work area and leave it in clean condition.

END OF SECTION

SECTION311000 – SITE CLEARING

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR) which are hereby made a part of this Section of the Specifications.
	2. DESCRIPTION OF WORK
		1. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
			1. Protecting existing trees and vegetation to remain, including temporary fencing for trees in close proximity to construction operations.
			2. Removing existing trees and vegetation indicated to be removed.
			3. Clearing and grubbing.
			4. Stripping and stockpiling topsoil.
			5. Removing above and below grade site improvements.
			6. Disconnecting, capping or sealing of utilities as required.
		2. Alternates: Not Applicable.
		3. Items To Be Installed Only: Not Applicable.
	3. RELATED WORK
		1. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
			1. Section 312000 – EARTH MOVING for soil materials, excavating, backfilling, and site grading and removal of site utilities.
			2. Section 312500 – EROSION AND SEDIMENTATION CONTROLS for required erosion and sedimentation control measures.
	4. DEFINITIONS
		1. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; 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.
		2. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.
	5. MATERIAL OWNERSHIP
		1. Except for materials indicated to remain the Owner’s property, cleared materials shall become Contractor's property and shall be removed from the Project site and disposed of legally offsite.
		2. Refer to specification section 010100 Summary of Work.
	6. SUBMITTALS
		1. Photographs sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
		2. Record drawings, according to Section 017000 - PROJECT CLOSEOUT identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.
	7. PROJECT CONDITIONS
		1. 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 the Owner and authorities having jurisdiction.
			2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
		2. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner’s premises where indicated.
		3. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
		4. Do not commence site clearing operations until erosion and sedimentation control measures are in place.
		5. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place or outside of the limit of work. Protect improvements on adjoining properties and on Owner’s property.
			1. Restore improvements damaged by Contractor’s clearing activities to their original condition, at no additional expense to the Owner.

PART - 2 PRODUCTS (Not Used)

PART - 3 EXECUTION

3.1 PREPARATION

* + 1. Protect and maintain benchmarks and survey control points from disturbance during construction.
		2. Locate and clearly flag trees and vegetation to remain or to be relocated.
		3. Protect existing site improvements to remain from damage during construction.
			1. Restore damaged improvements to their original condition, as acceptable to the Owner.

3.2 TREE PROTECTION

* + 1. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
			1. Do not store construction materials, debris, or excavated material within fenced area.
			2. Do not permit vehicles, equipment, or foot traffic within fenced area.
			3. Maintain fenced area free of weeds and trash.
			4. Except as otherwise directed, cutting and trimming of existing trees will not be permitted.
		2. Do not excavate within tree protection zones, unless otherwise indicated.
		3. Where excavation for new construction is required within tree protection zones, hand clear and excavate 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.
			1. Cover exposed roots with burlap and water regularly.
			2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
			3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
			4. Backfill with soil as soon as possible.
		4. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the Engineer.
			1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
			2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the Engineer.

3.3 UTILITIES

* + 1. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
			1. Arrange with utility companies to shut off indicated utilities.
		2. Existing Utilities: Do not interrupt utilities serving facilities occupied by the 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 the Owner not less than two days in advance of proposed utility interruptions.
			2. Do not proceed with utility interruptions without the Owner’s written permission.
		3. Removal of underground utilities is included in Section 312000 – EARTH MOVING.
		4. Removal of underground utilities is included in Division 33 Sections covering site utilities.

3.4 CLEARING AND GRUBBING

* + 1. Remove obstructions, trees, shrubs, grass, 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. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
			3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade in landscaped areas. Completely remove stumps and roots under pavement, sidewalks and building footprint.
			4. Use only hand methods for grubbing within tree protection zone.
			5. Chip removed tree branches and dispose of off-site.
		2. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, or as otherwise noted, 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.

3.5 TOPSOIL STRIPPING

* + 1. Remove sod and grass before stripping topsoil.
		2. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
			1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
		3. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent saturation, windblown dust or contamination by air-borne weed seed.
			1. Limit height of topsoil stockpiles to 72 inches.
			2. Do not stockpile topsoil within tree protection zones.
			3. Surround stockpiles with silt fence.

3.6 SITE IMPROVEMENTS

* + 1. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
		2. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
			1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
			2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.7 DISPOSAL

* + 1. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off the Owner’s property.
			1. Burning and burying on site is prohibited.
			2. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION

SECTION312000 – EARTH MOVING

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR) which are hereby made a part of this Section of the Specifications.
	2. DESCRIPTION OF WORK
		1. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
			1. Preparing subgrades for buildings, structures and landscaping.
			2. Excavating and backfilling for buildings, pavements and structures.
			3. Removal of underground utilities.
			4. Drainage course for slabs-on-grade.
			5. Subbase course for concrete pavements.
			6. Subbase and base course for asphalt paving.
			7. Subsurface drainage backfill for walls and trenches.
			8. Excavating and backfilling for utility trenches.
			9. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
			10. Remove and replace existing unsuitable fill material.
	3. REFERENCES
		1. American Society of Testing and Materials
			1. C136 Sieve Analysis of Fine and Coarse Aggregates
			2. D422 Particle Size Analysis of Soils
			3. D698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3)
			4. D1556 Density of Soil in Place by the Sand-Cone Method.
			5. D1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch drop
			6. D2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)
			7. D3017 Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
			8. D4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils
			9. E329 Agencies Engaged in Testing and/or Inspection of Materials Used in Construction
			10. E548 General Criteria Used for Evaluating Laboratory Competence
		2. American Association of State Highway and Transportation Officials (AASHTO)
			1. T 191 Density of Soil In-Place by the Sand Core Method
			2. T 239 Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
		3. Commonwealth of Massachusetts Highway Department (MHD) Standard Specifications Highways and Bridges, 1988, as amended including supplemental specifications and special provisions.
		4. Geotechnical Engineering Report, included as part of this specification
	4. RELATED WORK
		1. The following items are not included in this Section and will be performed under the designated Sections:
			1. Section 033000 - CAST-IN-PLACE CONCRETE for granular course if placed over vapor retarder and beneath the slab-on-grade.
			2. Section 311000 - SITE CLEARING for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
			3. Section 321123 - AGGREGATE BASE COURSE for pavement base material aggregates and subgrade preparation.
			4. Section 32321216 ASPHALT PAVING for pavement base material aggregates and subgrade preparation.
			5. Section 312500 - EROSION AND SEDIMENTATION CONTROLS for temporary erosion and sedimentation control measures.
			6. Section 321840 – TENNIS PAVING for tennis court base material aggregates and subgrade preparation.
		2. Division 02, for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
	5. DEFINITIONS
		1. 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.
		2. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
		3. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
		4. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
		5. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
		6. 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 Designer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
			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 Designer. Unauthorized excavation, as well as remedial work directed by Designer, shall be without additional compensation.
		7. Fill: Suitable soil materials used to raise existing grades.
		8. 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 without systematic drilling, ram hammering, ripping, or blasting, when permitted.
		9. 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.
		10. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
		11. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
		12. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
	6. SITE INVESTIGATION
		1. The Contractor shall satisfy himself to the nature and location of the work, the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, groundwater table or similar physical conditions at the site, the confirmation of subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of work and other matters which can affect the work or the cost thereof under this contract. Failure by the Contractor to acquaint himself with all information concerning these conditions will not relieve him from responsibility for properly estimating the difficulty or cost of successfully performing the work.
	7. SUBSURFACE DATA
		1. **<Test Pit Logs are included with these Specifications**.>Such data is offered in good faith solely for the purpose of placing the Contractor in receipt of available information. The Contractor must interpret data according to his own judgment and acknowledges that he is responsible for his own determinations regarding the subsurface conditions which may exist. The Contractor shall assume all risk pertaining to subsurface conditions, including rock, actually encountered by him in performing the work covered by the contract, even though such actual conditions may result in the Contractor performing more or less than originally anticipated. No warranty, either expressed or implied, is made as to the accuracy of the subsurface information.
		2. Variations in existing ground or subsurface soil conditions from those indicated on the test pit or boring logs shall not constitute grounds for changes in contract price or completion dates of this contract.
	8. SUBMITTALS
		1. Product Data: For the following:
			1. Each type of plastic warning tape.
			2. Geotextile.
			3. Controlled low-strength material, including design mixture.
		2. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
			1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
			2. Laboratory compaction curve according to ASTM D 1557 for each onsite and borrow soil material proposed for fill and backfill.
		3. Pre-excavation Photographs and Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins. Maintain catalog of up-to-date photographs at the site.
		4. Contractor shall submit compaction test results, as required under this section.
	9. PROJECT CONDITIONS
		1. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by Designer and then only after arranging to provide temporary utility services according to requirements indicated.
			1. Notify the Owner not less than two days in advance of proposed utility interruptions.
			2. Do not proceed with utility interruptions without the Owner's written permission.
			3. Contact utility-locator service for area where Project is located before excavating.
		2. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.
	10. QUALITY CONTROL
		1. Compaction and materials testing results shall be submitted to the Engineer for review as outlined in the following sections.
		2. Unless stated otherwise in this specification, perform work and materials testing, in accordance with the Commonwealth of Massachusetts Highway Department (Mass DOT) Standard Specifications Highways and Bridges, 1988, as amended including supplemental specifications and special provisions.
		3. Verify that survey bench marks and elevations of existing utilities are as indicated on the Contract Drawings.

PART - 2 PRODUCTS

2.1 SOIL MATERIALS

* + 1. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
		2. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM 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.
		3. Common Fill: Imported Common Fill should consist of Satisfactory Soils having a maximum particle size of 6 inches and no more than 25 percent by weight passing the US No. 200 sieve.
		4. 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.
		5. Subbase Material: Material meeting the minimum requirements for Gravel Borrow, as defined by Commonwealth of Massachusetts Highway Department (MHD) Standard Specifications for Highways and Bridges (Section M1.03.1). The gradation requirements for Subbase are as follows:

Percent Passing

|  |  |
| --- | --- |
| Sieve Size | By Weight |
| 3 in. | 100 |
| 1½ in. | 70-100 |
| ¾ in. | 50-85 |
| No. 4 | 30-60 |
| No. 200 | 0-10 |

* + - 1. Subbase material shall not exceed 40% wear per the Los Angeles abrasion test for small size coarse aggregates (ASTM C131).
		1. Base Course: Material meeting the minimum requirements for DENSE-GRADED CRUSHED STONE, as defined by the Commonwealth of Massachusetts Highway Department (MHD) Standard Specifications for Highways and Bridges (Section M2.01.7). The gradation requirements for Dense-graded Crushed Stone for Subbase are as follows:

Percent Passing

|  |  |
| --- | --- |
| Sieve Size | By Weight |
| 2 in. | 100 |
| 1½ in. | 70-100 |
| ¾ in. | 50-85 |
| No. 4 | 30-55 |
| No. 50 | 8-24 |
| No. 200 | 3-10 |

* + - 1. Base materials shall not exceed 40% wear per the Los Angeles abrasion test for small size coarse aggregates (ASTM C131).
		1. Engineered Fill (Structural Fill): Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940. The gradation requirements for Engineered Fill (Structural Fill) are as follows:

Percent Passing

|  |  |
| --- | --- |
| Sieve Size | By Weight  |
| 8 in. | 100 |
| 3 in. | 70-100\* |
| ¾ in. | 45-95 |
| No. 4 | 30-90 |
| No. 10 | 25-80 |
| No. 40 | 10-50 |
| No. 200 | 0-10 |

*Three inch maximum particle size within twelve*

*(12) inches of the underside of footings or slabs*

* + 1. Gravel Borrow: Shall conform Massachusetts Highway Department Specifications Section M1.03.0 Type C. Maximum size of stone in the gravel shall be 2” in its largest dimension. The gradation requirements for Gravel Borrow are as follows:

Percent Passing

|  |  |
| --- | --- |
| Sieve Size | By Weight  |
| 1/2 in. | 50-85 |
| No. 4 | 40-75 |
| No. 50 | 8-28 |
| No. 200 | 0-10 |

*\*2” maximum stone*

* + - 1. Gravel borrow materials shall not exceed 40% wear per the Los Angeles abrasion test for small size coarse aggregates (ASTM C131).
		1. Three quarter inch stone: Shall be imported 3/4-inch stone meeting MHD section M.2.01.4

|  |  |
| --- | --- |
| Sieve Size | Percent Passing |
| 1 inch | 100 |
| 3/4 inch | 90-100 |
| 1/2 inch | 10-50 |
| 3/8 inch | 0-20 |
| No. 4 | 0-5 |

* + - 1. Three quarter inch stone shall not exceed 30% wear per the Los Angeles abrasion test for small size coarse aggregates (ASTM C131).
		1. Bedding Course: Bedding course for utilities shall comply with the requirements of Sand listed below.
		2. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
			1. Drainage Course shall not exceed 25% wear per the Los Angeles abrasion test for small size coarse aggregates (ASTM C131).
		3. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
		4. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
			1. Sand for long/triple jump pits will be washed river sand, 0 to 2 mm graining, with no organic components, and a maximum of 5% of its weight can be less than 0.20 mm in diameter.
		5. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.
		6. Drainage Stone: Materials will conform to the applicable requirements of the indicated subsections of Section M; MATERIALS of the MHD Standard Specifications for Road and Bridge Construction:
			1. Crushed Stone or Crushed Gravel, M2.01.1 or M2.01.2

|  |  |
| --- | --- |
| Sieve Size | By Weight  |
| 2 inch | 100 |
| 1 1/2 inch | 95-100 |
| 1 inch | 35-75 |
| 3/4 inch | 0-25 |

* + - 1. Drainage Stone shall not exceed 25% wear per the Los Angeles abrasion test for small size coarse aggregates (ASTM C131).
		1. Peastone: Shall be crusher or natural stone meeting the following gradation:

|  |  |
| --- | --- |
| Sieve Size | Percent Passing |
| 1/2 inch | 100 |
| 3/8 inch | 85-100 |
| No 4 | 10-30 |
| No 8 | 0-10 |
| No. 16 | 0-5 |

* + 1. Stonedust: Shall be stone screenings as specified in MHD specification Section M2.05.0 stone crusher material completely passing a No. 4 sieve with not less than 40% passing a No. 8 Sieve
		2. Stone Screenings: Shall be processed stone screenings or stone crusher material completely passing a 3/8" sieve with not less than 60% passing a No. 8 Sieve.
		3. Riprap: Riprap material where called out on plan shall conform to MHD Section M2.02.4 Modified Rock Fill.

2.2 GEOTEXTILES

* + 1. Filter Fabric: Shall be 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. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
		2. Stabilization Fabric: Shall be 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

* + 1. 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

* + 1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
		2. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 311000 - SITE CLEARING.
		3. Protect and maintain erosion and sedimentation controls, which are specified in Section 311000 - SITE CLEARING, during earthwork operations.
		4. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

* + 1. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Dispose of contaminated water in accordance with regulations of authorities having jurisdiction.
		2. 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.
			2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

* + 1. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

* + 1. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
			1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
			2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
				1. 24 inches outside of concrete forms other than at footings.
				2. 12 inches outside of concrete forms at footings.
				3. 6 inches outside of minimum required dimensions of concrete cast against grade.
				4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
				5. 6 inches beneath bottom of concrete slabs on grade.
				6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.
				7. **<12 inches beneath subgrade of proposed tennis court base materials.>**

3.5 EXCAVATION FOR STRUCTURES

* + 1. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
			1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
			2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

* + 1. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

* + 1. Excavate trenches to indicated gradients, lines, depths, and elevations.
			1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
		2. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
			1. Clearance: 12 inches each side of pipe or conduit.
		3. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
			1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
			2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
			3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 OVER-EXCAVATION OF UNSUITABLE SOILS

* + 1. When approved by the Engineer, the Contractor may be required to remove unsuitable soils, fill, or natural soil materials in areas where fills are to be placed when determined to be undesirable in their location or condition. The Contractor shall be required to remove the undesirable material and backfill with approved material properly compacted.
		2. At locations where unstable soil is identified, the removal and replacement of such soil shall be as directed as recommended by the Engineer.
		3. At locations where soil is wet of optimum moisture, the Contractor shall provide a "good faith" effort in drying and discing these areas prior to completing over-excavation as approved by the Engineer.
		4. Where over-excavations are required adjacent or beneath the location of the proposed drainage structure, undercut and backfill shall be done over a sufficient distance adjacent to the installation to prevent future operations from disturbing the completed drainage structure.
		5. All material removed in the work of over-excavation will be classified by the Engineer and Owner as either suitable for other use without excessive manipulation and utilized by the Contractor elsewhere in the work, or unsuitable for future use and disposed of by the Contractor as directed by the Engineer.
		6. The Contractor shall conduct over-excavation operations in such a way that the necessary measurements can be taken before any backfill is placed.
		7. Backfill in over-excavation areas shall be placed as a continuous operation along with the over-excavation operation. Backfill materials shall be consistent with the intended use. No backfill material shall be placed in water unless otherwise permitted by the Engineer.

3.9 SUBGRADE INSPECTION

* + 1. Notify Designer when excavations have reached required subgrade.
		2. If Designer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed and specified herein.
		3. Proof-roll subgrade below the building slabs and pavements with suitable equipment, as specified herein, to identify soft pockets and areas of excess yielding. During the proofrolling process, the subgrade shall be reviewed by the Engineer to identify unstable zones. Where fine-grained subgrades are present, proofrolling may need to be accomplished statically, to reduce the potential for disturbing the subgrade. 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 minimum 10-ton vibratory rollers or a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons, in open areas or a minimum 1-ton walk-behind roller or large plate compactor in trenches or confined areas.
			3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Designer, and replace with compacted backfill or fill as recommended by the Engineer.
		4. The Contractor shall be responsible for maintaining stable soil subgrades. Fine-grained subgrade soils exposed during construction are anticipated to be easily disturbed by construction traffic and are likely to become unstable when above the optimum moisture content. The Contractor shall be responsible for managing construction traffic, stockpiling of materials, and providing routine maintenance to protect subgrades from disturbance. Where subgrades are damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, they shall be reconstructed as directed by the Designer, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

* + 1. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Alternatively, the unauthorized excavation may be backfilled to design elevation using appropriate soil for the intended use. Lean concrete fill, with 28-day compressive strength of 2500 psi may also be used when approved by Designer.
			1. Fill unauthorized excavations under other construction or utility pipe as directed by Designer.

3.11 STORAGE OF SOIL MATERIALS

* + 1. 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, if applicable.

3.12 BACKFILL

* + 1. Place and compact backfill in excavations promptly, but not before completing the following:
			1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
			2. Observing and accepting subgrade.
			3. Surveying locations of underground utilities for Record Documents.
			4. Testing and inspecting underground utilities.
			5. Removing concrete formwork.
			6. Removing trash and debris.
			7. Removing temporary shoring and bracing, and sheeting.
			8. Installing permanent or temporary horizontal bracing on horizontally supported walls.
		2. Place backfill on subgrades free of mud, frost, snow, or ice.

3.13 UTILITY TRENCH BACKFILL

* + 1. Place backfill on subgrades free of mud, frost, snow, or ice.
		2. 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.
		3. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 - CAST-IN-PLACE CONCRETE.
		4. Place and compact initial backfill of subbase material free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
			1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
		5. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
		6. Place and compact final backfill of satisfactory soil to final subgrade elevation.
		7. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.14 SOIL FILL

* + 1. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
		2. Place and compact fill material in layers to required elevations as follows:
			1. Common Fill: Under grass and planted areas.
			2. Common Fill: Under walks and pavement base material.
			3. Engineered fill: Under steps and ramps.
			4. Engineered fill: Under structural slabs & building slabs.
			5. Engineered fill: Under footings and foundations.
			6. Clean Sand: Under and around subsurface plumbing, use clean sand 4 inches (min.) above and below pipe or as otherwise specified in plumbing drawings or specifications.
			7. Angular washed stone: At stormwater infiltration areas.
			8. Clean Sand: Under and around subsurface utilities, including but not limited to: sewer pipes, non-perforated drainage pipes, water pipes, electric, telephone, cable conduit (unless encased in concrete), use clean sand 4 inches (min.) above and below pipe.
		3. Place soil fill on subgrades free of mud, frost, snow, or ice.
		4. All soils to be compacted to a minimum of 95% of its maximum density at optimum moisture content or as otherwise specified.

3.15 SOIL MOISTURE CONTROL

* + 1. 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.

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

* + 1. 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.
		2. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
		3. 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; and areas within 10 feet of structures, building slabs, steps, and pavements at 92 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 lawn 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. Under synthetic turf field compact Drainage Course material under synthetic turf field compact each layer of drainage course material at 90 percent.
			5. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.17 GRADING

* + 1. 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.
		2. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
			1. Lawn or Unpaved Areas: Plus or minus 1 inch.
			2. Walks: Plus or minus 1/2 inch. Tolerance will not alleviate the contractor's responsibility to meet required slopes in Accessible areas.
			3. Pavements: Plus or minus 1/4 inch.
		3. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.18 SUBBASE AND BASE COURSES

* + 1. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
		2. On prepared subgrade, place subbase and base course under pavements and walks as follows:
			1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
			2. Place base course material over subbase course under hot-mix asphalt pavement.
			3. Shape subbase and base course to required crown elevations and cross-slope grades.
			4. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
			5. Place subbase 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.
			6. Compact subbase 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.

3.19 DRAINAGE COURSE

* + 1. Place drainage course on subgrades free of mud, frost, snow, or ice.
		2. 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. 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 1557.

3.20 FIELD QUALITY CONTROL

* + 1. Testing Agency: Engage a qualified independent materials testing agency to perform field quality-control testing.
		2. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
		3. 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 Designer.
		4. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
			1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
			2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
			3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
		5. 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 to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

* + 1. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
		2. 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 Designer; reshape and recompact.
		3. 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.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

* + 1. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the property.

END OF SECTION

SECTION312500 – EROSION AND SEDIMENTATION CONTROLS

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR) which are hereby made a part of this Section of the Specifications.
	2. DESCRIPTION OF WORK
		1. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
			1. Control measures to prevent all erosion, siltation and sedimentation of wetlands, waterways, construction areas, adjacent areas and off-site areas.
			2. Control measures shall be accomplished adjacent to or in the following work areas:
				1. Soil stockpiles and on-site storage and staging areas.
				2. Cut and fill slopes and other stripped and graded areas.
				3. Constructed and existing swales and ditches.
				4. Protection of drainage structure inlets.
				5. At edge of wetlands areas, if applicable, as shown on Drawings.
				6. Protection of stockpile areas.
			3. Additional means of protection shall be provided by the Contractor as required for continued or unforeseen erosion problems, at no additional cost to the Owner
			4. Periodic maintenance of all sediment control structures shall be provided to ensure intended purpose is accomplished. Sediment control measures shall be in working condition at the end of each day.
			5. On a weekly basis and after any significant rainfall, sediment control structures shall be inspected for integrity. Any damaged device shall be corrected immediately.
		2. Alternates: Not Applicable.
		3. Items To Be Installed Only: Not Applicable.
		4. Items To Be Furnished Only: Not Applicable.
		5. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
			1. Section 311000 - SITE CLEARING for protection of existing tress and other vegetation to remain.
			2. Section 312000 - EARTH MOVING for soil materials, excavating, backfilling, and site grading and removal of site utilities.
	3. QUALITY ASSURANCE
		1. **If required: The Contractor will be responsible for adhering to the site specific Stormwater Pollution Prevention Plan (SWPPP) throughout construction. The Contractor shall develop, submit, and comply with the requirements of the NPDES permit, and all other applicable requirements of governing authorities having jurisdiction. The specifications and drawings are not represented as being comprehensive, but rather convey the intent to provide complete slope protection and erosion control for both the Owner's and adjacent property. It shall be the responsibility of the Contractor to adhere to the site specific SWPPP and to file for a Construction General Permit through the EPA at least 7-business days prior to the start of work.**
			1. **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 a sediment and erosion control plan specific to the site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.**
		2. Erosion control measures shall be established at the beginning of construction and maintained during the entire period of construction. On-site areas which are subject to severe erosion, and off-site areas which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention.
		3. All land-disturbing activities are to be planned and conducted to minimize the size of the area to be exposed at any one time, and the length of time of exposure.
		4. Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.
		5. When the increase in the peak rates and velocity of storm water runoff resulting from a land-disturbing activity is sufficient to cause accelerated erosion of the receiving stream bed, provide measures to control both the velocity and rate of release so as to minimize accelerated erosion and increased sedimentation of the stream.
		6. All land-disturbing activities are to be planned and conducted so as to minimize off-site sedimentation damage.
		7. The Contractor is responsible for cleaning out and disposing of all sediment once the storage capacity of the sediment facility is reduced by one-half.
		8. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
		9. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

PART - 2 PRODUCTS

2.1 MATERIALS

* + 1. Straw Bales: Wire or nylon bound bales of straw, oriented around sides, rather than over and under.
		2. Stakes: Stakes for bales shall be one of the following materials: Wood stakes of sound hardwood 2 by 2 inches in size or steel reinforcing bars of at least No. 4 size. Lengths shall be approximately three feet.
		3. Siltation Fence: Fabricated or prefabricated unit consisting of the following filter fabric properties:
			1. Grab Tensile Strength 90 ASTM D1682
			2. Elongation at Failure (%) 50 ASTM D1682
			3. Mullen Burst Strength (PSI) 190 ASTM D3786
			4. Puncture Strength (lbs) 70 ASTMD751(modified)
			5. Slurry Flow Rate (gal/min/sf) 0.5 Virginia DOT VTM-51
			6. Equivalent Opening Size 40-80 US Std Sieve CW-02215
			7. Ultraviolet Radiation Stability (%) 90 ASTM G26
		4. Fencing: Steel posts shall be standard 6 foot long metal stamped drive stakes commonly used to support snow fences. Fencing shall be new four foot height wood lath snow fencing. Provide suitable steel staples or heavy nylon cord for securing filter cloth to support system.
		5. Silt Socks: The silt socks for construction of erosion control devices shall be 12" in diameter. In areas of slope greater then 2:1(horizontal: vertical), silt sock must be secured in place by stakes. Silt socks shall be either lapped or butted at the ends to create a continuous line.
		6. Protective Measures: As temporary coverings on ground areas subject to erosion, provide one of the following protective measures, and as directed by the Engineer:
			1. Hay or straw temporary mulch, 100 pounds per 1,000 square feet.
			2. Wood fiber cellulose temporary mulch, 35 pounds per 1,000 square feet.
			3. Tackafier for anchoring mulch or straw shall be a non-petroleum based liquid bonding agent specifically made for anchoring hay or straw.
			4. Provide natural (jute, wood excelsior) or man-made (glass fiber) covering with suitable staples or anchors to secure to ground surface. Note that wire stapes and non-biodegradable coverings shall not be used for any area that will be mown turf.
			5. Temporary vegetative cover for graded areas shall be undamaged, air dry threshed straw or hay free of undesirable weed seed.
			6. Provide temporary settling basis as shown on the contract drawings and described in the specifications.
		7. Stone for Construction Entrance: Shall be ASTM designation C-33, size No. 2 (1-1/2" to 2-1/2") crushed stone.

PART - 3 EXECUTION

3.1 STRAW BALE BARRIERS

* + 1. Excavation shall be to the width of the bale and the length of the proposed barrier to a minimum depth of 4 inches.
		2. Bales shall be placed in a single row, lengthwise on proposed line, with ends of adjacent bales tightly abutting one another. In swales and ditches the barrier shall extend to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale.
		3. Staking shall be accomplished to securely anchor bales by driving at least two stakes or rebars through each bale to a minimum depth of 18 inches.
		4. The gaps between bales shall be filled by wedging straw in the gaps to prevent water from escaping between the bales.
		5. The excavated soil shall be backfilled against the barrier. Backfill shall conform to ground level on the downhill side and shall be built up to 4 inches on the uphill side. Loose straw shall then be scattered over the area immediately uphill from a straw barrier.
		6. Inspection shall be frequent and repair or replacement shall be made promptly as needed.

3.2 STABILIZED CONSTRUCTION ENTRANCE AND STONE BERMS

* + 1. Stone as specified above.
		2. Length: As effective, but not less than 50 feet.
		3. Thickness: Not less than eight inches.
		4. Width: Not less than full width of all points on ingress or egress, but not less than 25 feet.
		5. Washing: When necessary, wheels shall be cleaned to remove sediment prior to entrance onto public right-of-way. When washing is required, it shall be done on an area stabilized with crushed stone which drains into an approved sediment trap or sediment basin. All sediment shall be prevented from entering any storm drain, ditch, or watercourse through the use of sand bags, gravel boards or other approved methods.
		6. Maintenance: The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-or-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spoiled, dropped, washed or tracked onto public rights-of-way must be removed immediately.
		7. Place crushed stone berms in locations required and as directed. Berms shall have side slopes of 1:3 or less.
		8. Inspect stone berms periodically and replace and/or regrade crushed stone as required.

3.3 SILT FENCING

* + 1. Excavate a 6 inch trench along the upstream side of the desired fence location.
		2. Drive fence posts a minimum of 1'-6" into the ground. Install fence, well-staked at maximum eight foot intervals in locations as shown on Drawings. Secure fabric to fence and bury fabric end within the six inch deep trench cut.
		3. Lay lower 12 inches of silt fence into the trench, 6 inches deep and 6 inches wide. Backfill trench and compact.
		4. Overlap joints in fabric at post to prevent leakage of silt at seam.

3.4 VEGETATIVE STABILIZATION / TEMPORARY SEEDING

* + 1. Grassing shall be applied according to State of Rhode Island Highway Department Standard Specifications.

3.5 INLET PROTECTION

* + 1. Install silt fence or straw bales around inlet as specified herein.

3.6 DUST CONTROL

* + 1. Throughout the construction period the Contractor shall carry on an active program for the control of fugitive dust within all site construction zones, or areas disturbed as a result of construction. Control methods shall include the following: Apply calcium chloride at a uniform rate of one and one-half (1 ½) pounds per square yard in areas subject to blowing. For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the contractor.
		2. The frequency and methods of application for fugitive dust control shall be as directed by the Engineer.

3.7 TEMPORARY PROTECTIVE COVERINGS (AFTER GROWING SEASON)

* + 1. Place temporary covering for erosion and sedimentation control on all areas that have been graded and left exposed after October 30. Contractor shall have the choice to use either or both of the methods described herein.
		2. Hay or straw shall be anchored in-place by one of the following methods and as approved by the Engineer: Mechanical "crimping" with a tractor drawn device specifically devised to cut mulch into top two inches of soil surface or application of non-petroleum based liquid tackifier, applied at a rate and in accordance with manufacturer's instructions for specific mulch material utilized.
		3. Placement of mesh or blanket matting and anchoring in place shall be in accordance with manufacturer's printed instructions.
		4. Inspect protective coverings periodically and reset or replace materials as required.

3.8 TEMPORARY SETTLING BASIN

* + 1. Shall collect stormwater runoff by use of earthen berm or excavated settling pond. The settling basin shall provide at least 18 inches of depth for runoff to settle out suspended solids prior to discharge. Discharge shall be through a gravel and crushed stone filter and apron.

END OF SECTION

SECTION321123 – AGGREGATE BASE COURSE

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. SECTION INCLUDES
		1. Aggregate base course for placement under proposed paving (as necessary).
	3. 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:
			1. Section 311000 - SITE CLEARING for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
			2. Section 32321216 ASPHALT PAVING for pavement base material aggregates and subgrade preparation.
			3. Section 321840 – TENNIS PAVING for tennis court base material aggregates and subgrade preparation.
	4. REFERENCES
		1. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and an eighteen inch (18") Drop.
		2. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Willow Depth).
		3. Commonwealth of Massachusetts Highway Department (MHD) Standard Specifications Highways and Bridges, 1988, as amended including supplemental specifications and special provisions.
	5. SUBMITTALS
		1. Refer to the General Conditions. A product sample must be submitted prior to installation with product data sheet and sieve analysis.
	6. SOURCE QUALITY CONTROL
		1. Testing and Analysis of Soil Material: Perform in accordance with ASTM D1557.
		2. If tests indicate the material(s) do not meet the specified requirements, change the material(s) and retest.
		3. Provide materials of each type, from the same source, throughout the work.
	7. FIELD QUALITY CONTROL
		1. Compaction testing shall be installed by the Contractor, in accordance with ASTM D1557 and/or ASTM D2922, as directed by the Engineer or Owner. At a minimum, the Contractor shall conduct 5-tests per acre, with the locations approved by the Engineer.
		2. The Contractor shall submit the name(s) of testing labs to the Engineer for approval, prior to testing.
		3. If tests indicate materials do not meet the specified requirements, remove the work, replace it and retest.
		4. Frequency of tests: As directed by the Engineer and Owner.

PART - 2 PRODUCTS

2.1 MATERIALS

* + 1. Materials shall conform to the applicable requirements of the indicated subsections of Section M; MATERIALS of the Massachusetts (MHD) Standard Specifications for Road and Bridge Construction:
			1. Gravel Borrow; Subsection M.1.03.0 Type b.
			2. Crushed Stone or Gravel; Subsection M.2.01.7 – Dense Graded Aggregate.
			3. Fillers; Subsection M.2.01.5 (1/2” Stone)
		2. All base aggregates shall not exceed 40% wear per ASTM C131 (Los Angeles abrasion and crushing) testing for coarse aggregates.

PART - 3 EXECUTION

3.1 EXAMINATION

* + 1. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.2 PREPARATION

* + 1. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
		2. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

* + 1. Spread structural fill over prepared substrate to a total compacted thickness as specified on drawings.
		2. Place aggregate in maximum six inch (6”) layers compact to specified density.
		3. Level and grade surfaces to elevations and gradients indicated on the Contract Drawings.
		4. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
		5. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
		6. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

* + 1. Flatness: Maximum variation of one quarter inch (1/4”) measured with a ten foot (10’) straight edge.
		2. Scheduled Compacted Thickness: Within one quarter inch (1/4“).
		3. Variation From Design Elevation: Within one quarter inch (1/4“).

3.5 FIELD QUALITY CONTROL

* + 1. Compaction testing will be performed in accordance with ASTM D1557 and alternatively with ASTM D2922 at a frequency as requested by the Engineer or School.

END OF SECTION

SECTION321216 – ASPHALT PAVING MASSACHUSETTS

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. DESCRIPTION
		1. Work Included: Work under this section includes the installation of bituminous concrete pavement to a total compacted thickness indicated in the Contract Drawings. All existing pavement damaged or displaced as a result of the construction operations will be restored in accordance with the requirements for this Section. **<FOR TENNIS COURT AND RUNNING TRACK ASPHALT PAVING – REFER TO THE APPLICABLE SPECIFICATION SECTION FOR ASPHALT PAVING REQUIREMENTS.>**
	3. QUALITY CONTROL
		1. Submittals: Refer to the General Conditions. Include data showing the gradation, mix design, and composition of materials proposed. Product pavement slips are to include all material by percentage and weight.
		2. Compaction and materials testing results shall be submitted to the Engineer for review as outlined in the following sections.
		3. Unless stated otherwise in this specification, perform work and materials testing, in in accordance with the Massachusetts Specifications for Road and Bridge Construction (Latest Edition, as amended).
			1. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the Massachusetts Department of Transportation Highway Division (MassDOT).
			2. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the Massachusetts Department of Transportation Highway Division (MassDOT) for hot mix asphalt paving work.
				1. Comply with requirements of the Massachusetts Department of Transportation Highway Division (MassDOT) Standard Specifications for Highways and Bridges, including supplemental specifications and special provisions.
				2. Comply with requirements of the Americans with Disabilities Act (ADA) and the Massachusetts Architectural Access Board (MAAB). If these requirements cannot be met with the grades and slopes indicated on the plans, notify the Engineer immediately.
				3. Comply with requirements of the local authority having jurisdiction concerning the location and construction of accessible curb cuts.
	4. RELATED WORK
		1. The following items are not included in this Section and will be performed under the designated Sections:
			1. Section 321123 - Aggregate Base Course
			2. Section 321840 - Tennis Paving
	5. DELIVERY, STORAGE, AND HANDLING
		1. 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.
		2. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.
	6. DEFINITIONS
		1. 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.
		2. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
		3. 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 Designer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
		4. Fill: Suitable soil materials used to raise existing grades.
		5. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
		6. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
		7. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
	7. PROJECT CONDITIONS
		1. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by Designer and then only after arranging to provide temporary utility services according to requirements indicated.
		2. Notify the Owner not less than two days in advance of proposed utility interruptions.
		3. Do not proceed with utility interruptions without the Owner's written permission.
		4. Contact utility-locator service for area where Project is located before excavating.
		5. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.
		6. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
		7. 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.
		8. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

PART - 2 PRODUCTS

2.1 BANK OR CRUSHED GRAVEL

* + 1. Conform to Massachusetts Highway Department (MHD) Standard Specifications, subsection 401.02.

2.2 MINERAL AGGREGATE

* + 1. Conform to subsection 401.02 of the MHD Standard Specifications.
		2. Coarse Aggregate Shall be clean, crushed rock consisting of the angular fragments obtained by breaking and crushing shattered natural rock, free from detrimental quantity of thin or elongated pieces, free from dirt or other objectionable materials, and shall have a percentage of wear, as determined by the Los Angeles Abrasion Test (AASHTO-T96), of not more than 30. It shall be surfaced dry and shall have a moisture content of not more than ½% after drying. The use of crushed gravel stone will not be permitted.

Fine Aggregate shall consist of one of the following:

* + - 1. 100% natural sand
			2. 100% stone sand
			3. A blend of sand and stone screenings the proportions of which shall be approved by the engineer.
			4. A blend of natural sand and stone sand.

2.3 Natural sand shall consist of inert, hard, durable grains of quartz or other hard, durable rock, free from topsoil or clay, surface coatings, organic matter or other deleterious materials. When the primary source of material, passing the No. 200 sieve, is obtained from natural sand, these fines must be approved prior to use. Stone sand shall be a processed material prepared from stone screenings to produce a consistently graded material conforming to the specification requirement. The stone screening shall be the product of a secondary crusher and shall be free from dirt, clay, organic matter, excess fines or other deleterious material. The fine aggregate as delivered to the mixer shall meet the following requirements:

Sieve Size Percent Passing

3/8 inch 100-95

No. 8 70-95

No. 50 20-40

No. 200 2-16

2.4 BITUMINOUS MATERIALS

* + 1. Bituminous materials shall conform to the requirements of these Specifications and Section M3.11.06 of the Standard Specification.
		2. Bitumen delivered to a project or to a mix plant must be accompanied by a proper certificate signed by the producer's authorized representative. Shipments of material not accompanied by a certificate will not be accepted for use in the work.
		3. Bituminous Concrete Paving shall be Class I, Type 1-1, as specified in Section M3.11.0 of the Standard Specifications.
		4. Hot Poured Joint Sealer: Sealer shall be composed of a mixture of materials which will form a resilient and adhesive compound capable of effectively sealing joints in concrete and shall conform to the requirements of AASHTO M 173.
		5. Tack coat shall consist of either emulsified asphalt, Grade MS-l conforming to
		6. Section M3.03.0, or cutback asphalt, Grade MC-70 or MC-250 conforming to
		7. Section M3.02.0 of the Standard Specifications.
		8. Proportioning of Bituminous Concrete Mixture: The bituminous concrete mixture will contain from five to six (5.0 to 6.0) percent by weight of bitumen, and from 94.0 to 95.0 percent by weight of mineral aggregates. This amount may be adjusted by individual specification sections.

2.5 BITUMINOUS CONCRETE BINDER COURSE

* + 1. Standard Specifications subsection M.03.01.

2.6 BITUMINOUS TACK COAT

* + 1. Standard Specifications subsection M.03.01; Materials and Section 403; Asphalt Emulsion Tack Coat.

2.7 BITUMINOUS CONCRETE TOP COURSE

* + 1. Standard Specifications subsection M.03; Materials.

PART - 3 EXECUTION

3.1 EXAMINATION

* + 1. Examine exposed Subbase and Base surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
		2. 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.
		3. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 COLD MILLING

* + 1. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

3.3 PATCHING

* + 1. Existing 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. Recompact existing unbound-aggregate base course to form new subgrade.
		2. Existing Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.
			1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
		3. 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.
		4. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.4 SURFACE PREPARATION

* + 1. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
		2. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
		3. 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

* + 1. 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. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
		2. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
		3. 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.
		4. The permanent bituminous concrete pavement surface courses shall be provided in accordance with details and the applicable requirements of Massachusetts Standard Specifications Section 460, Subsection 460.40 and Section M.3.11 for "Materials" and Subsection 460.60 for "Construction Methods". The surface shall be rolled free of any roller marks, ridges, and voids, and shall be repaired if directed.
		5. Per Section 460.61 of the MHD Standard Specifications, the temperature of asphalt at time of placement shall be as follows:

|  |  |
| --- | --- |
|  Base Temp °F on which mix is placed | Mat Thickness |
| 1/2” | 3/4” | 1” | 1-1/2” | 2” | 3” + |
| 35-40 |  |  |  | 305 | 295 | 280 |
| 40-50 |  |  | 310 | 300 | 285 | 275 |
| 50-60 |  | 310 | 300 | 295 | 280 | 270 |
| 60-70 | 310 | 300 | 290 | 285 | 275 | 265 |
| 70-80 | 300 | 290 | 285 | 280 | 270 | 265 |
| 80-90 | 290 | 280 | 275 | 270 | 265 | 260 |
| 90+ | 290 | 275 | 270 | 265 | 260 | 255 |

Temperatures listed above shall be within plus or minus 15° F

3.6 JOINTS

* + 1. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
			1. Clean contact surfaces and apply tack coat to joints.
			2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
			3. Offset transverse joints, in successive courses, a minimum of 24 inches.
			4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.7 COMPACTION

* + 1. 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.
		2. 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.
		3. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
			1. Average Density: ASTM D 2041, per MHD Specifications.
		4. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
		5. 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.
		6. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
		7. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

* + 1. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
			1. Base Course: Plus or minus 1/2 inch.
			2. Surface Course: Plus 1/4 inch, no minus.
		2. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within MHD Specification tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas.

3.9 PAVEMENT MARKING

* + 1. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Designer.
		2. Allow paving to age for a minimum of 30 days before starting pavement marking.
		3. Sweep and clean surface to eliminate loose material and dust.
		4. 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

* + 1. Test the plane of the finished surfaces of base, binder, and surface courses with a 16-foot straightedge, except use a 10-foot straightedge on vertical courses and on the top course of resurfaced streets which contain manhole covers, valve boxes, and the like.
		2. Carefully apply the straightedge immediately after the first compaction by rolling, and from then on as may be necessary until and after the final compaction of the material in place. Hold the straightedge in successive positions parallel to the road centerline and in contact with the road surface; check the entire area from one side of the pavement to the other.
		3. Correct irregularities which vary 3/8 inch from a true finished surface in base and binder courses, and 1/4 inch in top courses.
		4. Irregularities which may develop before the completion of rolling and while the material is still workable, may be remedied by loosening the surface mixture and removing or adding material as necessary. Should any unsatisfactory irregularities or defects remain after final compaction, correct the defective work by removing and replacing with new material to form a true and even surface.

3.11 OPENING TO TRAFFIC

* + 1. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained, and the material has cooled sufficiently to prevent distortion or loss of fines, and the pavement has achieved a maximum temperature of 140 degrees F.
		2. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Designer.

3.12 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.

END OF SECTION

SECTION321838 – TENNIS COURT ASPHALT, COLOR FINISH SYSTEM, AND PAINTING

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.
	2. DESCRIPTION
		1. These specifications provide minimum standards for the preparation and installation of Asphalt tennis court base and textured acrylic surfacing, color finishes and striping of proposed asphalt tennis courts.
	3. RELATED SECTIONS
		1. Examine the 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:
			1. Section 312000 – Earth Moving
			2. Section 321123 - Aggregate Base Course
			3. Section 231216 – Asphalt Paving
	4. REFERENCES
		1. National Asphalt Paving Association (NAPA)
		2. United States Tennis Association (USTA)
		3. International Tennis Federation (ITF)
		4. American Sport Builders Association (ASBA)
		5. National Federation of High School Associations (NFHS)
	5. SUBMITTALS
		1. Provide manufacturer specifications for all components, color chart and installation instructions.
		2. Authorized Applicator certificate from the approved surfacing system manufacturer.
		3. ITF classification certificate for the system approved to be installed.
		4. Reference list from the installer of at least 5 projects of similar scope successfully completed in the past 3 years.
		5. The Contractor will prepare and submit for approval a colored court striping and marking plan shop drawing indicating all markings for approval prior to commencing this phase of the work.
		6. Provide specific manufacturers product data for all types of paints and overlays to be used in tennis marking and surfacing.
		7. Current Material Safety Data Sheets (MSDS) for all system components.
	6. MATERIAL HANDLING AND STORAGE
		1. Store materials in accordance with manufacturer specifications and MSDS.
		2. Deliver products to the site in original unopened containers with proper labels attached.
		3. All surfacing materials shall be non-flammable.
		4. Do not store or use materials that have been exposed to temperatures below 32d F.
	7. GUARANTEE
		1. Surfacing system contractor shall provide a guarantee against defects in the materials and workmanship for a period of one year from the date of substantial completion.
	8. SURFACING INSTALLER QUALIFICATIONS
		1. Surfacing Installer shall be regularly engaged in construction and surfacing of acrylic tennis courts, play courts or similar surfaces.
		2. Installer shall be an Authorized Applicator of the specified surface system.
		3. Installer shall be a builder member of the ASBA.
	9. MANUFACTURER QUALIFICATIONS
		1. Approved surfacing system manufacturer shall provide documentation that the surface to be installed has been classified by the ITF as a medium pace surface.
		2. Approved surfacing system manufacturer shall be a member of the ASBA.
	10. QUALITY ASSURANCE
		1. Asphalt surfacing shall conform to Part 3 of this specification section. Surfacing materials shall conform to the guidelines of the ASBA for planarity.
		2. Asphalt surface and base materials must be installed to proper slope requirements and specifications, in accordance with the American Sports Builders Association (ASBA) Guide Specifications, and must be thoroughly cured (minimum of twenty-one (21) days for asphalt), before the application of any surfacing, filler or color finish materials.
		3. All surface coatings products shall for a surfacing SYSTEM and shall be supplied by a single manufacturer.
		4. The contractor shall record the batch number of each product used on the site and maintain it through the warranty period.
		5. The contractor shall provide the Engineer, upon request, an estimate of the volume of each product to be used on the site.
		6. The installer shall be an authorized applicator of the approved surfacing system.
		7. The Contractor is responsible for the removal or correction of any overspray, spill or marking not in compliance with applicable track layout.
	11. SITE CONDITIONS
		1. Do not install Surfacing materials when rainfall in imminent or extremely high humidity prevents drying.
		2. Do not apply surfacing materials unless surface and air temperature are 50°F and rising.
		3. Do not apply surfacing materials if surface temperature is in excess of 140°F.
	12. WARRANTY
		1. The manufacturer will guarantee the surfacing material for two (2) years from date of finished application against chalking, checking, fading, discoloration, or other adverse effects from ultraviolet rays of the sun, from weather moisture or from weather temperatures.

PART - 2 PRODUCTS

2.1 ASPHALT BASE MATERIALS

* + 1. Asphalt for tennis courts shall comply with the requirements of specification section 32 1216 Asphalt Paving except for the following:
			1. Bituminous Design mix for Tennis court Pavements:
			2. **RAP - Recycled Asphalt content shall NOT be used in the design mix.**
			3. **Percent Asphalt by weight shall be**
				1. **6.5 to 7% by weight (+/- 0.5%) for surface courses**
				2. **6.0 to 6.5% by weight (+/- 0.5%) for binder courses**
		2. Grading tolerances for the Asphalt tennis courts are revised as noted in Part 3 of this specification section

2.2 COLOR SELECTION

* + 1. Tennis court play area will be surfaced in light blue, with the safety area in light green.

2.3 TENNIS COURT SURFACING/COLOR SYSTEM

* + 1. Shall be the Plexipave color finish and filler system intended for tennis courts on asphalt surfaces as manufactured by California Products Corp. Jefferson Massachusetts or approved equal SYSTEM.
		2. Court Patch Binder
			1. For use in patching cracks, holes and depressions. Shall be 100% acrylic resin blended with Portland Cement and silica sand with a minimum of 46% solids by weight and 8.7 to 8.9 lbs/gallon.
		3. Crack Filler
			1. For use in filling fine cracks, Shall be 100% acrylic resin heavily filled with sand with a minimum of 85% solids by weight and solids by weight of 15 lbs/gallon.
		4. Resurfacer / Filler Course
			1. For new or existing asphalt pavement. Shall be 100% acrylic resin with not less than 3.5% attapulgite with a minimum of 26.7% solids by weight and solids by weight of 8.7 to 8.9 lbs/gallon.
		5. Finish Color and Texture
			1. Shall be 100% acrylic resin (with no vinyl copolymerization constituent) and selected UV inhibitors for color stability, and required color pigments and a minimum of 36.5% solids by weight and solids by weight of 10.0-10.2 lbs/gallon.
			2. Color Base shall be 100% acrylic resin containing no vinyl copolymerization constituent, selected UV inhibitors for color stability, not more than 65% rounded silica sand, required color pigments and a minimum of 74% solids by weight and solids by weight of 13.1 to 14.1 lbs/gallon.
		6. Line Paint
			1. Shall be 100% acrylic resin containing no alkyds or vinyl constituents. Shall contain selected UV inhibitors for color stability, required color pigments and silica sand for texture. Line paint shall have a minimum of 60.5% solids by weight and solids by weight of 12.0-12.3 lbs/gallon.
		7. All surfacing materials shall be non-flammable and shall have a VOC content of not less than 100g./ltr measured by EPA method 24. Local sands are not acceptable as an admixture to the color playing surfaces.

PART - 3 EXECUTION

3.1 ASPHALT SURFACE

* + 1. The Asphalt surface shall be laid on an approved subbase and bituminous asphalt mat, a minimum of three inches (3”) in thickness. The General Contractor shall provide compaction test results of 95% or greater for the installed subbase and asphalt surface.
		2. Special care shall be taken during the paving process to insure smooth and imperceptible joints, blending asphalt uniformly to achieve a continuous surface. Infra-red heating devices shall be employed when temperature of material in place falls below 150d F.
		3. The court surface, i.e., asphalt substrate, shall not vary under a 10’ straight edge more than 1/8”.
		4. It is the responsibility of the asphalt-paving contractor to flood the surface with water immediately after the asphalt is capable of handling traffic, and within 24 hours of installation. If, after 20 minutes of drying time, there are birdbaths (depressions deeper than 1/8”) evident, it shall be the responsibility of the General Contractor, in conjunction with the surfacing contractor to determine the method of correction, subject to the engineers approval. Cold tar patching, skin patching or sand mix patching IS NOT an acceptable means of correction.
		5. Any oil spills (hydraulic, diesel, motor oil, etc.) shall be completely removed, either by chipping out or removing and replacing with new, keyed in asphalt. The minimum depth of any asphalt replacement shall be one inch. The curing time for the asphalt base is 21 days. It shall be the responsibility of the surfacing contractor to determine if the asphalt substrate has cured sufficiently prior to the application of the tennis surfacing system.
		6. It shall be the responsibility of the general contractor to determine if the asphalt substrate meets all design specifications; i.e., cross slopes, planarity and specific project criteria. After all the above conditions are met, the tennis surfacing contractor must, in writing, accept the planarity of the asphalt receiving base before installation of the surfacing can commence.
		7. Start of surface application shall constitute sub contractor’s acceptance of the asphaltic concrete surface to receive tennis surfacing.

3.2 SITE CONDITIONS

* + 1. Installation shall not take place if adjacent or concurrent construction generates excessive dust, abrasives or any other by-product that, in the opinion of the installer, would be harmful to the tennis surfacing, until completion of such works.
		2. Surfacing or fillers shall not be installed unless the temperature is fifty degrees Fahrenheit and rising. Installation shall be executed only in fully dry conditions.
		3. If, in the opinion of the installer, the weather and/or climatic conditions are detrimental to the proper installation of the surfacing materials, work shall be delayed until conditions are acceptable.

3.3 BASE PREPARATION

* + 1. Prior to applying the court surfacing system, the tennis net sleeves, tennis net strap anchor and fencing shall be installed and approved by the Engineer.
		2. Prior to application of Tennis court surfacing or filler, the contractor shall sawcut the asphalt base to ¾ of the depth of the asphalt mat with a 1/8” wide saw blade. Saw cuts shall be in the locations shown on plan and shall be straight and true to line. Contractor shall thoroughly clean courts of resulting dust and debris prior to application of tennis surfacing. Standard surfacing filler materials may then be swept into or over these joints.
		3. The asphalt base surface shall be thoroughly brushed or blown free of all dirt, oil, grease, leaves and other debris before placing any fillers or coloring systems. Treat areas showing algae or moss growth with bleach or other approved product and rinse the surface thoroughly with water. Once the surface is properly prepared and has been cured, apply the filler or texture materials. Any depressions greater than one-eighth inch (1/8”) shall be repaired by a trowel application of undiluted Filler Coat. This is to achieve a uniform texture, without ridges on the court area, including patches or treated areas.
		4. Holes and cracks: Cracks and holes shall be cleaned and a suitable soil sterilant, as approved by the Engineer, shall be applied to kill all vegetation 14 days prior to use of Court Patch Binder according to manufacturer's specifications.
		5. Depressions: Depressions holding enough water to cover a five cent piece shall be filled with Court Patch Binder Mix. 3 gallons of Court Patch Binder, 100 lbs. 60-80 silica sand, 1 gallon Dry Portland Cement (Type I). This step shall be accomplished prior to the squeegee application of Acrylic Resurfacer. The contractor shall flood all the courts and then allow draining. Define and mark all areas holding enough water to cover a nickel. After defined areas are dry, prime with tack coat mixture of 2 parts water/l part Court Patch Binder. Allow tack coat to dry completely. Spread Court Patch Binder mix true to grade using a straight edge (never a squeegee) for strike off. Steel trowel or wood float the patch so that the texture matches the surrounding area. Never add water to mix. Light misting on surface and edges to feather in is allowed as needed to maintain work ability. Allow to dry thoroughly and cure.
		6. Filler materials must be allowed to thoroughly dry and cure to a uniform texture. This can avoid any future problems of surface peeling. If shrinkage cracks appear, they shall be addressed prior to the application of additional coats.
		7. The prepared court base surface shall be reviewed and approved by the surfacing contractor prior to the application of any additional color or filler coats. Additional filler coats may be necessary if the court surface is too rough or has an excess amount of voids in the surface.

3.4 COURT SURFACING APPLICATION

* + 1. The court surfacing material will be applied to the entire area of the tennis courts to the proposed perimeter fence line, in at least three applications, in the selected and approved colors, as approved by the Engineer, in order to form a court surface with a true, uniform texture and color. Surfacing application work shall be performed by skilled mechanics, in a workmanlike manner, in accordance with the manufacturer’s standard printed instructions. However, no work will be performed when rain is imminent or when the ambient air or asphalt surface temperature is below 55 degrees Fahrenheit.
		2. Install all surface coating materials in strict adherence to the manufacturers specifications. Blend all materials with a mechanical mixer during application to achieve a uniform mixture.
		3. Filler Course. (Acrylic Resurfacer): Filler course shall be applied to the clean underlying surface in one application to obtain a total quantity of not less than .06 gallon per square yard based on the material prior to any dilution. Acrylic Resurfacer shall be used to pre-coat depression and crack/hole repairs to achieve true planarity prior to filler course application.
			1. Two coats of Acrylic Resurfacer shall be used to properly fill all voids in the asphalt surface. Use clean, dry 50-60 mesh sand and clean, potable water to make mixes. The quantity of sand and water in the above mix may be adjusted within above limits to complement the roughness and temperature of the surface.
			2. Mix all ingredients thoroughly and continually during application using accepted mixing devices. Contractor shall use a rubber bladed squeegee to apply each coat of Acrylic Resurfacer as required.
			3. Allow the application of Acrylic Resurfacer to dry thoroughly. Scrape off all ridges and rough spots prior to any subsequent application of Acrylic Resurfacer or subsequent cushion or color surface system.

3.5 APPLICATION OF ACRYLIC COLOR PLAYING SURFACING

* + 1. All areas to be color coated shall be clean, free from sand, clay, grease, dust, salt or other foreign matters. The Contractor shall obtain the Engineer's approval, prior to applying any surface treatment.
		2. Application shall be made by manufacturer recommended rubber faced squeegees. Surfacing mixtures shall be poured on to the court surface and spread to the specified, uniform thickness in a regular pattern.
		3. A total of 3 applications of color surfacing material shall be made to achieve the manufacturers recommended application rate and thickness. No application shall be made until the previous coat is thoroughly dry.

3.6 LINE PAINTING

* + 1. Base lines shall be not more than four inches (4”) wide and playing lines not more than two inches (2”) wide, accurately located, and marked in accordance with ASBA and USTA guidelines. Line paint shall be as recommended or approved by the manufacturer of the color surfacing material; use of traffic, oil, alkyd or solvent-vehicle type paint is prohibited. All measurements will be to the outer edge of the lines, except the center line and the center mark, which will be on the center line of the court. The painting will be done by skilled mechanics, in a workmanlike manner, in accordance with the manufacturer’s standard printed instructions.
		2. Lines shall be white unless otherwise noted on the drawings. The edges of lines to be marked shall be taped to insure a crisp line. The line paint shall have a texture similar to the surrounding play surface.

3.7 PROTECTION

* + 1. Erect temporary barriers to protect coatings during drying and curing.
		2. Lock gates to prevent court use until acceptance by the Engineer.

3.8 CLEAN-UP

* + 1. Remove all containers, surplus materials and debris. Remove all spills, and splatter from adjacent pavements, lawn and site amenities. Dispose of debris and excess materials in accordance with local, state and Federal regulations.
		2. Leave site in a clean, orderly, ‘as new’ condition.

END OF SECTION

SECTION323113 – FENCE AND GATES

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR) which are hereby made a part of this Section of the Specifications.
	2. WORK INCLUDED
		1. Provide all equipment and materials and installation, of Ornamental and Chain Link fence, line posts, end posts, rails, and gates as designated on the Contract Drawings.
	3. RELATED WORK
		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:
			1. Section 312000 - Earth Moving
			2. Section 033000 - Cast-in-Place Concrete
	4. REFERENCES
		1. Comply with applicable requirements of the following standards. Where these standards conflict with other requirements, the most restrictive requirements shall govern.
			1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
				1. ASTM A 53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
				2. ASTM A 123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
				3. ASTM A 153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
				4. ASTM A 176 (1994) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
				5. ASTM A 385 Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
				6. ASTM A 392 (1991b) Zinc-Coated Chain-Link Fence Fabric
				7. ASTM A 478 (1995a) Chromium-Nickel Stainless and Heat-Resisting Steel Weaving and Knitting Wire
				8. ASTM A 491 (1994) Aluminum-Coated Steel Chain-Link Fence Fabric
				9. ASTM A 666 (1994) Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
				10. ASTM C 94 (1994) Ready-Mixed Concrete
				11. ASTM F 626 (1994a) Fence Fittings
				12. ASTM F 688 Poly (Vinyl Chloride) (PVC) and other Organic Polymer-Coated Steel Chain link fence fabric, Class 2B
				13. ASTM F 883 (1990) Padlocks
				14. ASTM F 900 (1994) Industrial and Commercial Swing Gates
				15. ASTM F 1043 (1995) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework
				16. ASTM F 1083 (1993) Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded for Fence Structures
			2. AMERICAN WELDING SOCIETY (AWS)
				1. AWS WZC (1972) Welding Zinc-Coated Steels
			3. CHAIN LINK FENCE MANUFACTURERS INSTITUTE (CLFMI)
				1. CLFMI Product Manual (CLF-PM0610) revised January 2012
	5. SUBMITTALS
		1. Submit shop drawings and manufacturer's specifications and installation instructions for all materials to be used.
		2. Certificates: Statement signed by an official authorized to certify on behalf of the manufacturer attesting that the chain link fence and component materials meet the specified requirements.

PART - 2 PRODUCTS

2.1 CHAIN LINK FENCE MATERIALS

* + 1. Vinyl Coated Fence Fabric
			1. Fabric shall be black vinyl coated thermally fused and bonded to a primer which is thermally cured onto galvanized steel core wire conforming to ASTM F 668, Class 2b. Color of vinyl coating shall be black as specified in the plan set. Minimum coating thickness shall be 0.006 in. Color sample shall be submitted to the Owner for approval.
			2. Chain link Fabric shall be woven into a two (2) inch mesh of 8-core 9 or 6 gauge galvanized wire with a minimum breaking strength of 1290 lbs. In accordance with ASTM F 668, Class 2b.
			3. Zinc for galvanized coating shall conform to ASTM B 6, galvanized by hot dipped method AISI Type I, before vinyl coating; coating shall be smooth. Minimum weight of zinc coating shall be 1.2 oz. per sq. ft.
			4. Polyvinyl chloride coating shall meet the following requirements:
				1. Specific gravity shall be 1.30 maximum, tested in accordance with ASTM D 792.
				2. Hardness shall have a minimum Durometer reading of A 95 in accordance with ASTM D 2240. Ultimate elongation shall be 275% in accordance with ASTM D 412.
			5. Tensile strength shall have a test minimum of 3,300 psi in accordance with ASTM D 412.
			6. Vinyl shall be a dense and impervious covering free of voids, having a smooth, lustrous surface without pinholes, bubbles, voids, or rough or blistered surface.
		2. Fence Posts, Hardware, and Fittings - General
			1. Fittings shall be of best quality malleable iron castings, wrought iron forgings, or pressed steel and provided with pin connections. Equipment shall be designed to carry 100% overload.
			2. Malleable iron castings shall be hot-dipped galvanized in accordance with ASTM A 153.
			3. Wrought iron forgings or pressed steel fitting and appurtenances shall be hot-dipped galvanized in accordance with ASTM A 123.
			4. Fence Hardware Coatings: shall match fence fabric coating.
			5. Piping for fence posts shall be steel conforming to ASTM A 53 except that pipe shall be unthreaded and untested for water pressure.
			6. Galvanized items shall be galvanized in accordance with ASTM A 123, A 153, or A 385, as applicable.
			7. Bolts, which are installed six (6) feet or less above grade shall not protrude more than 1/4 inch beyond the nut after tightening. Rough edges shall be filed smooth to the satisfaction of the engineer. Peen ends of all bolts after tightening.
		3. Posts
			1. Under Six Foot (6’) High Fence:
				1. Line posts shall be 1.9 in. outside diameter (O.D.), Schedule 40 pipe, weighing 2.28 lb./ft.
				2. End and corner posts shall be 2.375 in. O.D., Schedule 40 pipe, weighing 3.65 lb./ft.
			2. Six Feet to Nine Feet (6’ to 9’) High Fence:
				1. Line posts shall be 2.375 in. O.D., Schedule 40 pipe, weighing 3.65 lb./ft.
				2. End and corner posts shall be 2.875 in. O.D., Schedule 40 pipe, weighing 5.79 lb./ft.
			3. Nine Feet to Twelve Feet (9’ to 12’) High Fence:
				1. Line posts shall be 2.875 in. outside diameter (O.D.), Schedule 40 pipe, weighing 5.79 lb./ft.
				2. End and corner posts shall be 4.00 in. O.D., Schedule 40 pipe, weighing 9.11 lb./ft.
			4. The gatepost for any gate leaf 6 ft. wide and less shall be 3.0 in. O.D., Schedule 40 pipe, weighing 5.79 lb./ft.
			5. Posts shall be PVC coated, thermally fused and bonded to a primer that is thermally cured onto galvanized steel posts. The color of the vinyl coating shall be black. The minimum coating thickness shall be 0.006 in.
		4. Rails and Post Braces
			1. Top rail, mid rail (8-ft. fence) and bottom rails shall be 1.66 in. O.D., Schedule 40 pipe, weighing 2.27 lb./ft.
			2. Rails and post braces shall be PVC coated, thermally fused and bonded to a primer which is thermally cured onto galvanized steel rails and post braces. The color of the vinyl coating shall be black, as specified in the plan set. The minimum coating thickness shall be 0.006 in.
		5. Gates and Gate Frames
			1. Fabrication: Assemble gate frames by welding connections. Use the same fabric as for the fence, unless otherwise indicated. Install fabric with stretcher bars at the edges (and tie wire at top and bottom edges, if stretcher is not used). Attach the stretcher bars to gate frame at not more than 12 in. O.C. Attach the hardware with rivets or by other means, which shall provide security against removal or breakage.
				1. Framing:

Fabricate perimeter frames of a minimum of 1.90 in. O.D., Schedule 40 pipe, that has been hot-dipped and galvanized, with a minimum of 2.0 oz. of zinc per sq. ft. of surface area.

* + - * 1. Bracing:

Provide diagonal cross bracing, consisting of 3/8 in. diameter adjustable length truss rods, on gates where four sided tension rods are not used. Provide frame rigidity without sag or twist.

* + - 1. Gate hardware: Galvanize per ASTM A 153 (each gate). Provide lockable drop bar on each gate leaf for double swing gates, so that gate leaves can be locked in place individually.
			2. Gate Hardware Coatings: These shall match the fence fabric coating.
			3. Hinges: Pressed steel or malleable iron to gate size, non-lift-off type, offset to permit 180° gate opening. Provide one pair of hinges for each leaf.
			4. Latch: Forked type, to permit operation from either side of gate: Provide padlock eye as integral part of latch.
			5. Keeper: Provide keeper for gates, which automatically engages the gate leaf and holds it in the open position until it is manually released.
			6. Gates and gate frames shall be PVC coated, thermally fused and bonded to a primer that is thermally cured onto galvanized steel components. The color of the vinyl coating shall be black, as specified in the plan set. The minimum coating thickness shall be 0.006 in.
			7. Stretcher Bars
				1. Stretcher bars shall not be less than 3/16 in. x 3/4 in. and shall be the full height of the fabric with which they are being used.
				2. Provide stretcher bars for each gate, end and corner, and pull post stretcher bar bands and clips shall be of heavy pressed steel or malleable iron.
		1. Caps
			1. Posts shall have caps, which shall be designed to exclude water from the posts. Caps shall have holes suitable for the through passage of the top rail, where necessary.
			2. Caps for posts shall be PVC coated, thermally fused and bonded to a primer which is thermally cured onto the galvanized steel caps. The color of the vinyl coating shall be black, as specified in the plan set. The minimum coating thickness shall be 0.006 in. All caps shall be securely fastened to the posts.
		2. Tension and Tie Wire
			1. PVC Coated Fence: Tie wire shall be 9-gauge O.D., vinyl-clad, galvanized steel wire.
		3. Galvanized Paint
			1. Cold galvanized paint shall be one of the following:

|  |  |
| --- | --- |
| Product | Manufacturer |
| Galvicon | Galvicon Corporation |
| Zinc Shield | Stanley Chemical Division of The Stanley Works |

* + - 1. Touch-up for Galvanized Surfaces: Touch-up damaged or abraded galvanized surfaces with products equal to one of the following:
				1. Cold Galvanizing Compound; ZRC.
				2. Speedhide Galvanized Steel Paint; PPG.
				3. Series 90-97 Zinc-Rich Primer; Tnemec.
		1. Concrete
			1. Concrete shall meet ASTM C 94, using 3/4 inch maximum size aggregate, and having minimum compressive strength of 4000 psi at 28 days. Grout shall consist of one part Portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

PART - 3 EXECUTION

3.1 GENERAL

* + 1. Fence shall be installed to the lines and grades indicated. The area on either side of the fence line shall be cleared to the extent indicated. Line posts shall be spaced equidistant, at intervals not exceeding ten feet (10). Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between the terminal posts. However, runs between terminal posts shall not exceed 500 feet. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust, in accordance with ASTM A 780.

3.2 POSTS

* + 1. Posts shall be poured-in-place, into the proposed concrete footings, as shown on the plans and details.

3.3 RAILS

* + 1. Top Rail, Mid (8-ft. fence) and Bottom Rails
			1. Top, mid (8-ft. fence) and bottom rails shall be supported at each post to form a continuous brace between terminal posts. Where required, sections of top rail shall be joined using sleeves or couplings that shall allow expansion or contraction of the rail. Bottom tension wire is not acceptable.

3.4 BRACES AND TRUSS RODS

* + 1. Braces and truss rods shall be installed as indicated and in conformance with the standard practice for the fence furnished. Braces and truss rods shall extend from terminal posts to line posts. Diagonal braces shall form an angle of approximately 40 to 50 degrees with the horizontal. No bracing is required on fences six feet high or less, if a top rail is installed.

3.5 CHAIN LINK FABRIC

* + 1. Chain link fabric shall be installed on the playing field side of the fence unless otherwise noted. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately fifteen inch (15") intervals. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fabric shall be fastened to line posts at approximately fourteen inch (14") intervals and fastened to all rails at approximately twelve inch (12") intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The top and bottom of installed fabric shall be as indicated on the Drawings. After the fabric installation is complete, the fabric shall be exercised by applying a 50-pound push-pull force at the center of the fabric between posts. The use of a 30-pound pull at the center of the panel shall cause fabric deflection of not more than two and one half inches (2-1/2")when pulling fabric from the post side of the fence. Every second fence panel shall meet this requirement. All failed panels shall be resecured and retested at the Contractor's expense.

3.6 GATES

* + 1. Gates shall be installed plumb, level and secure, at the locations shown. Hinged gates shall be mounted to swing, as indicated. Latches, stops and keepers shall be installed, as required. Slide gates shall be installed as recommended by the manufacturer. Hinge pins and hardware shall be welded or otherwise secured to prevent removal. All gates shall be tested by the Engineer for proper functionality prior to final approval.

3.7 TOUCH-UP

* + 1. Following installation, scratches and marred spots in vinyl-coated surfaces shall be field coated with a vinyl coating supplied by the fence manufacturer.
		2. Following installation, scratches and marred spots in galvanized surfaces shall be power wire brushed and painted, with a cold-applied galvanized paint, at a rate of 2 oz. zinc per sq. ft. of surface.

3.8 GROUNDING

* + 1. Electrical equipment attached to the fence shall be grounded, as specified in manufacturer's instructions. Fences shall be grounded on each side of all gates, at each corner, at the closest approach to each building located within 50 feet of the fence, and where the fence alignment changes by more than 15 degrees. Grounding locations shall not exceed 650 feet. Each gate panel shall be bonded with a flexible bond strap to its gatepost. Fences crossed by power lines of 600 volts or more shall be grounded, at or near the point of crossing, and at distances not exceeding 150 feet on each side of crossing. The ground conductor shall consist of No. 8 AWG solid copper wire. Grounding electrodes shall consist of No. 8 AWG solid copper wire. Grounding electrodes shall be ¾ inch, by 10-foot long, copper-clad steel rod. Electrodes shall be driven into the earth so that the top of the electrode is at least six inches below the grade. Where driving is impracticable, electrodes shall be buried a minimum of twelve inches (12") deep and radially from the fence. The top of the electrode shall be not less than two feet or more than eight feet from the fence. The ground conductor shall be clamped to the fence and electrodes with bronze grounding clamps to create electrical continuity between fence posts, fence fabric and ground rods. After installation, the total resistance of the fence to the ground shall not be greater than 25 ohms.

END OF SECTION

SECTION323223 – SEGMENTAL BLOCK RETAINING WALLS

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR) which are hereby made a part of this Section of the Specifications.
	2. SUMMARY
		1. Description
			1. Work includes furnishing segmental retaining wall (SRW) units required to meet the lines and grades designated on the construction drawings or as directed by the Engineer.
		2. Referenced Standards
			1. Segmental Retaining Wall Units
				1. ASTM C 140 Sampling and Testing Concrete Masonry Units
	3. PERFORMANCE REQUIREMENTS
		1. Structural Performance: Provide segmental retaining walls capable of withstanding the effects of loads due to soil pressures resulting from grades indicated due to any external superimposed loads specified.
			1. Include the effects of sloped backfill as indicated on Drawings.
			2. Include the effects of superimposed loads as indicated on Drawings.
			3. Design retaining walls according to NCMA's "Design Manual for Segmental Retaining Walls."
	4. SUBMITTALS
		1. Product Data: For each type of segmental retaining wall and other manufactured products specified.
			1. For installed systems indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
			2. Shop Drawings: Manufacturer to submit shop drawings sealed by a registered professional engineer in the State of Massachusetts and schedules for type, location and quantity, and details of components required for the project. Shop Drawings shall also include support base and foundation details based on field verified soil data. Shop drawings shall include the manufacturer's standard conditions and specifications for construction. Where the manufacturer's specifications differ from the contract documents, the manufacture's specifications shall prevail with approval of the Engineer.
		2. Samples for Verification: Sets for each color, finish, and pattern of unit required. Include 2 or more samples in each set showing the full range of variations expected.
		3. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
		4. Preconstruction Test Reports: Indicate and interpret test results for compliance with performance requirements.
		5. Product Test Reports: Indicate compliance of retaining wall units and soil reinforcement with requirements based on comprehensive testing of current products.
			1. Include test data verifying properties used as basis of structural design.
			2. Include test data required by "Source Quality Control" Article for each roll of soil reinforcement.
		6. Research/Evaluation Reports: Evidence of system's compliance with building code in effect for Project from a model code organization acceptable to authorities having jurisdiction.
		7. Revised design stamped by professional engineer if another product system is to be submitted.
	5. QUALITY ASSURANCE
		1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of systems that are similar to those indicated for this Project in material, design, and extent.
		2. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated without delaying the Work, as documented according to ASTM E 548.
		3. Reconstruction Testing Service: Engage a qualified independent testing agency to perform the following preconstruction testing:
			1. Test proposed retaining wall units and soil reinforcement for connection strength according to NCMA SRWU-1.
			2. Test proposed soil reinforcement and backfill materials for pullout behavior according to GRI GG5, Controlled Strain Rate Method for Short-Term Testing (Method A).
	6. DELIVERY, STORAGE, AND HANDLING
		1. Deliver materials to Project Site in an undamaged condition.
		2. Store and handle retaining wall units and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, or other causes.
		3. Store accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

PART - 2 PRODUCTS

2.1 SEGMENTAL RETAINING WALL (SRW) UNITS

* + 1. Small block SRW units shall be Sienna Stone as supplied by Unilock, Ltd. or equal.
		2. SRW color shall be natural. Please confirm color with owner prior to ordering retaining wall units.
		3. Special Units: Provide corner units, end units, cap units, and other special shapes as necessary to produce retaining walls of dimensions and profiles indicated and to provide indicated textures on exposed surfaces.
		4. The SRW units shall be solid units.
		5. The SRW units shall have an integral shear key connection and shall be offset to the minimum wall batter per the manufacture's specification.
		6. The concrete wall modules shall have a minimum 28-day compressive strength of 35 Mpa (5000 psi) as tested in accordance with ASTM C 140. The concrete shall have a maximum moisture absorption rate of 5 percent to ensure adequate freeze-thaw protection.

2.2 SRW DESIGN GEOMETRY

* + 1. The walls' design height (H) shall be measured from the top of the stone base to the top of the wall where the ground surface intercepts the wall facing.
		2. The minimum wall embedment shall be a minimum of one SRW below the top of the stone base.
		3. The following surcharges shall be applied to the top of each design cross section based on the following proposed uses of the wall:
			1. No Traffic 0 kPA (0 lb/sq ft)
			2. Light Traffic 4.8 kPA (100 lb/sq ft)
			3. Heavy Traffic 9.6 kPA (200 lb/sq ft)

2.3 SOIL REINFORCEMENT

* + 1. A geotextile or geogrid, specifically manufactured for use as soil reinforcement, and with necessary properties for completed segmental retaining walls and per SRW manufacture's specifications to comply with performance requirements. As manufactured by one of the following:
			1. Amoco Fabrics and Fibers Co.
			2. Nicolon Corp.; Nicolon/Mirafi Group.
			3. Strata Systems, Inc.
			4. 4. Tensar Earth Technologies, Inc.

2.4 LEVELING BASE

* + 1. Shall be Base Stone or Dense Graded Aggregate as specified in Section 312000 Earth Moving

2.5 DRAINAGE SOIL

* + 1. Shall be Drainage Course as specified in Section 312000 Earth Moving

2.6 GEOTEXTILE FILTER

* + 1. Filter Fabric shall be Geotextile Filter Fabric as specified in Section 312000 Earth Moving

2.7 DRAINAGE PIPE

* + 1. Drainage Pipe shall be perforated, polyethylene tubing and fittings. Complying with ASTM F 405, corrugated, for coupled joints. Provide with manufacturer's standard, band-type couplings.

PART - 3 EXECUTION

3.1 RETAINING WALL DESIGN

* + 1. The Engineer is responsible for providing a design that shall consider the external and internal stability, including global stability, total and differential settlement, of the SRW system. The design life of the structure shall be 75 years.
		2. The segmental retaining wall shall be designed in accordance with recommendations of the NCMA Design Manual for Segmental Retaining Walls, Second Edition. The following is a summary of the minimum factors of safety for the various modes of failure in the proposed design:
			1. External Stability:
				1. Base Sliding 1.5
				2. Overturning 2.0
				3. Bearing Capacity 2.0
				4. Global Stability 1.3
			2. Internal Stability:
				1. Tensile Overstress 1.0
				2. Pullout 1.5
				3. Internal Sliding 1.5
			3. Local Stability:
				1. Facing Shear 1.5
			4. Connection 1.5

3.2 EXAMINATION

* + 1. Examine areas to receive segmental retaining walls and conditions under which walls will be installed, with Installer present, for compliance with requirements for excavation tolerances, condition of subgrades, and other conditions affecting performance of retaining walls.
			1. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 RETAINING WALL INSTALLATION

* + 1. General: Place units according to manufacturer's written instructions. Lay units in running bond, overlapping half units of course below.
			1. Form corners and ends by using special units.
			2. Form corners and ends by cutting units with motor-driven saw.
			3. Form corners and ends by splitting with mason's hammer and chisel.
			4. Form corners and ends by any method above as indicated in manufacturer's written instructions.
		2. Leveling Base
			1. The leveling base shall be crushed stone compacted to 98% Standard Proctor Density, or vibrated concrete on the Contract drawings.
		3. Bottom Row
			1. The bottom row of retaining wall modules shall be placed on the prepared leveling base as shown on the Contract Drawings. Care shall be taken to ensure that the wall modules are aligned properly, leveled from side to side and front to back and are in complete contact with the base material. Place and compact fill, either drainage fill or soil fill as indicated, to top of first course. Place fill on both sides of wall at same time without disturbing alignment of units. Fill voids between and within units with drainage fill. The wall modules shall be swept clean before placing additional levels to ensure that no dirt, concrete or other foreign materials become lodged between successive lifts of the wall modules.
		4. Subsequent Courses:
			1. The wall modules above the bottom course shall be placed such that the tongue and groove arrangement provides the design batter (i.e. setback) of the wall face. Successive courses shall be placed to create a running bond pattern with the edge of all units being approximately aligned with the middle of the unit in the course below it. The wall modules shall be swept clean before placing additional levels to ensure that no dirt, concrete or other foreign materials become lodged between successive lifts of the wall modules.
			2. Place and compact fill as each course is laid. Place fill on both sides of the wall at same time, where both sides are indicated to be filled.
			3. Fill voids between and within units with drainage fill.
		5. Cap Units:
			1. Place cap units and secure with cap adhesive according to manufacturer's written instructions.

3.4 FILL PLACEMENT

* + 1. General: Comply with requirements of retaining wall unit manufacturer's written instructions.
		2. Place, spread, and compact fill in uniform lifts for full width and length of embankment as wall is laid. Begin at back of wall and place and spread fill toward embankment.
			1. Use only hand-operated compaction equipment within 36 inches (900 mm) of wall.
			2. Compact drainage fill to not less than 95 percent maximum dry density according to ASTM D 698.
			3. Compact reinforced soil fill to not less than 95 percent maximum dry density according to ASTM D 698.
		3. Place filter fabric and drainage fill behind the wall as shown on the Plans.
			1. Wrap drainage pipe with filter fabric and place in drainage fill as indicated, sloped 1/4 inch per foot (1:50) to drain.
			2. Place final cover over the top edge of drainage fill layer as shown on the plans.
		4. Place soil reinforcement in horizontal joints of retaining wall where indicated and according to soil reinforcement manufacturer's written instructions. Embed reinforcement past shear within retaining wall and stretch tight over compacted backfill. Anchor soil reinforcement before placing fill on it.
			1. Use additional soil reinforcement at corners and curved walls to provide continuous reinforcement and to comply with manufacturer's written instructions.
			2. Place geotextiles with sewn seams oriented with seams perpendicular to retaining walls.
			3. Do not dump fill material directly from trucks onto geotextile.
			4. Before compacting, place sufficient depth of fill over reinforcement to produce compacted depth of 4 inches (100 mm) for wheeled vehicles or 6 inches (150 mm) for tracked vehicles.
			5. Do not turn vehicles on fill until first layer of fill is compacted and second layer is placed over each soil-reinforcement layer.

3.5 CONSTRUCTION TOLERANCES

* + 1. Variation from Level: For bed-joint lines along walls, do not exceed 1/4 inch in 10 feet (6 mm in 3 m) or 1 inch in 40 feet (24 mm in 12 m) or more.

3.6 FIELD QUALITY CONTROL

* + 1. Comply with requirements of Division 2 Section 02 3000 "Earthwork" for in-place soil density testing.
			1. In each compacted backfill layer, perform at least one (1) field in-place density test for each 100 feet (30 m) or less of retaining wall length, but no fewer than two (2) tests along a wall face.

3.7 ADJUSTING AND CLEANING

* + 1. Remove and replace segmental retaining walls of the following description:
			1. Broken, chipped, stained, or otherwise damaged units. Units may be repaired if methods and results are approved by Engineer.
			2. Segmental retaining walls not matching approved samples and mockups.
			3. Segmental retaining walls not complying with other requirements indicated.
		2. Replace in a manner that results in segmental retaining wall's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

END OF SECTION

SECTION329250 – LOAM AND SEED

1. GENERAL
	1. GENERAL PROVISIONS
		1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR) which are hereby made a part of this Section of the Specifications.
		2. Examine all other Sections of the Specifications for requirements which affect work of this Section, whether or not such work is specifically mentioned in this Section.
		3. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.
	2. WORK INCLUDES
		1. Refer to the Drawings for the extent and details of the work.
		2. The work of this Section consists of all seeding and related work as shown on the Drawings or required herein, and includes, but is not limited to, the following:
			1. Providing all topsoil required for work of this Section.
			2. Screened, stripped and stockpiled topsoil.
			3. Providing additional new topsoil from off-site sources, as required to complete work for this Section.
			4. Providing all soil amendments, fertilizers, erosion controls and mulches, as required for work in this Section.
			5. Scarification of subsoil in preparation for loaming.
			6. Spreading and fine grading topsoil for all lawn areas, sodded or seeded.
			7. Seeding required for work in this Section.
			8. Maintenance and guarantee.
	3. RELATED SECTIONS
		1. Section 31 2000 – Earth Moving.
	4. SUBMITTALS
		1. Materials List: Submit a complete list of all materials proposed for use in this work, demonstrating complete conformance with the requirements specified.
			1. Submit grass seed mixes for approval.
			2. Submit topsoil analysis results for review by the Landscape Architect. State recommended quantities of amendments necessary to produce satisfactory topsoil, as stated in the specifications herein. If on-site stockpiled topsoil is to be used, submit topsoil analysis of screened products.
			3. Submit product information, with mix ratios and amounts, for hydromulching to be used during hydroseeding, for Landscape Architect's approval.
			4. Submit fertilizer, herbicide and fungicide products for application, as required, for Landscape Architect's approval.
			5. Submit mechanical analysis of any soil amendments.
	5. QUALITY ASSURANCE
		1. All seed and amendments shall comply with all federal, state and local laws and regulations requiring inspection for plant disease and insect control.
	6. PRODUCT HANDLING
		1. Delivery and Storage:
			1. Deliver all items to the job site in their original containers, with all labels intact and legible at time of the Landscape Architect's inspection.
			2. Immediately remove from the site all materials which do not comply with the specified requirements.
			3. Use all means necessary to protect seed from moisture and other contaminants which may adversely affect proper germination.
			4. Use all means necessary to protect fertilizers, amendments and other materials from moisture and other contaminants which may adversely affect their efficacy.
	7. JOB CONDITIONS
		1. Utilities: Determine the location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned.
		2. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions or obstructions, notify Landscape Architect before spreading topsoil.

PART - 2 PRODUCTS

2.1 TOPSOIL

* + 1. Topsoil
			1. Topsoil stockpiled from on-site stripping, once tested, may be utilized and amended to meet the requirements for New Topsoil (aka Topsoil Mix).
			2. All topsoil that was stripped and stockpiled shall be screened to a maximum stone size of three quarters of a inch (3/4”) in any dimention.
			3. If determined by soil testing that the existing topsoil does not meet these specifications, the topsoil shall be amended to provide an acceptable topsoil for use.
		2. New Topsoil for Lawns(Topsoil Mix/Amended Topsoil):
			1. New Topsoil (Topsoil Mix): Shall be natural, fertile loam, typically cultivated topsoils of the locality, containing not less than 4% or more than 8% by weight, of decayed organic matter (humus), as determined in ASTM F-1647. If organic amendments are needed to obtain the specified matter content of the topsoil, the organic matter source may be a peat or compost material.
			2. Topsoil shall be taken from a well-drained, arable site, free of subsoil, slag and any stones, earth clods, sticks, stumps, clay lumps, roots or other objectionable, extraneous matter or debris over ¾” in any dimension.
			3. Topsoil shall be free of Quack-grass rhizomes, Agropyron Repens, and the nut-like tubers of Nutgrass, Cyperus Esculentus, and all other primary noxious weeds.
			4. Topsoil shall have a pH not less than 6.0 or greater than 7.0.
			5. Topsoil shall not have soluble salts greater than 500 parts per million.
			6. Topsoil mix (amended topsoil) shall have target Nutrient levels of Phosphorus (P), Potassium (K), Calcium (C) and Magnesium (Mg) in the Optimum Range as determined local Agricultural Extension Service Topsoil testing recommendations for Sportsturf/Golf Fairway Lawn Establishment.
			7. Topsoil shall be a loamy sand, sandy loam, loam, sandy clay loam as defined by the USDA, as determined by Pipette Method, in compliance with ASTM F-1632.
			8. Topsoil shall not be delivered or placed while in a frozen or muddy condition.
		3. Imported Topsoil:
			1. The Contractor shall submit representative samples of topsoil he intends to bring onto the site, and samples of topsoil that was stockpiled from on-site stripping, to a Soil Plant Testing Laboratory acceptable to the Engineer or Landscape Architect. All reports shall be sent to the Engineer / Landscape Architect for approval. The cost for testing and analysis of the soils shall be borne by the Contractor.
			2. Samples of topsoil to be brought to the site must be approved prior to delivery of topsoil to the site. Imported topsoil shall be amended by the Contractor to comply with the requirements of New Topsoil (aka Topsoil Mix)
			3. Testing reports shall include the following tests and recommendations:
				1. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System.
				2. The silt and clay content shall be determined by a Pipette Test of soil passing the No. 270 sieve.
				3. Percent of organics shall be determined by an Ash Burn Test or Walkley/Black Test (ASTM F-1647).
				4. Test for gradation and organics shall be performed by a private testing laboratory approved by the Engineer/Landscape Architect. Tests for soil chemistry and pH may be performed by a public extension service agency.
				5. Chemical analysis shall be undertaken for Phosphorus, Potassium, Calcium, Magnesium, Aluminum, Soluble Salts, and acidity (pH).
				6. Soil analysis tests shall include recommendations for soil additives to correct soils deficiencies, as necessary, and for additives necessary to meet defined topsoil mix requirments.
				7. All tests shall be performed in accordance with the current standards of the Association of Official Agriculture Chemists.
			4. Deficiencies in the topsoil shall be corrected by the Contractor

2.2 SOIL AMENDMENTS:

* + 1. Organic Amendments: Shall be Compost or Peat.
			1. Peat shall be Canadian sphagnum peat, having an ash content not exceeding 15%, as determined by ASTM D-2974.
			2. Compost may be used, provided that the material has been composted in an in-vessel system, and has an ash content not exceeding 40%, and is free from debris and contaminants.
		2. Lime
			1. Lime shall be an approved agricultural limestone, containing no less than fifty (50%) percent of total carbonates and twenty five (25%) percent total magnesium, with a neutralizing value of at least one hundred (100%) percent.
			2. The material shall be ground to such a fineness that forty (40%) percent will pass through a Number 100 U.S. Standard Sieve, and ninety eight (98%) percent will pass through a Number 20 U.S. Standard Sieve.
			3. The lime shall be uniform in composition, dry and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis.
			4. Any lime which becomes caked or otherwise damaged, making it unsuitable for use, will be rejected.
		3. Fertilizers: Quantity, gradation and rate of application shall be determined based on soil tests and recommendations conducted by an approved soil testing laboratory.
		4. Water: The Contractor is responsible for providing all water equipment, hoses, etc. for watering throughout the project and until final acceptance of lawn and turf areas by the Landscape Architect.
		5. Herbicides, Pesticides and Fungicides: Herbicides, pesticides and fungicides may be used, subject to the approval of the Engineer / Landscape Architect, and handled by state-licensed operators only.

2.3 SEED:

* + 1. Seed
			1. Grass seed shall be clean, new crop seed, composed of a mixture of varieties, mixed in proportion by weight and tested for minimum percentages of purity and germination. Submit proposed mixture to the Engineer / Landscape Architect for approval.
			2. General Lawn Area Seed Mix:
				1. Perennial Ryegrass: 40%
				2. Chewing Fescue: 30%
				3. Kentucky Bluegrass: 30%
				4. All seed shall have 90% purity and 85% germination.
				5. Final blend of seed shall be approved by the Landscape Architect.
				6. Seed shall be free of Poa Annua and all other noxious or objectionable weed and shall have a maximum weed crop of one-tenth (0.1) percent.
		2. Hydroseed Mix (Lawn Areas Only)
			1. All work will be carried out by an approved spraying machine specifically used for this work. Amounts of fertilizer used shall reflect recommendations outlined in the Soil Analysis, see Section 2.01 D. The Contractor shall submit to the Landscape Architect for approval, prior to the start of work, a certified statement as to number of pounds of fertilizer, amounts and types of grass seed, and processed fiber, per one hundred (100) gallons of water.
			2. Hydromulch: Shall be Terra-Sorb GB, or an approved equal. Add Terra-Sorb to the hydroseed tank at the amount of 60 pounds per acre.
			3. Hydroseeding is not permitted for athletic field areas

PART - 3 EXECUTION

3.1 PREPARATION OF SUBSOIL (General Lawn Areas)

* + 1. Prior to spreading topsoil, subsoil should be rough graded to correspond with finish grades, as indicated on the Drawings. Subgrade shall slope to allow for subsurface drainage. Depressions shall be filled and areas which are highly compacted shall be loosened to a depth of 2 inches (2”) minimum, which is adequate for the passage of gravitational water through the subsoil.
		2. After acceptance of subsoil grades, loosen and mix subgrade material four to six inches (4”-6”) deep. Remove all stones, sticks, rubbish and other deleterious materials, over ¾ inch in any dimension which may impede the healthy and vigorous growth of grass. Do not allow heavy objects or machinery, except as necessary for the spreading of topsoil, over the seedbeds after the preparation of the subgrade.
		3. Subsoil which becomes compacted due to excessive construction activity shall be loosened, as directed by the Engineer / Landscape Architect, at no additional cost to the Owner.

3.2 SPREADING OF TOPSOIL

* + 1. Immediately after approval and loosening of subgrade, evenly spread and lightly compact approved topsoil to finish grades, as indicated on the Drawings. Do not spread topsoil which is in a muddy or frozen condition. Handle no topsoil when dry or above the plastic limit. Install a minimum of six inches (6") of topsoil to lawn areas, unless otherwise indicated on the Drawings.
		2. When possible, the spreading of topsoil shall be performed from the center of the lawn area to the perimeter. Contractor may use alternate spreading pattern, if approved in writing by the Engineer / Landscape Architect.
		3. Caution should be exercised to minimize or eliminate travel over areas previously covered with topsoil. Topsoil which becomes compacted due to construction activity shall be stripped and re-spread or loosened, as directed by Engineer / Landscape Architect, at no additional cost to the Owner.

3.3 TOPSOIL SEED BED PREPARATION

* + 1. The minimum depth of topsoil in all lawn areas shall be six inches (6"). Contractor is responsible for supplying all topsoil needed from off-site sources.
		2. Grade all lawn areas to finish grades, as indicated on the Drawings. When no grades are shown, areas shall have a smooth and continuous grade between existing or fixed controls and elevations shown on plans. Roll, scarify, rake and level, as necessary, to obtain true even lawn surfaces. All lawn areas shall slope to drain. Finish grades shall be approved by Engineer / Landscape Architect prior to commencing any seeding or sodding work.
		3. Install soil additives per manufacturer's and topsoil testing lab instructions and as indicated on the Drawings.
		4. Amend all disturbed areas to be topsoiled, seeded or sodded to meet amended topsoil target recommendations. Follow the testing lab and manufacturer's recommendations for installation.
		5. Spreading Limestone: Spread ground limestone evenly over the topsoil surface. Incorporate limestone within the top two inches (2") of soil, prior to finish raking. Apply limestone at the rate recommended by the testing and analysis agency.
		6. Rake and remove all rocks and debris over ¾" in any dimension from the topsoil surface.

3.4 SEEDING

* + 1. Schedule for Seeding: Sow grass seed between April 1 and May 31, or between August 15 and October 1, except as otherwise approved in writing by the Engineer / Landscape Architect.
		2. If seeding out of season, as described above, the Contractor is still obligated by all conditions and responsibilities described under 3.06 LAWN MAINTENANCE, until final acceptance of all lawn areas.
		3. Before seed is sown, scarify soil and rake until surface is smooth, friable and of uniformly fine texture. Seed evenly at supplier's recommendation rates, lightly rake and water with fine spray. Do not use wet seed which is moldy or otherwise damaged in transit or storage.
		4. Mulch bank areas with three to one (3 to 1) slope or greater with straw mulch, one and one half to two (1½ to 2) tons per acre. Secure mulch at Contractor's discretion as to method or need. Wood fiber mulch may be substituted at a rate of 1,400 pounds per acre, at same time as seed and fertilizer.
		5. Equipment Calibration
			1. The equipment to be used and the methods of seeding shall be subject to the inspection and approval of the Owner's Representative, prior to commencement of seeding operations. Immediately prior to the commencement of seeding operations, the Contractor shall conduct seeding equipment calibration tests in the presence of the Owner's Representative.
		6. Applying Seed
			1. Mechanical Seeding of Lawn Seed Mix:
				1. Seed shall not be placed until soils have stabilized and further settlement is not apparent. Utilize an irrigation system for consolidation of top mix.
				2. Seed at a minimum rate of three (3) lbs per 1000 square feet.
				3. Sow grass seed, applying half the quantity in one direction and the remaining quantity at right angles to the previous application
				4. Do not sow seed on a windy day or when the ground is frozen, wet or otherwise non-tillable.
				5. Cover seed with a thin layer of topsoil by raking or dragging. Cover with straw mulch, loosely spread to a uniform depth.
				6. Keep soil moist throughout the germination period.
			2. Mechanical seeding of athletic fields with Athletic Field Seed Mix:
				1. Seeding athletic fields shall not occur until topsoil has been approved as noted in Section 32 9125 – Athletic Field Construction.
				2. Seed shall not be placed until soils have stabilized and further settlement is not apparent. Utilize irrigation system for consolidation of top mix.
				3. Apply seed with a mechanical seeding machine, such as a Brillon drill.
				4. Seed at a minimum rate of 10 pounds per 1000 square feet. Sow one half of the seed in two separate applications, in a 90-degree crossing pattern.
				5. Irrigation during germination: It is important to keep the soil moist, not wet, through out the germination period.
			3. Hydroseeding lawn areas may be permitted with the Engineer's approval.

3.5 FERTILIZING

* + 1. The Contractor is to have the topsoil tested for soil fertility by an approved soil testing laboratory, and a complete fertilization program will be recommended by the testing laboratory and Landscape Architect for the installation and maintenance period.

3.6 LAWN MAINTENANCE

* + 1. Maintenance of the grass areas shall begin immediately and generally consist of watering, weeding, fertilization, mowing and edging, reseeding, disease and insect pest control, repair of all erosion, and any other procedure consistent with good horticultural practice, as necessary to insure normal, vigorous and healthy growth.
		2. After grass has appeared, reseed all areas which have failed to show a uniform stand of grass.
		3. Maintenance shall also include filling, regrading and reseeding, as necessary, to correct depressions caused by settling, subsidence or other physical or mechanical damage.
		4. Maintenance shall also include all temporary protection fences, barriers, signs and all other work incidental to proper maintenance.
		5. The Contractor shall be responsible for maintenance to establish a uniform stand of the approved grasses until acceptance. After the grass has started, all areas and parts of areas showing poor germination or growth shall be re-seeded, repeatedly, until all areas are covered with a satisfactory growth of grass. At the time of the first cutting, mow lawn with sharp mowing units not less than two and one half inches (2 1/2") high. Lawn shall be maintained between two and one half inches to three and one half inches (2 1/2" - 3 1/2") high. Do not remove more than one third (1/3) of the grass blade. All lawns shall receive a minimum of three (3) mowings before Contractor's request for inspection and acceptance. Additional mowings may be required before acceptance.
		6. Where permitted, the contractor shall be responsible for the application of pre-emergent crabgrass control, in accordance with manufacture's recommended rate and timing for all lawn areas the Spring following seeding.
		7. Fertilization: Second fertilization of all lawn areas shall be done either the following spring after a fall seeding or in the fall after a spring seeding.
		8. Watering: The Contractor shall include the cost for daily and, if necessary, continuous watering of all grass areas during a normal eight (8) hour working day.
			1. The seed bed shall be maintained in a continuous moist condition, to the depth of 2". Maintain soil moisture satisfactory for good germination and growth of grass until acceptance of lawns.
		9. Full and complete written instructions for maintenance of the lawn areas are to be furnished to the Owner, by the Contractor, at least ten (10) days prior to the end of the contractual maintenance period, to familiarize him with the maintenance requirements for proper care and development of lawns.

3.7 INSPECTION AND ACCEPTANCE

* + 1. The Landscape Architect shall inspect the lawns upon written request by the Contractor. The request shall be received at least ten (10) days before the anticipated date of inspection.
		2. Final acceptance will not be granted until all seeded areas are in satisfactory condition. No seeded areas will be inspected prior to 60 days from seeding and prior to the completion of two mowings. An acceptable stand of grass will be determined by the Engineer or Landscape Architect.
		3. A satisfactory stand of grass which is acceptable is defined as consisting of a uniform stand of at least 60% established, permanent grass species, free of weed species and no bare spots (free of germinating grass) over 1sf in area.
		4. If the grass is in satisfactory condition, the Contractor's care and maintenance responsibilities will end. If the grass stand is unsatisfactory, the Contractor's maintenance responsibility shall continue, including a normal program of mowing, irrigation, reseeding, fertilizing and repair until an acceptable stand of grass is achieved.

3.8 CLEAN UP

* + 1. Absolutely no debris may be left on the site. Excavated material shall be removed, as directed. Repair any damage to site or structures to restore them to their original condition, as directed by the Landscape Architect, at no cost to the Owner.

END OF SECTION