CONSTRUCTION DOCUMENTS

ST. MARY'S COLLEGE OF MARYLAND
SOMERSET TENNIS COMPLEX RENOVATION
ST. MARY'S CITY, MD

JULY 20, 2023

PREPARED FOR:

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SPECIFICATIONS

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

DIVISION 01 – GENERAL REQUIREMENTS

DIVISION 02 – EXISTING CONDITIONS

DIVISION 03 - CONCRETE

DIVISION 11-EQUIPMENT

DIVISION 31 - EARTHWORK

DIVISION 32 - EXTERIOR IMPROVEMENTS

DIVISION 33 – UTILITIES

ATTACHMENTS

END OF TABLE OF CONTENTS

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SECTION 010100 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED SECTIONS

A. Section 00 2113 – Bid Instructions

B. Section 01 3114 – Conduct of the Work

C. Section 02 2113 – Existing Conditions

1.3 GENERAL SCOPE OF WORK

A. The Somerset Tennis Complex Renovation at St. Mary's College shall include:

1. The demolition of existing site features to include, but not limited to, the existing tennis courts complex, chain link fence perimeter fencing, adjacent pedestrian walkways, and other appurtenances as detailed in the Contract Documents.
2. The construction of bituminous pavement tennis courts includes the installation of tennis nets, posts, new perimeter fencing, portable bleacher, and other appurtenances, as detailed in the Contract Documents.
3. Various site improvements to include landscaping, concrete walkways, pavilion area, and all other requirements, as detailed in the Contract Documents.
4. The restoration of any items damaged or destroyed by encroaching upon areas outside the Project Site.
5. Existing lighting system (Poles, foundations, panels, conduit, infrastructure, etc.) shall remain and be protected. Contractor shall be responsible for repair/ replacement/ rerouting of conduit/ wiring as necessary to perform work.
6. Providing and restoring, where appropriate, all temporary facilities.
7. All other work indicated on the contract plans and/or specifications.

1.4 TIME OF COMPLETION

A. Project Start: TBD

B. Substantial Completion: TBD

C. Final Completion: TBD

D. Prior to construction, the Contractor shall provide a detailed Gantt Chart schedule noting the start and end date of each task to be completed. The schedule shall include submission dates for key product submittals.

1.5 TESTING

A. 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. However the Owner shall pay for testing of concrete. The Contractor shall coordinate and schedule concrete testing.

1.6 MEETINGS

A. A competent representative of the Contractor who is familiar with the site and the progress of the work is required to attend weekly jobsite meeting during the period of construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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.

B. Prices for each Alternate shall include overhead, bonding, profit, and all other expenses incidental to the Work under each Alternate.

C. 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 – Install 20' x 20' Pavilion with concrete pad. (refer to Sheet C101).

B. Alternate No. 2 – Install two (2) Portable Bleachers (47 seats) with concrete pad. (refer to Sheet C101)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 013114 – CONDUCT OF THE WORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED SECTIONS

A. Section 01 0100 – Summary of Work

B. Section 02 2113 – Existing Conditions

1.3 PROJECT MANAGEMENT

A. Adjacent school buildings proximate to the project sites may 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.

B. 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.

C. Unless specifically authorized by the Owner, in writing, the work must be conducted between the hours of 7:00 A.M. and 5:00 P.M., Monday through Friday. No work is to be done on holidays or Sundays, other than for emergencies or as approved by the Owner. Work may be allowed on Saturdays, provided the Contractor obtains the Owner's written approval at least one week prior to the date of such work.

D. The Contractor is responsible for the security of partially completed work until the Owner accepts the project.

E. 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.

F. 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.

1.4 SHUTDOWN OF SERVICES

A. 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.

1.5 COORDINATION

A. At the pre-construction conference, the Contractor will submit to the Owner for approval, a detailed project progress schedule showing the sequence of operations. The progress schedule will be in a gantt chart or CPM format with tasks on the critical path clearly identified. The progress schedule must reflect achievements of the required substantial and final completion dates. The Owner may request a revised progress schedule at any point in the project when the working progress schedule is determined to be out of date. The Owner must approve any changes to this operational plan.

B. 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.

C. 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

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SECTION 013302 – SUBMITTAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED DOCUMENTS

A. Consult the individual sections of the specifications for the specific submittals required under those sections and for further details and descriptions of the requirements.

1.3 GENERAL PROCEDURES FOR SUBMITTALS

A. 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.

B. 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.

C. 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.

D. 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.

E. 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.

F. 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.

G. 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.

1.4 OR EQUALS

A. 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.

B. 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.

C. 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.

D. 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.

E. 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.

F. 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.

1.5 SUBMISSION OF SHOP DRAWINGS

A. 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.

B. Shop Drawings will be for whole systems. Partial submissions will not be accepted.

C. The Engineer reserves the right to review and approve shop drawings only after approval of related product data and samples.

D. 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.

E. The Contractor will submit to the Engineer legible shop drawings. Shop drawings shall be electronic PDF Format.

F. When the shop drawing 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 to the Engineer for approval. This procedure will be repeated until the Engineer's approval is obtained.

G. When the shop drawing is returned by the Engineer with the stamp "Approved" or "Make Corrections Noted", the Contractor will provide and distribute the drawing for all Contractors and Subcontractors use.

H. 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.

I. 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.

1.6 SUBMISSION OF PRODUCT DATA

A. The Contractor will submit Product Data to the Engineer via electronic PDF Format. 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.

B. Product Data will be accompanied by a transmittal notice. The Contractor's stamp of approval will appear on the information itself, in a location which will not impair legibility.

C. Product Data returned by the Engineer as "Rejected" will be resubmitted until the Engineers approval is obtained.

D. When the Product Data is acceptable, the Engineer will stamp them "Approved" or "Make Corrections Noted", and return to the Contractor. The Contractor will provide and distribute as may be required to complete the Work.

E. The Contractor will maintain one full set of approved, Product Data at the site.

1.7 SUBMISSION OF SAMPLES

A. Unless otherwise specified in the individual section, the Contractor will submit two (2) specimens of each sample required for submission.

B. 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.

C. 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.

D. 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.

E. 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.

F. 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

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SECTION 013543 – ENVIROMENTAL PROTECTION PROCEDURES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 SUMMARY

A. Furnishing all labor, materials, equipment and perform all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and, as the result, of construction operation under this Contract. For the purpose of this Section, environmental pollution is defined as the presence of chemical, physical or biological elements, or agents, which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires consideration of air, water and land, and involves management of runoff, dust, noise and solid waste, as well as other pollutants. Work will include installing, maintaining and removing sedimentation and erosion control components within the Limits of Work.

C. This Section does not address erosion and sedimentation control requirements, which are addressed in Section 31 2500 of these Specifications.

1.3 SECTION INCLUDES

A. Applicable Regulations

B. Notifications

C. Protection of Groundwater

D. Protection of Streams And Wetlands

E. Protection of Land Resources

F. Protection of Air Quality

G. Maintenance of Pollution Control Facilities During Construction

H. Noise Control

I. Diesel Equipment Emission Controls

J. Spill And Discharge Control

1.4 RELATED SECTIONS

A. Section 01 5000 - TEMPORARY FACILITIES

B. Section 02 4113 – SELETIVE SITE DEMOLITION

C. Section 31 1000 - SITE CLEARING

D. Section 31 23 19 - DEWATERING

E. Section 31 2000 - EARTH MOVING

F. Section 31 2500 - EROSION AND SEDIMENTATION CONTROLS

1.5 APPLICABLE REGULATIONS

A. The General Contractor will comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

B. Fines and related costs resulting from failure to provide adequate protection against any environmentally objectionable acts and corrective action to be taken are the obligations of the General Contractor.

1.6 NOTIFICATIONS

A. Engineer may notify the General Contractor, in writing, of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements may notify the General Contractor, in writing, through the Engineer, of any non-compliance with State or local requirements. After receipt of such notice from the Engineer or from the regulatory agency, through the Engineer, the General Contractor will immediately take corrective action. Such notice, when delivered to the General Contractor or his/her authorized representative at the site of the Work, will be deemed sufficient for the purpose. If the General Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. No part of the time lost, due to any such stop orders, will be made the subject of a claim for extension of time or for excess costs or damages by the General Contractor, unless it is later determined that the General Contractor was in compliance.

PART 2 - MATERIALS

2.1 WATER

A. Water used for dust control and equipment washes will be clean and free of salt, oil and other injurious materials. The General Contractor will provide all necessary water.

B. ONSITE SPILL KIT

1. The General Contractor will provide the following minimum equipment to be kept onsite, at all times, during site work activities for any unexpected spills or discharges:

2. Sand, clean fill and absorbent pillows;
3. Four (4) drum drums (55 gallon, U.S. DOT 17-E or 17-H);
4. Shovels; and
5. Steam cleaner for decontamination of tools and equipment.

PART 3 - EXECUTION

3.1 PROTECTION OF GROUNDWATER

3.2 PROTECTION OF STREAMS AND WETLANDS

A. Care will be taken to prevent, or reduce to a minimum, any damage to any wetland from pollution by debris, sediment, or other material. Manipulation of equipment and/or materials in delineated wetland areas is prohibited. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in downstream waters of the state will not be discharged from the Site. Such waters will be collected and disposed of by the General Contractor, in accordance with all applicable Federal, State and local regulations.

3.3 PROTECTION OF LAND RESOURCES

A. Land resources, within the project boundaries and outside the limits of permanent work, will be restored to a condition, after completion of remediation activities that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to Limits of Work areas shown on the Drawing.

B. Outside of the Limits of Work as shown on the Drawing, do not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. Snow fence or other approved equal will be erected at the "fall line" of the tree canopy, and no vehicles or storage will be permitted within, to prevent damage to trees.

C. The locations of storage and other facilities, required in the performance of the Work, will not be within wetlands or resource areas.

3.4 PROTECTION OF AIR QUALITY

A. Burning – The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. Dust Control – Maintain all demolition excavations, stockpiles, waste areas and all other work areas within or without the project boundaries free from dust, which could cause the standards for air pollution to be exceeded (MADEP 310 CMR 7.09.-7.10) and, which would cause a hazard or nuisance to others.

C. The General Contractor will provide adequate means for the purpose of preventing dust and odor caused by construction operations throughout the period of the construction contract. If the Designer indicates that the level of dust or odors is unacceptable, the General Contractor will employ measures necessary to reduce dust or odors to an acceptable level.

D. The General Contractor will implement engineering controls (e.g. watering, misting) to control dust whenever required by the Engineer.

3.5 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this Contract, maintain all facilities constructed for pollution, erosion and sedimentation control as long as the operations creating the particular pollutant area being carried out.

3.6 NOISE CONTROL

A. The General Contractor will develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum. Local noise ordinances will govern.

B. The General Contractor will execute construction work by methods and by use of equipment, which will reduce excess noise.

C. Equipment will be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with Federal and State regulations.

D. The General Contractor will manage vehicular traffic and scheduling to reduce noise.

3.7 DIESEL EQUIPMENT EMISSION CONTROLS

A. All motor vehicles and construction equipment will comply with all pertinent local, state, and federal regulations covering exhaust emission controls and safety.

B. All General Contractor and Subcontractor diesel-powered, non-road construction equipment with engine horsepower (HP) ratings of 50HP and above, which are used on the Project Site, for a period in excess of 30 calendar days over the course of the construction period on the Project Site, will be retrofitted with Emission Control Devices in order to reduce diesel emissions.

C. The reduction of emissions of volatile organic compounds (VOCs), carbon monoxide (CO) and particulate matter (PM) from diesel-powered equipment will be accomplished by installing Retrofit Emission Control Devices.

D. Construction will not proceed until the General Contractor has submitted a certified list of the non-road, diesel-powered, construction equipment subject to this specification which are, or will be, retrofitted with emission control devices. The list will include: (1) the equipment number, type, make and General Contractor/Subcontractor name; and (2) the emission control device make, model, and EPA verification number. General Contractors will also submit a receipt or other documentation from a manufacturer or installer that verifies that the appropriate equipment has been installed. The General Contractor will

also identify any vehicles that will use Clean Fuels. Equipment that has been retrofitted with an emission control device will be stenciled, or otherwise clearly marked as "Low Emission Equipment".

E. The General Contractor will submit monthly reports, updating the same information stated in Paragraph D above, including the quantity of Clean Fuel utilized. The addition, or deletion, of non-road diesel equipment will be indicated in the report.

F. The General Contractor will use methods to control nuisance odors associated with diesel emissions from construction equipment including, but not limited to, the following: (1) turning off diesel combustion engines on construction equipment not in active use and on trucks that are idling for five (5) minutes or more; and (2) locating diesel equipment away from the general public and sensitive receptors.

G. All costs associated with implementation of the diesel equipment emissions control will be borne by the respective General Contractor and included in their cost for performing the work of the Contract.

3.8 SPILL AND DISCHARGE CONTROL

A. The General Contractor will provide equipment and personnel to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. The collected spill material will be properly disposed of at the General Contractor's expense.

B. Costs to provide the above spill and discharge control materials will be included in the contract base bid price.

END OF SECTION

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SECTION 015000 – TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 GENERAL REQUIREMENTS

A. 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

B. 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.

C. The Contractor must comply with all safety laws and regulations of the State of Maryland, the United States Government, and local government agencies applicable to Work under this contract. The Contractor's attention is directed to the State Maryland, Department of Labor and Industries Regulations.

D. 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).

1.3 FIELD OFFICES

A. A field office is not required for this project.

1.4 TEMPORARY TELEPHONES

A. 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.

1.5 TEMPORARY TOILETS

A. The Contractor will provide and service an adequate number of toilet booths, with chemical type toilets.

B. The toilets will be maintained by the Contractor in a clean and orderly condition, in compliance with all local and state health requirements.

C. Under no circumstances will the Contractor's personnel be allowed to use Owner's toilets.

1.6 TEMPORARY CONSTRUCTION FENCE

A. 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.

1.7 TEMPORARY STRUCTURES AND MATERIAL HANDLING

A. 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.

B. 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.

C. 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.

1.8 HOISTING FACILTIIES

A. 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.

1.9 TEMPORARY WATER

A. 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 metered and paid for by the contractor. If onsite water is not available the contractor is responsible for supplying temporary water.

B. The Contractor will provide all necessary backflow preventers, piping, and hoses to utilize the available sources of water.

C. The Contractor will provide an adequate supply of cool drinking water, with individual drinking cups, for personnel on the job.

1.10 TEMPORARY ELECTRICITY

A. The Contractor may make use of the electricity as available at the site as long as the electricity is metered and paid for by the contractor, provided that the Contractor will supply proper adapters and extension cords. Power requirements that cannot be met with onsite power 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.

B. 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.

C. All temporary work will be provided in conformity with the National Electric Code, state and local laws, and the requirements of the power company.

D. 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.

E. Electrical permits will be the responsibility of the Contractor to obtain.

1.11 WEATHER PROTECTION

A. 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.

END OF SECTION

SECTION 017000 – PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED DOCUMENTS

A. Consult the individual sections of the specifications for specific items required under those sections.

1.3 PERMITS

A. The Contractor will coordinate the efforts of all Subcontractors and obtain any final permits that may be required.

1.4 SUBSTANTIAL COMPLETION

A. 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.

B. 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 in additional to items that are not acceptable or incomplete. The Contractor will coordinate all Subcontractors to achieve prompt completion of the punch list.

C. The Contractor will not be relieved of the responsibility to provide Contract items omitted on the Engineer's punch list.

D. 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.

E. 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 on work which must be done before final acceptance.

F. The Engineer may revise the punch list, from time to time, to ensure that all items of Work are properly completed.

G. The Engineer will prepare the Certificate of Substantial Completion.

1.5 RECORD DRAWINGS

A. See Section 01 7123 – Surveys and Record Drawings

1.6 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Consult the individual sections of the specifications for the specific requirements for those sections and for further details and descriptions of the requirements

B. Prior to final payment and completion, the Contractor will provide all Operating Manuals and Maintenance Instructions, as required by the Contract Documents.

C. Operating Instructions and Manuals

1. Subcontractors, installers and suppliers will furnish to the Contractor two (2) sets of operating and maintenance instructions of all equipment furnished and installed by them.

2. The Contractor will collect all of the above instructions, bind them into two (2) 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.

D. 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.

1.7 FINAL COMPLETION

A. 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.

1.8 Partial Release of Retainage

A. If, within sixty (60) days after Substantial Completion, any of the items on the Engineer's 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.

1. If the Engineer is required to prepare a Certificate for Partial Release of Retainage, the Contractor will still complete all remaining Work.

2. The Contractor's signature on this Certificate will be notarized.

3. 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.

4. Upon completion of all remaining items, the Final Release of Retainage will be processed in accordance with Paragraph A above.

END OF SECTION

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SECTION 017123 – SURVEYS AND RECORD DRAWINGS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RECORD DRAWINGS

A. Prior to final payment, the Contractor will engage a Professional Land Surveyor (PLS) to complete an "on-the-ground" detailed survey and provide an as-built plan of all facilities within the limit of work. This includes grading, court layout, fencing, walkways, and all other related amenities within the project scope. The final submitted as-built will be stamped by a Professional Land Surveyor registered in Maryland, demonstrating compliance with all NCAA, USTA, American Sports Builders Association (ASBA), 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 or later format shall be provided. As-Built drawings that consist of the Engineer's electronic design file will not be accepted.

B. Record Drawings will consist of all the Contract Drawings with mark-ups made during construction.

C. From the sets of drawings furnished by the Owner, the Contractor will reserve one (1) set for record purposes.

D. The Contractor will keep their marked-up record 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 variations from the Contract Drawings. All changes, including those issued by Addendum, Change Order, or instructions by the Engineer will be recorded. Marked-up record drawings will be prepared for the entire project and include all Work, including, but not limited to:

E. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically, at ten-foot (10') intervals and at all changes of direction.

F. The Engineer may periodically inspect the marked-up record 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.

G. 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 record drawings 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.

H. The Engineer will review the marked-up record drawings and verify by letter to the Owner that the Work is complete. The Contractor will incorporate any and all changes into the as-built drawings.

I. The Contractor may make a written request for copies of the completed Record Drawings. The Contractor will reimburse the Owner directly for the cost of printing of any requested Record Drawings.

J. Submission of accurate marked-up record drawings, 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

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SECTION 017419 – CLEANING UP

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED DOCUMENTS

A. Consult the individual sections of the specifications for cleaning of Work installed under those sections.

1.3 CLEANING DURING CONSTRUCTION

A. Conduct cleaning and disposal operations to comply with local ordinances, anti-pollution laws and the Owner.

B. Do not burn or bury rubbish and waste materials on the site.

C. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

D. Do not dispose of wastes into streams or waterways.

E. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

F. Maintain the site free from accumulations of waste, debris and rubbish.

G. Provide on-site containers for collection of waste materials and rubbish.

H. At the end of each day, remove and legally dispose of waste materials and rubbish from site.

I. Schedule cleaning operations so that dust and other contaminants, resulting from cleaning process, will not fall on wet, newly applied surfaces.

J. Disposal of materials will be in compliance with all applicable laws, ordinances, codes and by-laws.

1.4 FINAL CLEANING

A. Prior to submitting a request to the Engineer to certify Substantial Completion of the Work, the Contractor will inspect all 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.

B. Unless otherwise specified under other sections of the Specifications, the Contractor

will perform final cleaning operations as herein specified prior to final inspection.

C. Cleaning will include all surfaces which Contractor has had access to, whether new or existing.

D. Employ experienced workmen or professional cleaners for final cleaning.

E. Use only cleaning materials recommended by the manufacturer of the surface to be cleaned.

F. Use cleaning materials which will not create a hazard to health or property and will not damage surfaces.

G. Remove grease, mastic, adhesive, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed 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.

H. Repair, patch and touch up marred surfaces to the specified finish, to match adjacent surfaces.

I. In cleaning items with 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.

J. Broom clean exposed concrete surfaces and paved surfaces. Rake clean other surfaces of grounds.

K. The Owner's responsibility for cleaning commences at Substantial Completion and transfer of occupancy from the Contractor to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017600 – PROTECTION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 PROTECTION OF PERSONS & PROPERTIES

A. All Owner facilities may be occupied during construction. The Contractor will take all necessary precautions to ensure public safety and convenience of the occupants during construction

B. 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.

C. 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.

1.3 TEMPORARY PROTECTION

A. The Contractor Will:

B. Protect all existing vegetation to remain that is in proximity to the site work required for completion of the construction project.

C. 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.

D. After the installation of the 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.

1.4 ACCESS

A. 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.

1.5 SECURITY

A. The Contractor will be responsible for providing all security precautions necessary to protect the Contractor's and Owner's interests.

B. Where excavation is involved, the Contractor will be responsible for providing continuous watchmen service, as necessary, to insure adequate protection of the general public.

1.6 NOISE AND DUST CONTROL

A. 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:

i. Keeping common pedestrian and vehicular circulation areas clean and unobstructed

ii. Applying water or other dust palliatives, as needed, for dust mitigation.

iii. Keeping all loose trash picked up and preventing it from blowing outside the limit or work.

1.7 FIRE PROTECTION

A. 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 all combustible rubbish and construction debris is promptly removed from the site.

B. Installation of equipment suitable for fire protection will be done as soon as possible after commencement of the Work.

1.8 WIND PROTECTION

A. 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.

1.9 WEATHER PROTECTION

A. The Contractor will provide Weather Protection, as required by Specification Section 01 5000, Temporary Facilities and any other specific requirements of the Contract Documents.

1.10 COORDINATION - NOTIFICATIONS

A. The Contractor will coordinate all work activities with the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 022113 – EXISTING CONDITIONS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED SECTIONS

A. Section 01 0100 – Summary of Work

B. Section 01 3114 – Conduct of the Work

1.3 EXISTING CONDITIONS

A. 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.

B. 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.

C. 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.

D. The Specifications include Test Pit Logs and Borings by Bob Taylor Engineering, Inc provided for information only. The Contractor shall remove all topsoil and organic material from beneath areas to receive pavements, and structures. 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.

E. 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.

1.4 SUBMITTALS

A. 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

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SECTION 023000 – SUBSURFACE INVESTIGATION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 SUBSURFACE INVESTIGATION

A. 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 (811-DIG-SAFE) at least 72-hours prior to excavation.

B. The Contractor may refer to the Test Pit Logs and Geotechnical Report in the Appendices.

1.3 CONFIRMATION OF GRADES AND UTILITIES

A. 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.

1.4 CONFIRMATION OF INTEGRITY OF ADJACENT STRUCTURES

A. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 024113 – SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 SUMMARY

A. Work to include the demolition of indicated existing utilities, drainage structures, fencing, fencing foundations, sports equipment, sports equipment foundations, bituminous concrete pavement, asphalt, topsoil, and grass.

B. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option and in full compliance with all applicable disposal regulations.

1.3 DESCRIPTION OF WORK

A. Work Included:

1. Demolition and removal of selected site elements as required for new work. Refer to the Drawings for additional requirements.

2. Salvage of existing items to be reused or turned over to the owner.

3. Removal and legal disposal of demolished materials off-site. Except those items specifically designated to be relocated, reused, or turned over to the owner, all existing removed materials, items, trash, unsuitable soils, stumps, and debris shall become property of the Contractor and shall be completely removed from the site and legally disposed of at her/his expense. Salvage value belongs to the Contractor. On-site sale of materials is not permitted.

4. Demolition and removal work shall properly prepare for alteration work and new construction to be provided under the Contract.

5. Scheduling and sequencing operations without interrupting utilities serving occupied areas. If interruption is required, obtain written permission from the utility company. Provide temporary services as necessary to serve occupied and usable facilities when permanent utilities must be interrupted, and schedule interruption when the least amount of inconvenience will result.

B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 01 5000 - TEMPORARY FACILITIES: Maintenance of access, cleaning during construction, dust and noise control.

1.4 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to the Owner ready for reuse, at a location designated by the Owner. Protect from weather until accepted by Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated. Protect from weather until reinstallation.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.5 MATERIALS OWNERSHIP

A. Where indicated on plan, Historic items, relics, and similar objects including, but not limited to, ornamental signage, metalwork, cornerstones and their contents, commemorative plaques, antiques, and other items of interest or value that may be encountered during demolition shall remain property of the Owner as applicable. Carefully remove each item or object in a manner to prevent damage and deliver promptly to a location acceptable to the Owner.

B. Excess topsoil: Refer to Site Clearing 31 1000.

C. Except for materials indicated to be stockpiled, reused, or to remain as the Owner's property, cleared materials shall become the Contractor's property and shall be removed from the site.

1.6 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with early and late starting and finishing dates for each activity. Ensure Owner's on-site operations are uninterrupted if applicable.

2. Coordination of Owner's continuing occupancy of portions of existing site.

3. Means of protection for items to remain and items in path of removal.

B. Submit 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. Submit photographs of existing items to be removed and reinstalled to record original condition of objects to be retained.

1.7 RECORD DRAWINGS

A. Record drawings at Project Closeout shall be in accordance with Division 1.

B. Identify and accurately locate capped utilities and other subsurface conditions.

1.8 REGULATORY REQUIREMENTS

A. Comply with governing State and EPA notification regulations, before starting selective demolition. Comply with the hauling and disposal regulations of any authorities having jurisdiction.

B. The Owner will occupy portions of the facilities and fields immediately adjacent to selective demolition areas. Conduct selective demolition so that the Owner's operations will not be disrupted. Provide not less than 72 hours of notice to the Owner of activities (if any) that may affect the Owner's operations.

C. The Owner assumes no responsibility for the actual condition of facilities or items to be selectively demolished or removed and reused.

D. Storage or sale of removed items or materials on-site will not be permitted without the Owner's permission.

1.9 QUALITY ASSURANCE

A. Examination of Existing Conditions: The Contractor shall examine the Contract Drawings for demolition and removal requirements and provisions for new work. Verify all existing conditions and dimensions before commencing work. The Contractor shall visit the site and examine the existing conditions as he finds them and shall inform herself/himself of the character, extent and type of demolition and removal work to be performed. Submit any questions regarding the extent and character of the demolition and removal work in the manner and within the time period established for receipt of such questions during the bidding period.

1.10 WARRANTY

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

existing warranties.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXECUTION

A. Prior to commencing any excavation or demolition, the Contractor shall take all actions necessary to fully protect the existing facilities from damage. The Contractor shall take all actions required to repair any damage and return the fields to their existing conditions.

B. Survey the condition of the site to determine whether removing any element might result in the undesirable damage of any portion of the adjacent facilities during selective demolition.

C. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Conduct demolition operations and remove debris to ensure minimum interference with roads, parking lots, streets, walks and other adjacent occupied and utilized facilities.

E. 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 selective demolition areas.

F. Use water mist and other suitable methods, as necessary, to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

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

H. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to conditions existing before the start of selective demolition.

I. Demolish and remove existing construction only to the extent required by new construction and as indicated. The Contractor is to be responsible for any cutting and patching that is required.

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

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

L. 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.

M. Disposal: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

N. Do not burn demolished materials.

O. Transport demolished materials off the Owner's property and legally dispose of them, if they are not designated for salvage by the Owner or reuse.

P. In areas where bituminous concrete is to be removed, the edge of any bituminous concrete to remain must be a sawcut edge.

Q. Items to be removed and reset may be stored on site, at a location approved by the Owner.

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

3.2 PREPARATION

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

1. Comply with requirements for access and protection specified in Section 01 5000 - TEMPORARY FACILITIES.

B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area(s).

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction. Provide temporary barricades as required to limit access to demolition areas.

2. Protect existing site improvements, appurtenances, and landscaping to remain.

3.3 DISCOVERY OF HAZARDOUS MATERIALS

A. If hazardous materials, such as chemicals, asbestos-containing materials, or other hazardous materials are discovered during the course of the work, cease work in affected area only and immediately notify the Designer of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Continue work in other areas.

B. If unmarked containers are discovered during the course of the work, cease work in the affected area only and immediately notify the Designer of such discovery. Do not

proceed with work in such areas until instructions are issued by the Designer. Take immediate precautions to prohibit endangering the containers integrity. Continue work in other areas.

3.4 CUTTING

A. Provide a flush saw cut edge where pavement, curb and concrete removals abut new construction work or existing surfaces to remain undisturbed.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Comply with requirements of Section 01 7419 - CLEANING UP and the following.

1. Do not allow demolished materials to accumulate on-site.

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

3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

    A. Burning: Do not burn demolished materials.

    B. Burning: Do not burn demolished materials.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Premises shall be left in a clean condition and ready to accept alteration work and new construction.

END OF SECTION

SECTION 031000 – CONCRETE FORMWORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED WORK

A. 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 03 2000 - Concrete Reinforcement
2. Section 03 3000 - Cast-In-Place Concrete
3. Section 31 2000 - Earth Moving

1.3 WORK INCLUDED

A. The Contractor shall supply all labor, materials, equipment, temporary protection, tools and appliances necessary for the proper completion of the work in this section, as required in the specifications and in accordance with good construction practice. The work under this section generally includes the following:

B. Furnish, erect, and remove after use, all concrete formwork and accessories, as required for cast-in-place concrete work.

1.4 REFERENCES

A. Comply with applicable requirements of the following standards (current edition). Where these standards conflict with other requirements, the most restrictive requirements shall govern.

1. AMERICAN CONCRETE INSTITUTE (ACI)
2. ACI 301 Specifications for Structural Concrete
3. ACI 318/318R Building Code Requirements for Structural Concrete and Commentary
4. ACI 347R Guide to Formwork for Concrete
5. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
6. ASTM C578 Rigid, Cellular Polystyrene Thermal Insulation
7. AMERICAN HARDBOARD ASSOCIATION (AHA)

8. AHA A135.4 Basic Hardboard
9. DEPARTMENT OF COMMERCE (DOC)
10. DOC PS 1 Construction and Industrial Plywood
11. MARYLAND STATE BUILDING CODE

1.5 SUBMITTALS

A. The following shall be submitted in accordance with Section 01 3302 SUBMITTAL PROCEDURES:

1. Data: Design analysis and calculations for form design and methodology used in the design.
2. Manufacturer's data, including literature describing form materials, accessories, and form releasing agents.
3. Drawings: Drawings showing details of formwork including, joints, supports, studding and shoring and the sequence of form and shoring removal.
4. Instructions: Manufacturer's recommendation on method and rate of application of form releasing agents.

1.6 DESIGN

A. Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures and stresses.

B. Forms shall be capable of producing a surface which meets the requirements of the class of finish specified in Section 03 3000 CAST-IN-PLACE CONCRETE.

C. Forms shall be capable of withstanding the pressures resulting from the placement and vibration of concrete, in addition to applicable and anticipated construction loads.

1.7 QUALITY CONTROL

A. A.Unless otherwise specified herein, or indicated on the drawings, concrete formwork construction and materials shall conform to ACI 301, 318, and 347, and the following tolerances:

TABLE 1: TOLERANCES FOR FORMED SURFACES			
1.	Variations from the plumb.	In any 10 feet of length.	¼ inch
a.	In the lines and surfaces of piers, walls.	Maximum for entire length and in arises.	1 inch

2.	Variation from the level or from the grades indicated on the drawings.	In any 10 feet of length. In any bay or in any 20 feet of length.	¼ inch 3/8 inch
3.	Variation in the thickness of slabs and walls.	Minus. Plus.	¼ inch ½ inch
4.	Footings.		
a.	Variation of dimensions in plan. When formed: When placed against unformed excavation:	 Minus. Plus. Plus.	 ½ inch 2 inches 3 inches
b.	Misplacement of the eccentricity.	2 percent of the footing width in direction of misplacement. But not more than	 2 inches
c.	Reduction in thickness.	Minus.	5 percent of specified thickness

B. The maximum deflection of form facing materials at concrete surfaces exposed to view shall be L/240 of span.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for Class A and Class B finished surfaces shall be plywood panels conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used, provided the smoothness and appearance of the concrete produced will be equivalent to that produced by the plywood concrete form panels.

B. Forms for Class C finished surfaces shall be shiplap lumber; plywood conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II; tempered concrete form hardboard, conforming to AHA A135.4; other approved concrete form material; or steel, except that steel lining on wood sheathing shall not be used.

C. Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

D. Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than ¼ inch, nor more than 1 inch deep and not more than 1 inch in diameter. Removable tie rods shall not be more than 1-½ inches in diameter.

E. Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces, depending upon bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

F. Form release agents shall be fully compatible with project specified foundation waterproofing, damp-proofing, vapor barriers and sealants.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Forms shall be mortar tight, properly aligned, and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03 3000 CAST-IN-PLACE CONCRETE. Forms shall conform to construction tolerances given in TABLE 1, "Tolerances for Formed Surfaces", of this Section, Part 1.

B. Where concrete surfaces are to have a Class A or Class B finish, joints in form panels shall be arranged as approved. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar.

C. Forms shall not be reused if there is any evidence of surface wear and tear, or defects which would impair the quality of the surface. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse.

D. Form ties that are to be completely withdrawn shall be coated with a non-staining bond breaker.

E. Formwork and form ties shall not be placed in a location or manner which would cause interference with or impede the performance of reinforcing, embedded items or water stops.

3.2 CHAMFERING

A. Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled or rounded by moldings placed in the forms.

3.3 COATING

A. Forms for Class A and Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions.

B. Forms for Class C and D finished surfaces may be wet with water, in lieu of coating immediately, before placing concrete; except that in cold weather with probable freezing temperatures, coating shall be mandatory.

C. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be completely removed before placing concrete. Insofar as practical, form release agents shall be applied to form surfaces prior to placing the forms into position.

3.4 REMOVAL OF FORMS

A. Forms shall be removed in a manner that will prevent damage to the concrete and will ensure the complete safety of the structure. Formwork for footings, walls and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation, but not before at least 24 hours has elapsed since concrete placement.

B. Supporting forms and shores shall not be removed from walls until the structural units are strong enough to carry their own weight and any other construction or natural loads.

C. In no case will supporting forms or shores be removed before the concrete strength has reached 70 percent of design strengths, as determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens and by a structural analysis, considering the proposed loads in relation to these test strengths and the strength of the forming and shoring system.

D. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

END OF SECTION

SECTION 032000 – CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACT REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.2 RELATED WORK

A. 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 03 1000 – Concrete Formwork

2. Section 03 3000 – Cast-in-Place Concrete

1.3 WORK INCLUDED

A. In general, the Contractor shall supply all labor, materials, equipment, temporary protection, tools and appliances necessary for the proper completion of the work in this section, as required in the specifications and in accordance with good construction practice. The work under this section generally includes the following:

1. Furnish and install reinforcing bars, tie wires and supports, as required.

2. Furnish and install welded wire fabric, as required.

3. All reinforcing must be grounded in accordance with the National Electric Code and MD State Building Code. Coordinate with electrical engineer and contractor.

4. Clean all areas affected by the work.

1.4 REFERENCES

A. Comply with applicable requirements of the following standards (latest edition). Where these standards conflict with other requirements, the most restrictive requirements shall govern.

1. American Concrete Institute Standards (ACI), Latest Edition.

    a. 117- Specifications for Tolerances for Concrete Construction and Materials and Commentary

    b. 301- Specifications for Structural Concrete

    c. 318 - Building Code Requirements for Structural Concrete

    d. 315 - Details and Detailing of Concrete Reinforcement.

    e. 315R Manual of Engineering and Placing Drawings for Reinforced Concrete Structures

2. American Society for Testing and Materials (ASTM)

    a. A615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement

3. Concrete Reinforcing Steel Institute (CRSI)

    a. Manual of Standard Practice, Latest Edition

    b. Placing Reinforcing Bars, Latest Edition

1.5 SUBMITTALS

A. The following shall be submitted in accordance with Section 01 3302 SUBMITTAL REQUIREMENTS:

B. Shop Drawings:

1. Show sizes and dimensions for fabrication and placing of reinforcing steel and bar supports. Indicate bar schedules, stirrup spacing and diagrams of bent bars, including all accessories.

2. Reinforcement in foundation walls, piers and footings shall be shown in elevation of at least ¼" = 1'-0".

3. Detail reinforcing in accordance with ACI 215.

C. Certificates:

1. Mill test certificates; identifying the chemical and physical analysis of each load of reinforcing steel delivered.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcement to project site, in bundles, marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent contamination and contact with the ground. Store reinforcing steel under cover and protect from rusting, oil, grease and/or distortion.

C. Remove from storage only those materials needed for immediate use.

1.7 QUALITY CONTROL

A. Reinforcing steel shall be fabricated to conform to the required shapes, dimensions and tolerances specified in the CRSI Manual.

B. Allowable Tolerances:

1. Fabrication Tolerances: Sheared Length: Plus or minus 1 inch for bends. Stirrups, ties, and spirals: Plus or minus ½ inch.

2. Placement Tolerances:

a. When member depth (or thickness) is 4 in. or less: Plus or minus ¼ in.

b. When member depth (or thickness) is over 4 in. and not over 12 in.: Plus or minus 3/8 in.

c. When member depth (or thickness) is over 12 in.: Plus or minus ½ in.

3. Minimum spacing between bars: The greater of the bar diameter or 1 in. for unbundled bars.

4. Top bars in slabs and beams: Members 8 inches deep or less: Plus or minus ¼ in.; Members between 8 inches and 2 feet: Plus or minus ½ inch; Members 2 feet deep or greater: Plus or minus 1 inch.

5. Crosswise of members: Spaced evenly within 2 inches.

6. Lengthwise of members: Plus or minus 1 inch.

7. Maximum bar movement, to avoid interference with other reinforcing steel, conduits or embedded items: 2 bar diameters.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars; Ties and Stirrups:

1. Deformed billet steel: ASTM A615, Grade 60.

2. Bend test: Meet 90° bend test at 60° F minimum temperature, around a 10 bar diameter bend, without cracking.

B. Welded Wire Mesh:

1. Size per plans, conform to ASTM A884, Epoxy Coated.

2. All welded wire mesh to be provided in flat sheets.

3. All supplied welded wire mesh shall meet the current test criteria from the following four (4) ASTM Standards: A82, A496, A185 and A497.

C. Tie Wire:

1. Annealed Steel - Federal Specification QQ-W-461, 16 gage minimum.

D. Bar Supports; Accessories:

1. Conform to "Bar Support Specifications", CRSI Manual of Standard

2. Practice, Class B – Pre-galvanized Cold-Drawn Wire.

3. All necessary spacers, ties, chains, bolsters and other devices required to properly support and fasten reinforcing shall be galvanized or plastic, in accordance with ACI 315. Legs or other parts in contact with forms of exposed surfaces shall be plastic coated.

E. Fiber Reinforcement:

1. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1-1/2 inches (38 mm)] long.

a. Available Products:

1) Axim Concrete Technologies; Fibrasol F.
2) Euclid Chemical Company (The); Fiberstrand F.
3) FORTA Corporation; Forta.
4) Grace Construction Products, W. R. Grace & Co.; Grace Fibers.
5) SI Concrete Systems; Fibermesh.

2.2 FABRICATION

A. In accordance with CRSI Manual of Standard Practice.

B. Fabricate and mark reinforcing bars, in accordance with ACI 315 and ACI 318.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove all mud, oil, loose rust or mill scale and other foreign materials that may reduce bond prior to placing concrete. "Tight" rust or mill scale will be permissible without cleaning or brushing, provided weights and dimensions are not less than the minimum required by referenced specifications.

B. Form oils shall be placed prior to erecting around reinforcement; or, if applied in the vicinity of reinforcement, adequate masking shall be temporarily placed to avoid coating the reinforcing steel with form release agents.

C. All bars shall be cold bent to the required shapes before they are placed in the forms. Reinforcement shall not be straightened or re-bent in a manner that will injure, damage or weaken the material.

D. Bars with kinks or bends not required shall not be used.

3.2 INSTALLATION

A. Reinforcing Bar Placement:

1. Conform to CRSI-WCRSI, "Placing Reinforcing Steel".

2. Position bars in accordance with above tolerances and secure in place.

3. All rods shall be securely wired together at all intersections.

4. Where continuous bars are called for, they shall be run continuously around corners and lapped at necessary splices or booked at discontinuous ends. Laps shall be forty (40) bar diameters, unless otherwise shown.

B. Notify the Engineer for inspection of the completed installation of reinforcement at least forty-eight (48) hours prior to the scheduled placement of concrete

C. Welded Wire Mesh Placement:

1. Install in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

2. Mesh shall be wired or clipped together at laps, at intervals not to exceed 4 feet. Mesh shall be positioned by the use of appropriate supports suitable for application.

3. Welded wire mesh must be adequately supported and placed 2" below the top surface of the slab. Mesh shall lap 6" minimum, or one space, whichever is larger.

4. Maximum space between chair supports for mesh shall be 18" in each direction.

D. Bar Supports:

1. Provide minimum number of supports, as required by ACI 315.

2. Do not use pebbles, pieces of broken stone, brick, concrete, metal pipe or wood blocks to support reinforcement. Do not use bar supports as support for runways for concrete buggies or similar loads. Do not place bars more than 2 inches beyond the last leg at the end of a run of continuous supports.

3. All reinforcement shall be securely held in place with approved supporting, spacing and tying devices. Concrete supports require the Engineer's approval.

4. Maximum space between bar supports shall be 24" in each direction.

E. Concrete Cover:

1. Except as otherwise indicated on the construction drawings; provide the minimum clearance for concrete cover, in accordance with ACI 318.

F. Reinforcing Adjustment:

1. Move only within allowable tolerances to avoid interference with other reinforcing steel, conduits or embedded items. Do not move bars beyond allowable tolerance without approval of the Engineer.

2. Do not heat, bend or cut bars without the approval of the Engineer.

G. Splices:

1. Do not splice bars, except at locations on the details, without the approval of the Engineer.

2. Minimum lap distance is as shown on the details and as specified in ACI 318. Tie splices securely with wire to prevent displacement during the placing of concrete.

END OF SECTION

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SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED REQUIREMENTS

A. Section 03 10 00 – Concrete Formwork

B. Section 03 20 00 – Concrete Reinforcement

1.3 SCOPE OF WORK

A. In general, the Contractor shall supply all labor, materials, equipment, temporary protection, tools and appliances necessary for the proper completion of the work in this section, as required in the specifications and in accordance with good construction practice. The work under this Section includes cast-in-place concrete as shown on the contract documents.

B. Clean all areas affected by the work to the satisfaction of the Owner.

1.4 JOB CONDITIONS

A. The Contractor shall provide all protection, barriers, and guards necessary to segregate his work area and the areas below, from pedestrian and vehicular traffic. Also protect existing buildings, landscaping and paved areas from damage.

B. The Contractor shall be responsible for securing and protecting his/her equipment, materials and tools (as well as partially completed construction) from wind blow-off and vandalism or abuse.

C. Environmental Requirements: Do not place concrete during rain, sleet or snow unless adequate protection is provided and the Engineer's approval is obtained. Do not allow rainwater to increase the mixing water or damage the surface finish.

D. Cold Weather Concreting:

1. Conform to ACI 306 latest edition, "Recommended Practice for Cold Weather Concreting."
2. Temperature of concrete when placed shall not be less than the following:

Minimum Concrete Temperature °F
Sections with Least Dimension

Air Temp (°F)	Under 12"	12" and Over
30 to 45	60	50
0 to 30	65	55
Below 0	70	60

3. When placed, heated concrete shall not be warmer than 80° F.
4. Prior to placing concrete, all ice, snow, and surface and subsurface frost shall be removed, and the temperature of the surfaces to be in contact with the new concrete shall be raised to the temperature specified above for placing.
5. Protect the concrete from freezing for four (4) days after placement.
6. Heated enclosures shall be strong and windproof to ensure adequate protection of corners, edges and thin sections. Do not permit heating units to locally heat or dry the concrete. Do not use combustion heaters during the first 24 hours unless the concrete is protected from exposure to exhaust gases which contain carbon dioxide.
7. When air temperature gets below 25 degrees F, two (2) additional ASTM C39 cylinders shall be made and located at the site in a location and under conditions which will match the placement that they represent. After seven (7) days of site conditions, the cylinders shall be placed in a steam room for twenty-one (21) days.

E. Hot Weather Concreting:
1. Conform to ACI 305 latest edition, "Recommended Practice for Hot Weather Concreting." Take precautions when the ambient air temperature is 90° or above. Temperature of the concrete when placed shall not exceed 80° F. Cool forms and reinforcing to a maximum of 90° F by spraying with water prior to placing concrete. Do not use cement that has reached temperatures in excess of 170° F.

F. Prevent plastic shrinkage cracking due to rapid evaporation of moisture. Do not place concrete when the evaporation rate (actual or anticipated) equals or exceeds 0.20 pounds per square foot per hour, as determined by Figure 2.1.4 of ACI 305.
1. Set-retarding admixtures may be used with Engineer's approval when the ambient air temperature is 90° F or above to off-set the accelerating effects of high temperatures.

1.5 QUALITY ASSURANCE

A. Reference Standards: Except as modified or supplemented herein, all concrete materials, placing, furnishing, curing and all other appurtenant work shall meet the requirements of the latest edition of the following Standard Specifications. Pertinent portions of the reference standards are included herein. Refer to the standards for detailed requirements.

1. AMERICAN CONCRETE INSTITUTE STANDARDS (ACI)
    a. 301 - Standard Specifications for Structural Concrete for Buildings.
    b. 304 - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
    c. 316 - Building Code Requirements for Reinforced Concrete
    d. 318 – Building Code Requirements for

B. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. ATMS C109 "Test Method for Compressive Strength of Hydraulic Cement Mortars"

1.6 SUBMITTALS

A. Refer to Section 01 3302 - Submittals. Supplement with the following:

B. Test Reports: Perform and submit test reports for the following products in accordance with above general reference standards and specific standards set forth hereafter.

C. Proposed Mix Design:

1. Prior to commencing concrete work submit and obtain Engineer's approval of certified test report describing proposed concrete mix design, including:
    a. Fine Aggregates - Source, type, gradation, deleterious substances and saturated surface dry specific gravity (ASTM C128).
    b. Coarse Aggregates - Source, type, gradation, deleterious substances and saturated surface dry specific gravity (ASTM C127); soundness (ASTM C88).
    c. Ratio of fine to total aggregates.
    d. Weight (surface dry) of each aggregate per cubic yard.
    e. Total water content (gallons) per cubic yard, water/cementitious materials ratio and proposed source.
    f. Slump on which design is based, ASTM C143.
    g. Brand, type and quantity of cement.
    h. 7-day and 28-day compressive strength results from each of two sets of test cylinders for each proposed mix.
    i. Air Content, ASTM C231 or ASTM C173.
    j. Certifications of Chloride Content of admixtures.
    k. Water soluble chloride ion content of concrete, ASTM G1218.

l. Proportions of all ingredients including all admixtures added either at time of batching or at job site.

D. Cylinder Compression Test Reports:
1. Submit two copies of certified test reports to Engineer indicating results of tests required in Part 3 hereof.

E. Ready-Mix Delivery Tickets:
1. Submit one copy to the Engineer of ready-mix delivery ticket for each load delivered.
2. Include identification and quantity of concrete supplied.
3. Include time loaded and time unloaded.
4. Reading of revolution counter at times initial water added, supplemental water added, and unloading completed.
5. Amounts of initial and supplemental water added, and name of individual authorizing supplementing water.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store cement in watertight enclosures and protect against dampness, contamination and warehouse set.

B. Stock pile aggregates to prevent segregation, or contamination with other materials or other sizes of aggregates. Use only one supply source for each aggregate stockpile.

C. Store admixtures to prevent contamination, evaporation or damage. Protect liquid admixtures from freezing or harmful temperature ranges. Agitate emulsions prior to use.

D. Store rubber and plastic materials in a cool place away from direct sunlight.

1.8 INSPECTION AND TESTING

A. The Contractor agrees to accept as final the results of tests, inspection and reports as may be made by the testing laboratory.

B. Inspection
1. During the progress of the work, the General Contractor shall provide free and safe access to the work at all times to the Engineer and the Owner's representative. He/she shall cooperate with the Engineer to obtain proper inspection of all work and shall furnish any required samples of concrete for testing.

C. Laboratory Inspection and Testing

1. During the progress of the work, a testing laboratory paid for by the Contractor, contacted and coordinated by the Contractor, and approved by the Engineer, shall conduct necessary field tests and make compensation for any variation in water content of the aggregate; and shall further direct that all batches shall be as nearly uniform as possible by the use of selected materials which are accurately measured, thoroughly mixed, and maintained at a constant water-cement ratio and consistency.
2. Provide the Owner and Engineer with necessary reports covering all of the above.
3. The payment for laboratory inspection and testing will be the responsibility of the Contractor.
4. Coordination and scheduling of tests by the testing lab shall be the responsibility of the Contractor.
5. Testing required because of changes requested by the Owner in materials, sources of materials, or mix proportions; and extra testing of concrete or materials because of failure to meet the Specification requirements are to be paid for by the Owner.

D. Required Testing During Construction:

The following minimum testing shall be performed, and field/ lab- results submitted to the structural Engineer for approval:

1. Air entrainment at placement – ASTM C231
2. Slump – ASTM C143
3. Compressive strength – ASTM C39

Concrete cylinder samples shall be obtained from each concrete delivery truck for compressive strength testing. Five (5) cylinders shall be made from each sample. Each cylinder shall be standard 6" diameter by 12" tall. One (1) cylinder will be tested at 7-day cure, and three (3) cylinders will be tested at 28-day cure to determine compressive strength of the concrete in accordance with ASTM C39. Air entrainment and slump will be tested at each sample as well. Retain the fifth cylinder sample for potential 56 day compressive testing and/ or petrographic examination. Test results which are determined by the Engineer to be deficient or questionable will require that the contractor pay for additional testing and coring of the in-place concrete, including petrographic examination with report as direct by the Engineer. Concrete determined by the Engineer to remain deficient after final testing shall be entirely removed and replaced at no additional cost.

1.9 GUARANTEES

Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of his work as free from defect in materials and workmanship. The guarantee shall be for a period of three (3) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or II.

B. Aggregate: ASTM C 33, uniformly graded, from a single source. Maximum aggregate size = 1 ½" at foundations and ¾" at slabs.

C. Water: ASTM C 94.

D. Air-Entraining Admixture: ASTM C 260.

E. Water-Reducing Admixture: ASTM C 494, Type A.

F. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

G. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

H. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

I. Coloring pigment shall be a concentrated pigment specially process for mixing into concrete and conforming to ASTM C979. Provide color chart for Owner review. Provide mixed samples of up to four (4) colors for Owner review.

2.2 CONCRETE PRODUCTION

A. Concrete Mixes, General - Prepare design mixes, proportioned according to ACI 211.1 and ACI 301-05.

Refer to the Contract Drawings for additional information.

B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

C. Concrete shall have a minimum compressive strength of 4500 psi for foundations and 4500 psi for slabs at 28 days with a slump of no more than 4" and air entrainment of 4 ½ to 7 ½%.

D. Proportioning: Proportion ingredients to produce a well-graded mix of high density and maximum workability consistent with approved mix design and subject to the characteristics as specified in the Contract Drawings.

E. Mixing:

1. Central Mixed Concrete - 1 minute for mixer capacities one cubic yard or less plus 15 seconds for each cubic yard or fraction thereof of additional capacity.

2. Truck Mixed Concrete - 100 revolutions after the introduction of all ingredients.

F. Tempering and Control of Mixing Water:

1. Mix concrete only in quantities for immediate use. Do not use concrete which has stiffened due to initial set or concrete which cannot be discharged within 1-1/2 hours or 300 revolutions of the mixer drum after the introduction of the mixing water.

2. Water may be added to concrete arriving at the site, only if neither the maximum slump nor the maximum water cement ratio is exceeded. Provide additional cement if required by the addition of water to maintain water cement ratio within specified limits. Obtain Engineer's approval prior to adding water or cement.

3. Incorporate any added water or cement by additional mixing equal to half the total mixing required.

2.3 CURING MATERIALS

A. Impervious-sheet materials shall conform to ASTM C 171, type optional, except that polyethylene sheet shall not be used.

B. Burlap and cotton mat used for curing shall conform to AASHTO M 182, Class 2.

C. Topically applied and admix curing compounds and/or agents are not allowed due to project required epoxy floor coating and concrete densifier.

2.4 WATER

A. Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of ASTM C94.

2.5 EMBEDDED ITEMS

A. Embedded items shall be of the size and type indicated or as needed for the application.

B. All other embedded items shall also be securely anchored, and protected from damage or displacement.

2.6 JOINT MATERIALS

A. Expansion joint fillers shall be preformed materials conforming to ASTM D 1751.

B. Sawable type contraction joint inserts shall conform to COE CRD-C 540. Nonsawable joint inserts shall have sufficient stiffness to permit placement in plastic concrete without undue deviation from a straight line and shall conform to the physical requirements of COE CRD-C 540, with the exception of Section 3.4 "Resistance to Sawing". Plastic inserts shall be polyvinyl chloride conforming to the materials requirements of COE CRD-C 572.

C. Expansion joint fillers shall be a closed-cell, non-absorbent, synthetic foam, and as recommended by the sealant manufacturer. Filler shall be totally compatible with sealant, primer, and substrates. Backers shall conform to the requirements of ASTM C 962, Type A, such as Ceramar as manufactured by W.R. Meadows, Expansion Joint Filler as manufactured by BASF-Sonneborn, or approved equal.

2.7 LIQUID DENSIFIER/ SEALER

A. Liquid densifier sealer shall be a high performance, deeply penetrating concrete densifier; odorless, colorless, VOC – compliant, non-yellowing silicate and siliconate-based solution designed to hard, dustproof and protect concrete floors and to resist black rubber tire marks. The compound must contain a minimum solids content of 30% of which 50% is siliconate.

1. Basis of Design: Euco Diamond Hard by The Euclid Chemical Co.

PART 3 - EXECUTION

3.1 PREPARATION FOR PLACING

A. Before commencing concrete placement, the following shall be performed:

B. Surface Preparation:

1. Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water.
2. Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. The foundation shall be well drained and shall be satisfactorily graded and uniformly compacted.
3. Rock surfaces upon which concrete is to be placed shall be free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and loose, semi-detached or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Engineer, and to firm rock on the sides. Immediately before the concrete is placed, rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as specified below for Previously Placed Concrete. Rock surfaces shall be kept continuously moist for at least 24 hours immediately prior to placing concrete thereon. All horizontal and approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. Concrete shall be placed before the mortar stiffens.

4. Concrete surfaces to which other concrete is to be bonded shall be abraded in an approved manner that will expose sound aggregate uniformly without damaging the concrete. Laitance and loose particles shall be removed. Surfaces shall be thoroughly washed and shall be moist but without free water when concrete is placed.

C. Equipment:
   1. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material.
   2. Equipment for consolidating concrete shall be at the placing site and in proper working order.
   3. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition, and in sufficient amount for the entire placement.

D. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage, cracking, or other damaging drying of the concrete.

E. Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding shall not be performed on embedded metals within 2 feet of the surface of the concrete. Tack welding shall not be performed on or to embedded items.

F. Forms shall be in place, cleaned, coated, and adequately supported, in accordance with Section 03 1000, CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03 2000, CONCRETE REINFORCEMENT.

3.2 INSTALLATION

A. Conveying:
   1. Convey concrete from mixer to final position as rapidly as practical without segregation or loss of material.
   2. Use only metal or metal lined chutes with maximum length of 20 feet, maximum slope 1 vertical to 2 horizontal and minimum slope 1 vertical to 3 horizontal.
   3. Provide a hopper at the end of long belt conveyors and chutes not meeting the above requirements.

4. Conveying by pumping methods shall conform to ACI 304. Maximum loss of slump, 2 inches. Do not use pipe made of aluminum or aluminum alloy to convey concrete. Should pumping be required for this project, all costs for pumping shall be borne by the Contractor. No additional compensation will be considered for any pumping costs.

B. Depositing:
1. Deposit concrete in a continuous operation until the section is completed. Regulate rate of placement so concrete remains plastic and flows into position.
2. Maximum height of concrete free fall is 4 feet.
3. All concrete shall be placed within 2 hours of batching. All concrete on site more than 2 hours from batching time shall be rejected and sent back to the plant.

C. Consolidation:
1. Use mechanical vibrating, rodding or spading for consolidation. Conform to 309-72, "Recommended Practice For Consolidation of Concrete."
2. Do not use vibrators to transport concrete in forms.
3. Minimum vibrator speed 8000 rpm.
4. Vertically invert vibrators at points 18 inches apart to a depth sufficient to penetrate 6 inches into the preceding layer. Vibrate each location for a length of time to obtain adequate consolidation (generally 5 to 15 seconds).

D. Embedments:
1. Accurately position and securely fasten all anchor bolts, castings, steel shapes, conduit, sleeves, and other materials to be embedded in the concrete.
2. Embedments shall be clean when installed. Remove concrete spatter from all surfaces not in contact with concrete.

E. Wash-out:
1. The Contractor shall remove residue from concrete mixing wash-out from all landscape, walkways, curbs, driveways, and similar surfaces to the satisfaction of the Owner.

3.3 CURING

A. Normal Conditions
1. All concrete shall be prevented from drying for at least the first 7 days after placing. All slabs shall be cured by spraying on the specified curing compound as per the manufacturer's printed instructions. Concrete walls shall be cured as carefully as the slabs. However, instead of covering the sides with the curing compound, it would be satisfactory if the forms were "loosened after the concrete had hardened" and the wall sprinkled with water frequently for at least five (5) days allowing the water to flow down the sides between the forms and the concrete. After the five-day wetting the forms may be removed. Curing compounds which discolor the concrete are not permitted.

B. Cold Weather Conditions

1. Whenever the temperature of the surrounding air is below 40 degrees F, all concrete shall be maintained at a temperature of not less than 50 degrees F for at least 72 hours and shall be protected from freezing for at least another 72 hours, or for as much time as is necessary to insure proper curing of the concrete. The housing, covering or other protection used in connection with the curing shall remain in place and intact for at least 24 hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing. The approved practice for Winter Concreting are those outlined in ACI 306.

C. Alternates

1. Methods of curing other than those specified above shall be approved by the Engineer before being used.

3.4 FINISHING CONCRETE

A. Defective Concrete:

1. Any concrete which is not formed as shown on the plans or for any reason is out of alignment or level, or shows a defective surface shall be corrected or replaced as directed by the Engineer.
2. Repair all surface defects and tie holes immediately after form removal.
3. Remove honeycombed or otherwise defective concrete to sound concrete with square cut edges to avoid feathering.

B. Patching:

1. Immediately after removing the forms, all concrete surfaces shall be inspected and any poor joints, voids, stone pockets or other defective areas and all tie holes shall at once be patched before the concrete is thoroughly dry. The patching shall be done in such a manner that it shall form a homogeneous part, in appearance, and action of the main concrete. Fins shall be removed and patched as required where concrete is exposed.

C. Exposed Concrete:

1. All exposed concrete finish shall be as produced through the use of new smooth plywood or metal forms.

D. Rubbing:

1. Smooth rubbed finish shall be provided for exposed surfaces including walls and spandrels.
2. Smooth rubbed finish shall be produced on green concrete. All necessary patching shall be done immediately after forms have been removed and rubbing shall be completed not later than the following day. Surfaces shall be wetted and rubbed with carborundum brick or other abrasive until a uniform color and texture is produced. No cement grout or slush shall be used other than the cement paste drawn from the green concrete itself by the rubbing process.

E. Finishing Floors and Slabs: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces.

F. Float Finish: Apply float finish, defined in ACI 301, to surfaces indicated, to surfaces to receive trowel finish.

G. Trowel Finish: Apply a trowel finish to surfaces indicated and to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

H. After apply float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

I. Finish and measure surface so gap at any point between concrete surface and an unleveled free-standing 10-foot long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following: 1/8 inch.

J. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

3.5 FIELD QUALITY CONTROL

A. Concrete Tests: Conduct the following minimum tests in accordance with the requirements of ACI 301, Section 16.3.

1. Strength Test:
   a. Mold and cure five (5) cylinders from each sample. Test one at 7 days for information and three (3) at 28 days for acceptance. Retain one (1) cylinder for potential 56-day compressive testing and/ or petrographic examination.
2. Slump Test: Conduct test for each strength test sample and whenever consistency of concrete appears to vary.
3. Air Content: Conduct test from one of first three batches mixed each day and for each strength test sample.

B. Acceptance of Concrete:

1. The strength level of concrete will be considered satisfactory so long as the average of all sets of three consecutive strength test results equals or exceeds the specified 28-day strength and no individual strength test result falls below the specified strength by more than 200 psi.
2. Upon failure of test cylinder results, the Owner may require the Contractor, at his/her expense, to obtain and test at least three 2-inch diameter core samples from the area in question. Conform to ASTM C42. Concrete will be considered adequate if the average of the three cores is at least 85% of, and if no single core is less than 75% of the specified 28-day strength.

3. Upon failure of core test results, the Owner may require the Contractor, at his/her expense, to perform load tests as specified in ACI 318, Chapter 20. Should load tests fail to prove the concrete has reached the required strength; the Contractor shall remove and replace all defective concrete at no additional cost to the Owner. No contract extension will be considered for the time required to remove and replace defective concrete.
4. Fill all core holes as specified for repairing defective concrete.

END OF SECTION

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SECTION 116833 – ATHLETIC FIELD EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 WORK INCLUDED

A. 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. Certain items shall be carried as Alternate Bid items. All items shall be included in the base bid unless labeled as (ALTERNATE).

B. All equipment and materials shall meet or exceed NCAA and American Sports Builders Association (ASBA) Rules and Regulation.

1.3 RELATED WORK

A. Examine the Contract Documents for requirements that affect the work of this Section.

1.4 SUBMITTALS

A. 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.

B. 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.

1.5 PRODUCT DELIVERY AND STORAGE

A. 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.

B. 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

A. Tennis court post shall be 3'' OD round constructed from heavy-duty-11-gauge steel, with welded steel lacing integrated, black polyester powder coat finished, internally wound featuring a self-locking gear mechanism. Gears are constructed of plated steel and the small gear is case hardened. Provide 1 pair of posts for each court. Contractor will furnish and install ground sleeves and galvanized steel center pipe anchor. Model Number #63051 as manufactured by Douglas Industries, Inc., 3441 S. 11th Ave, Eldridge. IA 52748 or approved equal. Final color selection to be approved by owner.

B. Tennis court netting shall be 41-foot 7-inch length by 3-foot six-inch height, 3.5mm braided polyethylene rope netting, white vinyl headband, with 5mm steel coated cable and net strap. Model Number TN as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, or approved equal.

2.2 WINDSCREEN

A. There shall be windscreen on all tennis courts chain link fencing, made of vinyl coated polyester mesh (VCP/ VCM) windscreen material, Model Number VCP9DG (9' H Windscreen with Digitally Printed Graphics), as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, or approved equal. Final color selection and logos to be approved by owner.

2.3 REBOUNDERS

A. The rebounder shall be 10' x 12' wide backboard. Panels to be green with an integrated white net line, solid, 3/4" UV stabilized plastic panels. Mounting system includes (4) 12 gauge, galvanized mounting brackets are mounted horizontally to fence posts and bottom panel support is powder coated aluminum. Model number #34852 as manufactured by Douglas Industries, Inc., 3441 S. 11th Ave, Eldridge. IA 52748 or approved equal. Contractors shall install two (2) additional fence posts in location of rebounder for secure connections.

2.4 TEAM BENCHES

A. Team Benches, four (4) total, shall be 8-foot-long Single Tier Portable Aluminum Plank Bench with Back Rest, standard powder coat finish as selected by owner Model No. ATBBRPT as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, or approved equal. Final color to be approved by owner.

2.5 PORTABLE BLEACHERS SYSTEM

A. Bleachers, two (2) total, shall be five (5) rows 21-foot-long galvanized angle frame 47 seat portable (with wheels) aluminum bleachers. The angle frames are to have wheelchair cutouts to satisfy ADA requirements. Bleacher systems include slip resistant deck finish, powder coated risers and vinyl coated chain link fencing. Final color to be approved by owner.

PART 3 - EXECUTION

3.1 ATHLETIC FIELD EQUIPMENT

A. Establishment of subgrade will be completed under Division 31 – Earth Moving.

B. 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.

C. Equipment footings shall be installed prior to installation of surrounding pavement base, and any finished paving.

D. For Concrete footing requirements refer to Division 3 of this specification and Manufacturers installation instructions.

3.2 CLEANING

A. 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

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SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 DESCRIPTION OF WORK

A. 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. Clearing and grubbing.
3. Stripping topsoil.
4. Removing above and below grade site improvements.
5. Disconnecting, capping, or sealing of utilities as required.

B. Alternates: N/A

C. Items to Be Installed Only: Not Applicable.

1.3 RELATED WORK

A. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 31 2000 – EARTH MOVING for soil materials, excavating, backfilling, and site grading and removal of site utilities.
2. Section 31 2500 – EROSION AND SEDIMENATION CONTROLS for required erosion and sedimentation control measures.

1.4 DEFINITIONS

A. 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.

B. 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.

1.5 MATERIAL OWNERSHIP

A. 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.

1.6 SUBMITTALS

A. 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.

B. Record drawings, according to Section 01 7000 - PROJECT CLOSEOUT identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 PROJECT CONDITIONS

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

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

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

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until erosion and sedimentation control measures are in place.

E. 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 Commonwealth.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. 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

A. 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.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. 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.

D. 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

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

1. Arrange with utility companies to shut off indicated utilities.

B. 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.

3.4 CLEARING AND GRUBBING

A. 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.

B. 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

A. Remove sod and grass before stripping topsoil.

B. 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.

C. 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 EXCESS TOPSOIL

A. Topsoil that has been stripped and stockpiled but is not needed after the completion of all final topsoil spreading and grassing, shall become the property of the Contractor and shall be removed and disposed of offsite.

3.7 SITE IMPROVEMENTS

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

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

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut 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.

3.8 DISPOSAL

A. Disposal: Remove surplus soil material, boulders, 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

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SECTION 312000-EARTH MOVING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 DESCRIPTION OF WORK

A. 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 structures and landscaping.
2. Excavating and backfilling for pavements and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete pavements.
5. Subbase and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.
7. Remove and replace unsuitable existing fill material.

1.3 Related Work:

A. The following items are not included in this Section and will be performed under the designated Sections:

1. Section 03 3000 - CAST-IN-PLACE CONCRETE
2. Section 31 1000 - SITE CLEARING 0
3. MDE Standards and Specifications for Erosion and Sedimentation Control, Latest Edition.

1.4 DEFINITIONS

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

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

2. Final Backfill: Backfill placed over initial backfill to fill a trench.

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

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

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

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

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

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by 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.

G. Fill: Suitable soil materials used to raise existing grades.

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

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: 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.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

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

1.5 SITE INVESTIGATION

A. 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.

1.6 SUBSURFACE DATA

A. 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.

1.7 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.

2. Geotextile.

3. Controlled low-strength material, including design mixture.

B. 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.

C. 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.

1.8 PROJECT CONDITIONS

A. 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.

B. 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.

1.9 QUALITY CONTROL

A. Compaction and materials testing results shall be submitted to the Engineer for review as outlined in the following sections.

PART 2 – PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide common borrow soil materials meeting requirements of MD SHA Sections 203 and 916 when sufficient satisfactory soil materials are not available from excavations.

B. 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.

C. 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.

D. 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.

E. Subbase Material: Material meeting the minimum requirements for Processed Gravel, as defined by the Maryland Department of Transportation State Highway Administration Standard Specifications For Construction And Materials (Section 901.01). The gradation requirements for Processed Gravel 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

F. Base Course: Material meeting the minimum requirements for GRADE AGGREGATE BASE, as defined by the Maryland Department of Transportation State Highway Administration Standard Specifications For Construction And Materials (Section 901.01). 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

G. 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.*

H. Gravel Borrow: Shall comply with Maryland Department of Transportation State Highway Administration Standard Specification For Construction And Materials Section

203 and 916. 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.*

I. Three quarter inch stone: Imported 3/4-inch stone meeting MD SHA Section 901 and Section 308.

Sieve Size	Percent Passing
1 inch	100
3/4 inch	90-100
½ inch	10-50
3/8 inch	0-20
No. 4	0-5

J. Bedding Course: Bedding course for utilities shall comply with the requirements of Sand listed below.

K. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448 and MD SHA Section 901; 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.

L. 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.

M. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

N. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

O. Free draining angular washed stone: Imported angular double washed stone with particle size ranging from ¾ inch to 1-1/2 inch.

P. 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

Q. Stonedust: Shall be stone screening as specified in the Maryland Department of Transportation State Highway Administration Standard Specifications For Construction And Materials specifications Section 901.01 stone crusher material completely passing a No.4 sieve with not less than 40% passing a No. 8 Sieve.

R. Athletic Field Base Stone: Refer to Section 321823.

S. Graded Aggregate Base

T. Dense Graded Crushed Stone

U. Fine Grade Aggregate (No. 8 Aggregate)

2.2 GEOTEXTILES

A. Geotextile Filter Fabric: 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.

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

1. Survivability: Class 2; AASHTO M 288.

2. Grab Tensile Strength: 247 lbf; ASTM D 4632.

3. Sewn Seam Strength: 222 lbf; ASTM D 4632.

4. Tear Strength: 90 lbf; ASTM D 4533.

5. Puncture Strength: 90 lbf; ASTM D 4833.

6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.

7. Permittivity: 0.02 per second, minimum; ASTM D 4491.

8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

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

1. Red: Electric.

2. Yellow: Gas, oil, steam, and dangerous materials.

3. Orange: Telephone and other communications.

4. Blue: Water systems.

5. Green: Sewer systems.

PART 3 – EXECUTION

3.1 PREPARATION

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

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 31 1000 - SITE CLEARING.

C. Protect and maintain erosion and sedimentation controls, which are specified in Section 32 2500 - EROSION, during earthwork operations.

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

A. 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.

B. 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

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:

a. 24 inches outside of concrete forms other than at footings.

b. 12 inches outside of concrete forms at footings.

c. 6 inches outside of minimum required dimensions of concrete cast against grade.

d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.

e. 6 inches beneath bottom of concrete slabs on grade.

f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. 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

A. 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.

B. At locations where unstable soil is identified, the removal and replacement of such soil shall be as directed as recommended by the Engineer.

C. 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.

D. 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.

E. 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.

F. The Contractor shall conduct over-excavation operations in such a way that the necessary measurements can be taken before any backfill is placed.

G. 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

A. Notify Designer when excavations have reached required subgrade.

B. If Designer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed and specified herein.

C. 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.

D. 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

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. 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

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees, if applicable.

3.12 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, damp proofing, waterproofing, and perimeter insulation.

2. 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.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.13 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. 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 03 3000 - CAST-IN-PLACE CONCRETE.

D. 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.

E. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

A. Place soil fill on subgrades free of mud, frost, snow, or ice.

B. 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

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site 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.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. 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.

3.18 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.

2. 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.

3.19 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent materials testing agency to perform field quality-control testing.

B. 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.

C. 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.

D. 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 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. 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.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Designer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. 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

SECTION 312319 - DEWATERING

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. 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 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Construction dewatering.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 31 2000 - EARTH MOVING for excavating, backfilling, site grading, and for site utilities.

1.3 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. Test liquids for hazardous waste at start of construction operations and provide on-site remediation as acceptable to authorities having jurisdiction.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.

5. Remove dewatering system when no longer required for construction.

1.4 SUBMITTALS

A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.

1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.

2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.

B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Qualification Data: For qualified Installer

D. Field quality-control reports.

E. Other Informational Submittals:

1. Photographs: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer that has specialized in dewatering work.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1. Review methods and procedures related to dewatering including, but not limited to, the following:

a. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.

b. Geotechnical report.

c. Proposed site clearing and excavations.

d. Existing utilities and subsurface conditions.

e. Coordination for interruption, shutoff, capping, and continuation of utility services.

f. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

g. Testing and monitoring of dewatering system.

1.6 PROJECT CONDITIONS

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

1. Notify Engineer no fewer than two days in advance of proposed interruption of utility.

2. Do not proceed with interruption of utility without Engineer's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering.

2. The geotechnical report is referenced elsewhere in the Project Manual.

C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 PREPARATION

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

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.

2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

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

C. Provide temporary grading to facilitate dewatering and control of surface water.

D. Monitor dewatering systems continuously.

E. Promptly repair damages to adjacent facilities caused by dewatering.

F. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 31 2500 - EROSION AND SEDIMENTATION CONTROLS during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.

2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 FIELD QUALITY CONTROL

A. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.

B. Observe and record daily elevation of ground water and piezometric water levels in observation wells.

1. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.

2. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

C. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

END OF SECTION

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SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 DESCRIPTION OF WORK

A. 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:

    a. Soil stockpiles and on-site storage and staging areas.
    b. Cut and fill slopes and other stripped and graded areas.
    c. Protection of drainage structure inlets.
    d. At edge of wetlands areas, if applicable, as shown on Drawings.
    e. 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.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 31 1000 – SITE CLEARING for protection of existing tress and other vegetation to remain.

2. Section 31 2000 – EARTH MOVING for soil materials, excavating, backfilling, and site grading and removal of site utilities.

1.3 QUALITY ASSURANCE

A. The Contractor shall develop, submit, and comply with the requirements of Stormwater Pollution Prevention Plan (SWPPP) prepared for 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 prepare the required SWPPP plan and to file for a Construction General Permit through the EPA at least 14-business days prior to the start of work. The Contractor shall prepare the SWPPP in advance and submit to Engineer and Town for review. The Engineer may review and request changes / modifications as required.

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.

B. 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.

C. 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.

D. Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.

E. 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.

F. All land-disturbing activities are to be planned and conducted so as to minimize off-site sedimentation damage.

G. 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.

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

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. 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.

B. 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

C. 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.

D. Silt Socks: The silt socks for construction of erosion control devices shall be 12" in diameter. In areas of slope greater than 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.

E. 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.

F. 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 STABILIZED CONSTRUCTION ENTRANCE AND STONE BERMS

A. Stone as specified above.

B. Length: As effective, but not less than 75 feet.

C. Thickness: Not less than six inches.

D. Width: Not less than full width of all points on ingress or egress, but not less than 24 feet.

E. 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.

F. 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.

G. Place crushed stone berms in locations required and as directed. Berms shall have side slopes of 1:3 or less.

H. Inspect stone berms periodically and replace and/or regrade crushed stone as required.

3.2 SILT FENCING

A. Excavate a 6 inch trench along the upstream side of the desired fence location.

B. 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.

C. Lay lower 12 inches of silt fence into the trench, 6 inches deep and 6 inches wide. Backfill trench and compact.

D. Overlap joints in fabric at post to prevent leakage of silt at seam.

3.3 VEGETATIVE STABILIZATION / TEMPORARY SEEDING

A. Grassing shall be applied according to State of Massachusetts DOT Standard Specifications.

3.4 INLET PROTECTION

A. Install silt fence or straw bales around inlet as specified herein.

3.5 DUST CONTROL

A. 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.

B. The frequency and methods of application for fugitive dust control shall be as directed by the Engineer.

3.6 TEMPORARY PROTECTIVE COVERINGS (AFTER GROWING SEASON)

A. 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.

B. 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.

C. Placement of mesh or blanket matting and anchoring in place shall be in accordance with manufacturer's printed instructions.

D. Inspect protective coverings periodically and reset or replace materials as required.

3.7 TEMPORARY SETTLING BASIN

A. 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.

3.8 SILT SOCKS

A. Silt Socks shall be constructed and installed as required by the order of conditions prior to the start of work.

END OF SECTION

SECTION 321123 - AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 SECTION INCLUDES

A. Aggregate base course for placement under proposed paving.

1.3 SUBMITTALS

A. Contractor to submit product data sheet and sieve analysis results.

B. Samples shall be submitted at the request of the Engineer.

C. Nuclear density test results are to be in accordance with ASTM D6938-10.

1.4 RELATED SECTIONS

A. 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 31 2000 – Earth Moving

2. Section 32 1216 – Asphalt Paving

1.5 REFERENCES

A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and an 18 inch Drop.

B. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

C. "Standard Specifications for Construction and Materials," of the Maryland Department of Transportation State Highway Administration, latest edition, including any addenda thereto.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subbase and Base Course as specified in Section 31 2000 - Earth Moving.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.2 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

A. Spread fill over prepared substrate to a total compacted thickness as specified on drawings.

B. Place aggregate in maximum six (6) inch layers compact to specified density.

C. Level and grade surfaces to elevations and gradients indicated on the Contract Drawings.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from Design Elevation: Within 1/4inch.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ASTM Dl557 and alternatively with ASTM D2922 at a frequency as requested by the Engineer or School.

END OF SECTION

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SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 DESCRIPTION OF WORK

A. 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.

B. Refer to tennis court color finish system and painting specification for addition asphalt paving requirements.

C. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 31 2000 – Earth Moving for aggregate subbase and base courses and for aggregate pavement shoulders.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Material Certificates: For each paving material, from manufacturer.

D. Nuclear density gauge field density test results for finish grade.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the Maryland Department of Transportation State Highway Administration (MDOT SHA).

B. Regulatory Requirements: Unless otherwise superseded by this specification, comply with materials, workmanship, and other applicable requirements of the Maryland Department of Transportation State Highway Administration Standard Specifications For Construction And Materials for hot mix asphalt paving work.

1. Unless otherwise superseded by this specification, comply with requirements of the Maryland Department of Transportation State Highway Administration Standard Specifications For Construction And Materials , including supplemental specifications and special provisions.
2. Comply with requirements of the Americans with Disabilities Act (ADA). 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.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.

b. Review condition of subgrade and preparatory work.

c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. 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.

C. 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 GRAVEL BASE:

A. Subbase and Base Aggregate as specified in Section 32 1123 Aggregate Base Course.

2.2 MINERAL AGGREGATE

A. Conform to Section 900 of the MD SHA Standard Specifications, latest edition.

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.

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

2.3 BITUMINOUS MATERIALS

A. Bituminous materials shall conform to the requirements of these Specifications and Section 900 of the MD SHA Standard Specifications, latest edition.

B. 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.

C. Bituminous Concrete Paving shall be Class I, Type 1-1, as specified in Section 900 of the MD SHA Standard Specifications, latest edition .

D. 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.

E. Tack coat shall consist of either emulsified asphalt, Grade MS-l conforming to Section 500 and Section 900 of the MD SHA Standard Specifications, latest edition.

PART 3- EXECUTION

3.1 EXAMINATION

A. Examine exposed Subbase and Base surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

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

3.2 COLD MILLING

A. If applicable, 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 (If Applicable)

Not used.

3.4 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

D. The permanent bituminous concrete pavement surface courses shall be provided in accordance with details and the applicable requirements of Maryland Department of Transportation State Highway Administration Standard Specifications for Construction And Materials Section 900 for "Materials" and Section 500 for "Paving". The surface shall be rolled free of any roller marks, ridges, and voids, and shall be repaired if

directed.

E. Per Section 500 of the Maryland Department of Transportation State Highway Administration Standard Specifications For Construction And Materials, 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

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.

2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.

3. Offset transverse joints, in successive courses, a minimum of 24 inches.

4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.7 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling

while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: ASTM D 2041, per Maryland Department of Transportation State Highway Administration Standard Specifications For Construction And Materials.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.

2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within Maryland Department of Transportation State Highway Administration Standard Specifications For Construction And Materials tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas.

3.9 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Designer.

B. Allow paving to age for a minimum of 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 FIELD QUALITY CONTROL

A. 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.

B. 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.

C. Correct irregularities which vary 3/8 inch from a true finished surface in base and binder courses, and 1/4 inch in top courses.

D. 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

A. 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.

B. 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

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SECTION 321838 - COURT COLOR FINISH SYSTEM AND PAINTING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 DESCRIPTION

A. These specifications provide minimum standards for the preparation and installation of Asphalt tennis court base and textured acrylic surfacing, color finishes and stripping of proposed asphalt tennis courts.

1.3 RELATED SECTIONS

A. 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 31 2000 – Earth Moving
   2. Section 32 1123 – Aggregate Base Course
   3. Section 23 1216 – Asphalt Paving

1.4 REFERENCES

A. National Collegiate Athletic Association (NCAA)

B. United States Tennis Association (USTA)

C. International Tennis Federation (ITF)

D. American Sport Builders Association (ASBA)

E. National Asphalt Paving Association (NAPA)

1.5 SUBMITTALS

A. Provide manufacturer specifications for all components, color chart, and installation instructions.

B. Authorized Applicator certificate from the approved surfacing system manufacturer.

C. ITF classification certificate for the system approved to be installed.

D. Reference list from the installer of at least 5 projects of similar scope successfully completed in the past 3 years.

E. 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.

F. Provide specific manufacturers product data for all types of paints and overlays to be used in tennis marking and surfacing.

G. Current Material Safety Data Sheets (MSDS) for all system components.

H. Proof of certification of the ASBA certified tennis court builder that the contractor employs on their team.

1.6 MATERIAL HANDLING AND STORAGE

A. Store materials in accordance with manufacturer specifications and MSDS.

B. Deliver products to the site in original unopened containers with proper labels attached.

C. All surfacing materials shall be nonflammable.

D. Do not store or use materials that have been exposed to temperatures below 32d F.

1.7 GUARANTEE

A. 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.

1.8 SURFACING INSTALLER QUALIFICATIONS

A. Surfacing Installer shall be regularly engaged in construction and surfacing of acrylic tennis courts, play courts or similar surfaces.

B. Installer shall be an Authorized Applicator of the specified surface system.

C. Installer shall be a certified tennis court builder as certified by the ASBA.

1.9 MANUFACTURER QUALIFICATIONS

A. Approved surfacing system manufacturer shall provide documentation that the surface to be installed has been classified by the ITF as a medium pace surface.

1.10 QUALITY ASSURANCE

A. Asphalt surface and base materials must be installed to proper slope requirements and specifications, in accordance with the America 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.

B. Asphalt surfacing shall conform to Part 3 of this specification section. Surfacing material shall conform to the guidelines of the ASBA for planarity.

C. All surface coatings products shall for a surfacing SYSTEM and shall be supplied by a single manufacturer.

D. The contractor shall record the batch number of each product used on the site and maintain it through the warranty period.

E. The contractor shall provide the Engineer, upon request, an estimate of the volume of each product to be used on the site.

F. The installer shall be an authorized applicator of the approved surfacing system.

G. The Contractor is responsible for the removal or correction of any overspray, spill or marking not in compliance with applicable court layout.

1.11 SITE CONDITIONS

A. Do not install Surfacing materials when rainfall in imminent or extremely high humidity prevents drying.

B. Do not apply surfacing materials unless surface and air temperature are 50°F and rising.

C. Do not apply surfacing materials if surface temperature is in excess of 140°F.

1.12 WARRANTY

A. 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

A. Asphalt for tennis courts shall comply with the requirements of specification section 32 1216 Asphalt Paving except for the following:

Bituminous Design mix for Tennis Court Pavements:

- RAP – Recycled Asphalt content shall NOT be used in the design mix
- RAS – Recycled Asphalt Shingles shall NOT be used in design mix
- The Performance Grade (PG) of asphalt binder used in the design mix shall be tailored specifically for the climate/environmental conditions of the proposed project's geographic location and ability to resist thermal cracking at low temperatures. Contractor to submit documentation of examples where similar PG design mixers were used for tennis courts construction projects in the same regional area.

2.2 COLOR SELECTION

A. Tennis courts play area will be surfaced in Darker Blue, with the safety area surfaced in Light Blue. Colors to be approved by Owner.

2.3 TENNIS COURT SURFACING/ COLOR SYSTEM

A. Shall be the Plexipave color finish and filler system intended for tennis courts on asphalt surfaces as manufactured by California Sports Surfaces, Andover MA or approved equal SYSTEM.

B. 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.

C. 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.

D. 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.

E. 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

A. 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.

B. Special care shall be taken during the paving process to insure smooth and imperceptible joints, blending asphalt uniformly to achieve a continuous surface. Infrared heating devices shall be employed when temperature of material in place falls below 150d F.

C. The court surface, i.e., asphalt substrate, shall not vary under a 10' straight edge more than 1/8''.

D. 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 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.

E. 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.

F. 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.

G. Start of surface application shall constitute sub contractor's acceptance of the asphaltic concrete surface to receive tennis surfacing.

3.2 SITE CONDITIONS

A. 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.

B. 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.

C. Surfacing or filler shall not be installed unless the temperature is fifty degrees Fahrenheit and rising. Installation shall be executed only in fully dry conditions.

3.3 BASE PREPARATION

A. 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.

B. 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.

C. 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 products 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.

D. 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.

E. 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.

F. 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.

G. 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

A. 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.

B. 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.

C. 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 (2) 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 SURFACE

A. 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.

B. 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.

C. **A total of two (2)** 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

A. 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, NCAA, 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.

B. 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.

C. Contractor shall provide written confirmation that the court striping and markings were installed in accordance with ASBA, FIAA, NCAA, and USTA guidelines.

3.7 LOGO AND GRAPHICS

A. Contractor shall install a total of two (2) logos.

B. Each logo shall include the seahawk head and the "St. Mary's Tennis" lettering.

C. Contractor shall submit graphics/ logo to owner for approval prior to installation.

D. Paint for logos shall be provided by Tennis Surfacing Manufacturer and be compatible with tennis court surfacing.

3.8 PROTECTION

A. Erect temporary barriers to protect coatings during drying and curing.

B. Lock gates to prevent court use until acceptance by the Engineer.

3.9 CLEAN UP

A. 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.

B. Leave site in a clean, orderly, 'as new' condition.

END OF SECTION

SECTION 323113 – FENCE AND GATES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 WORK INCLUDED

A. Perform all work required to complete the work of the Section, as indicated. Such work includes, but is not limited to, the following:

1. 10' Chain Link Fence and Gates
2. 3' Chain Link Fence

1.3 RELATED WORK

A. 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
3. Section 116833 – Athletic Field Equipment

1.4 REFERENCES

A. 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)
    a. ASTM A 53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
    b. ASTM A 123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
    c. ASTM A 153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
    d. ASTM A 176 (1994) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

e. ASTM A 385 Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)

f. ASTM A 392 (1991b) Zinc-Coated Chain-Link Fence Fabric

g. ASTM A 478 (1995a) Chromium-Nickel Stainless and Heat-Resisting Steel Weaving and Knitting Wire

h. ASTM A 491 (1994) Aluminum-Coated Steel Chain-Link Fence Fabric

i. ASTM A 666 (1994) Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

j. ASTM C 94 (1994) Ready-Mixed Concrete

k. ASTM F 626 (1994a) Fence Fittings

l. ASTM F 688 Poly (Vinyl Chloride) (PVC) and other Organic Polymer-Coated Steel Chain link fence fabric, Class 2B

m. ASTM F 883 (1990) Padlocks

n. ASTM F 900 (1994) Industrial and Commercial Swing Gates

o. ASTM F 1043 (1995) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework

p. ASTM F 1083 (1993) Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded for Fence Structures

2. AMERICAN WELDING SOCIETY (AWS)

a. AWS WZC (1972) Welding Zinc-Coated Steels

3. CHAIN LINK FENCE MANUFACTURERS INSTITUTE (CLFMI)

a. CLFMI Product Manual (CLF-PM0610) revised January 2012

B. Regulatory Requirements: Comply with the following as applicable for fencing adjacent to athletic facilities:

1. American Sports Building Association (ASBA).

2. National Collegiate Athletic Association (NCAA).

3. The United States Association (USTA)

1.5 SUBMITTALS

A. Submit shop drawings and manufacturer's specifications and installation instructions for all materials to be used.

B. 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

A. 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 1.75 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. Color to be black.
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:
    a. Specific gravity shall be 1.30 maximum, tested in accordance with ASTM D 792.
    b. 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.
7. Fabric Selvage Edges: Knuckled top and bottom for all fencing systems.

B. 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.

C. Posts

1. Under Six Foot (6') High Fence:
   a. Line posts shall be 1.9 in. outside diameter (O.D.), Schedule 40 pipe, weighing 2.28 lb./ft.
   b. 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:
   a. Line posts shall be 2.375 in. O.D., Schedule 40 pipe, weighing 3.65 lb./ft.
   b. 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:
   a. Line posts shall be 2.875 in. outside diameter (O.D.), Schedule 40 pipe, weighing 5.79 lb./ft.
   b. 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.

D. Rails and Post Braces

1. Top rail 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.

E. 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.
   a. Framing:
      1) 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.

b. Bracing:

1) 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.

2. 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.

3. Gate Hardware Coatings: These shall match the fence fabric coating.

4. 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.

5. Latch: Forked type, to permit operation from either side of gate: Provide padlock eye as integral part of latch.

6. Keeper: Provide keeper for gates, which automatically engages the gate leaf and holds it in the open position until it is manually released.

7. 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.

8. Stretcher Bars

a. 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.

b. 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.

F. 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.

G. Tension and Tie Wire

1. PVC Coated Fence: Tie wire shall be 9-gauge O.D., vinyl-clad, galvanized steel wire.

H. 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

2. Touch-up for Galvanized Surfaces: Touch-up damaged or abraded galvanized surfaces with products equal to one of the following:
    a. Cold Galvanizing Compound; ZRC.
    b. Speedhide Galvanized Steel Paint; PPG.
    c. Series 90-97 Zinc-Rich Primer; Tnemec.

I. 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

A. 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

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

3.3 RAILS

A. Top Rail and Bottom Rails

1. Top 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

A. 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

A. Chain link fabric shall be installed on the Tennis Court side unless otherwise noted on plans. 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 re-secured and retested at the Contractor's expense.

3.6 GATES

A. 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

A. Following installation, scratches and marred spots in vinyl-coated surfaces shall be field coated with a vinyl coating supplied by the fence manufacturer.

B. 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

A. 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.

3.9 CLEANING

A. Clean up debris and unused material and remove from the site.

END OF SECTION

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SECTION 329250 – LOAM AND SEED

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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.

B. 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.

C. 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.

1.2 WORK INCLUDES

A. Refer to the Drawings for the extent and details of the work.

B. 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.

1.3 RELATED SECTIONS

A. Section 31 2000 – Earth Moving.

1.4 SUBMITTALS

A. 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 hydro mulching to be used during hydro seeding, 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.

1.5 QUALITY ASSURANCE

A. All seed and amendments shall comply with all federal, state and local laws and regulations requiring inspection for plant disease and insect control.

1.6 PRODUCT HANDLING

A. 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.

1.7 JOB CONDITIONS

A. 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.

B. 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

A. 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 an inch (3/4") in any dimension.

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.

B. 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.

C. 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:

   a. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System.

   b. The silt and clay content shall be determined by a Pipette Test of soil passing the No. 270 sieve.

c. Percent of organics shall be determined by an Ash Burn Test or Walkley/Black Test (ASTM F-1647).

d. 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.

e. Chemical analysis shall be undertaken for Phosphorus, Potassium, Calcium, Magnesium, Aluminum, Soluble Salts, and acidity (pH).

f. Soil analysis tests shall include recommendations for soil additives to correct soils deficiencies, as necessary, and for additives necessary to meet defined topsoil mix requirements.

g. 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:

A. 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.

B. 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.

C. Fertilizers: Quantity, gradation and rate of application shall be determined based on soil tests and recommendations conducted by an approved soil testing laboratory.

D. 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.

E. 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:

A. 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:

a. Perennial Ryegrass: 40%

b. Chewing Fescue: 30%

c. Kentucky Bluegrass: 30%

B. 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)

A. 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.

B. 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.

C. 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

A. 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.

B. 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.

C. 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

A. 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.

B. 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.

C. Install soil additives per manufacturer's and topsoil testing lab instructions and as indicated on the Drawings.

D. 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.

E. 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.

F. Rake and remove all rocks and debris over ¾" in any dimension from the topsoil surface.

3.4 SEEDING

A. 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.

B. If seeding out of season, as described above, the Contractor is still obligated by all conditions and responsibilities described under 3.6 LAWN MAINTENANCE, until final acceptance of all lawn areas.

C. 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.

D. 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.

E. 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.

F. Applying Seed

1. Mechanical Seeding of Lawn Seed Mix:

   a. Seed shall not be placed until soils have stabilized and further settlement is not apparent. Utilize an irrigation system for consolidation of top mix.

   b. Seed at a minimum rate of three (3) lbs per 1000 square feet.

   c. Sow grass seed, applying half the quantity in one direction and the remaining quantity at right angles to the previous application

   d. Do not sow seed on a windy day or when the ground is frozen, wet or otherwise non-tillable.

   e. Cover seed with a thin layer of topsoil by raking or dragging. Cover with straw mulch, loosely spread to a uniform depth.

   f. Keep soil moist throughout the germination period.

3.5 FERTILIZING

A. 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

A. 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.

B. After grass has appeared, reseed all areas which have failed to show a uniform stand of grass.

C. Maintenance shall also include filling, regrading and reseeding, as necessary, to correct depressions caused by settling, subsidence or other physical or mechanical damage.

D. Maintenance shall also include all temporary protection fences, barriers, signs and all other work incidental to proper maintenance.

E. 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.

F. 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.

G. 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.

H. 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.

I. 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

A. 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.

B. 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.

C. 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.

D. 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

A. 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

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SECTION 334100 – STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. 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 RELATED DOCUMENTS

A. The requirements of the sections of Division 1 – General Requirements, as listed in the Table of Contents, apply to the work specified in this section.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D 5034 (1995) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
2. F 405 (1996) Corrugated Polyethylene (PE) Tubing and Fittings
3. F 667 (1985) Large Diameter Corrugated Polyethylene Tubing and Fittings.

B. Unibell Handbook of PVC Pipe

1. C32-73 (1984) Sewer and Manhole Brick
2. C62-85a, Building Brick
3. C76-85a, Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
4. C139-73 (1985) Concrete Masonry units for Construction of Catch Basins and Manholes
5. C270-86b, Mortar for Unit Masonry
6. C443-85A, Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
7. C478-85a, Precast Reinforced Concrete Manhole Sections

1.4 SUBMITTALS

A. The following shall be submitted: Filter Fabric, HDPE Pipe, Free Draining Angular Washed Stone, Detention Chambers, Control Structures, Drain Manholes, Catch Basins and Leaching Basins.

B. Certifications from the manufacturers, attesting that the materials meet specification requirements, and samples are required for filter fabric, drain pipe and fittings.

C. Submit shop drawings and manufacturer's specifications and installation instructions for all pipe materials, precast concrete catch basins and manholes, frames and covers and detention chambers.

D. Each shipment of pipe, catch basins and metal castings shall be accompanied with the manufacturer's notarized certificate that the materials meet the specification requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Materials delivered to site shall be inspected for damage, unloaded, and stored with minimum handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. During shipment and storage, filter fabric shall be wrapped in burlap or similar heavy-duty protective covering. The storage area shall protect the fabric from mud, soil, dust and debris. Filter fabric materials that are not to be installed immediately shall not be stored in direct sunlight. Plastic pipe shall be installed within six (6) months from the date of manufacture, unless otherwise approved.

B. Handling: Material shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Pipe shall be carried and not dragged to the trench.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. Corrugated High-Density Polyethylene (HDPE) Pipe and Fittings: Use ASTM F 405 for pipes three (3") to six (6") inches in diameter, inclusive, and ASTM F 667 for pipes eight (8") to twenty-four (24") inches in diameter. Fittings shall be manufacturer's standard type and shall conform to the indicated specification.

B. Pipe Perforations: Water inlet area shall be a minimum of one-half (0.5 in2/lf) square inch per liner foot. Manufacturer's standard perforated pipe which essentially meets these requirements may be substituted with prior approval of the Owner's Representative.

C. Slotted Perforations in Plastic Pipe: Circumferential slots shall be cleanly cut so as not to restrict the inflow of water and uniformly spaced along the length and circumference of the tubing. Width of slots shall not exceed 1/8 inch nor be less than 1/32 inch. The length of individual slots shall not exceed 1-1/4 inches on three (3") inch diameter tubing, ten (10%) percent of the tubing inside nominal circumference on four (4") to eight (8") inch diameter tubing, and 2-1.2 inches on ten (10") inch diameter tubing. Rows of slots shall be symmetrically spaced so that they are fully contained in two (2) quadrants of the pipe. Slots shall be centered in the valleys of the corrugations of profile wall pipe.

2.2 PRECAST STRUCTURES

A. The material to be used in the construction of detention chambers, storm manholes, catch basins and drop inlets shall conform to the Maryland Department of Transportation State Highway Administration (SHA) Standard Specifications for Construction and Materials , and to the following requirements.

B. Precast Concrete Manholes and Catch Basins: ASTM C478, eccentric cone, flat slab precast top; precast riser section and monolithic base section, with integral floor.

C. Concrete Compressive Strength: 4000 psi minimum. Type II cement.

D. Reinforcing Steel: ASTM A185, 0.12 sq. in./linear ft. and 0.12 sq. in. (both ways) base bottom.

E. Joints sealed with rubber gaskets, conforming to ASTM C443.

F. Steps: Forged 6061B, T6 aluminum or Copolymer Polypropylene Plastic, with 1/2 inch Grade 50 steel reinforcement.

2.3 CAST IRON FRAMES AND COVERS

A. Concrete Catch Basins: To be heavy duty C.I. as manufactured by East Jordan Iron Works Inc. or approved equal.

B. Concrete Drain Manholes: To be heavy duty C.I. as manufactured by East Jordan Iron Works or approved equal.

C. Nyloplast Manholes and Catch Basins: To be in accordance with the manufacturer's standard specifications.

2.4 MASONRY MATERIAL

A. Concrete Masonry Units: ASTM C139.

B. Brick: ASTM C32, Grade MS or ASTM C62, Grade SW.

C. Mortar: ASTM C270, Type M.

2.5 PIPE BEDDING AND COVER MATERIALS

A. Bedding for drainage pipe: as specified in Section 31 2000 - Earth Moving.

B. Cover for drainage pipe: as specified in Section 31 2000 - Earth Moving.

2.6 FILTER FABRIC

A. Filter fabric for wrapping trenches shall be a non-woven, polypropylene fabric made specifically for use in subsurface drainage structures and equal to Mirafi 14ON, manufactured by Mirafi, Inc., Charlotte, NC 28224.

2.7 POLYMER TRENCH DRAINS

A. Polymer trench drains and slot drains shall be ACO system 4020 respectively, with neutral channel sections and Polyethelene grate for trench drains as manufactured by ACO Polymer Products, Inc., 12080 Ravenna Road, Chardon, OH 44024 or approved equal.

B. Drain grates for trench drains shall be black polypropylene, UV stabilized, ADA compliant grates with 'quik loc' locking mechanism, or approved equal

C. Catch basins for trench drain system shall be ACO trench drains intended for use with system 4020.

1. Provide matching black grate and locking mechanism for system 4020 trench drains
2. Provide plastic trash bucket for all catch basins. Provide oval to round invert adapters where required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that the trench cut and excavation base is ready to receive work and excavations, dimensions and elevations are as indicated on the contract drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with gravel borrow, in accordance with Section 312000 – Earth Moving.

B. Remove large stones or other hard matter that could damage piping or impede consistent backfilling or compaction.

3.3 EXCAVATION AND BEDDING FOR DRAIN SYSTEMS

A. All piping shall be installed in strict conformance with the manufacturer's recommendations. If these specifications conflict with the manufacturer's recommendations, the Subcontractor shall request direction prior to installation.

B. Trenching and excavation, including the removal of rock and unstable material, shall be in accordance with Section 312000 – Earth Moving. Bedding material shall be placed in the trench, as indicated or as required, as replacement for materials in those areas where unstable materials were removed. Compaction of the bedding material shall be as specified.

C. Thoroughly compact backfill around all drainage structures and within all trenches in accordance with Section 312000 – Earth Moving. Properly Backfill and compact in lifts as specified to prevent future settlement.

3.4 INSTALLATION OF FILTER FABRIC

A. One layer of filter fabric shall separate existing soil and crushed stone fill and shall be used on the top, bottom and all sides. The fabric shall be secured in such a manner that backfill material will not infiltrate through any fabric overlaps.

B. Filter fabric shall be installed with infiltration systems as shown on the contract drawings.

C. Filter fabric shall be installed along slopes where drainage pipes outlet. Fabric shall be pinned and secured with rip-rap.

D. Trenching Lining and Overlaps: Trenches to be lined with filter fabric shall be graded to obtain smooth side and bottom surfaces, so that the fabric will not bridge cavities in the soil or be damaged by projecting rock. The fabric shall be laid flat, but not stretched on the soil, and it shall be secured with anchor pins. Overlaps shall be at least twelve (12") inches and anchor pins shall be used along the overlaps.

3.5 INSTALLATION OF HDPE PIPE

A. Pipe Laying: Each pipe shall be carefully inspected before it is laid. Any defective or damaged pipe shall be rejected. No pipe shall be laid when the trench conditions or weather is unsuitable for such work. Water shall be removed from any trenches by sump pumping or other approved methods. The pipe shall be laid to the grades and aligned, as indicated. The pipe shall be bedded to the established grade line. Pipes of either the bell-and-spigot type or the tongue-and-grove type shall be laid with the bell or groove ends upstream. All pipes in place shall be approved before backfilling.

B. Jointings: HDPE drainage pipe shall be installed in accordance with the manufacturer's specifications and as specified herein. A pipe with physical imperfections shall not be installed. No more than five (5%) percent stretch in a section will be permitted.

3.6 INSTALLATION OF TRENCH DRAINS

A. Install trench drains per detail, and per manufacturer's instructions. Install drains true to line and grade, level at given elevations as shown on plan.

B. Install concrete and steel reinforcement per details, use concrete vibrators to ensure that concrete is distributed evenly underneath drain sections.

C. Replace all trench drain sections damaged by construction activities.

3.7 CONCRETE DRAINAGE STRUCTURES

A. Shall be designed to be non-buoyant.

B. Form bottom of excavation; clean and smooth to correct elevation.

C. Install and level precast concrete sections, with provision for storm drainage pipe and section.

D. Establish elevations and pipe inverts for inlets and outlets, as indicated.

E. Mount frame and cover level in grout, secured to top cone section, to elevations indicated.

F. Adjust and set existing manhole covers to new grade.

3.8 TESTS

A. Request inspection from the Site Engineer prior to and immediately after placing aggregate cover over pipe.

B. Compaction testing will be performed in accordance with ASTM D1557.

C. If tests indicate the work does not meet the specified requirements; remove work, replace and retest at no cost to the Owner.

D. Frequency of tests will be as directed by the Engineer and/or Owner.

E. Pipe Test: Strength tests of pipe shall conform to field service test requirements of Federal Specification, ASTM specification, or AASHTO specification covering the product.

3.9 DAMAGE TO OTHER WORK

A. This Subcontractor shall be held responsible and shall pay for all damage to other work caused by his work or workmen. Repairing of such damage shall be done by this Subcontractor who installed the work, as directed by the Engineer.

3.10 IMPROPER WORKMANSHIP

A. All work under this section of the specifications found to be improper or of poor workmanship shall be removed, repaired and/or replaced to the satisfaction of the Engineer, at no additional expense to Architect or the Owner.

3.11 CLEAN-UP

A. All debris created by this work shall be cleaned up and disposed of, off-site, in accordance with Specification Section 01 7419 - Cleaning Up.

1. Separate recyclable waste from other waste trash and debris generated.
2. Clean all contaminated recyclable waste to make it acceptable for recycling.
3. Remove from the site all excess liquids or chemicals used during construction.
4. Deposit material in the appropriate container.

B. Upon completion of the work in this section, all staging, planking, equipment and excess materials shall be removed from the site.

3.12 GUARANTEE

A. Earthwork shall be guaranteed for a period of one year from the date of substantial completion against defects in workmanship or materials and will be replaced or repaired, at no cost to Engineer or the Owner, if such defects occur.

END OF SECTION

ATTACHMENT A

SOIL INVESTIGATION

TENNIS COURT CONDITION SURVEY

18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND
PO #25934
BTE, INC. FEDERAL ID NO. 52-1612838

REPORT TO

ST. MARY'S COLLEGE OF MARYLAND
ATTN: BRAD NEWKIRK, DIRECTOR OF THE PHYSICAL PLANT
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND 20650

REPORT BY
BOB TAYLOR ENGINEERING, INC.
22688 THREE NOTCH ROAD
LEXINGTON PARK, MARYLAND 20653

OCTOBER 31, 2022

TABLE OF CONTENTS

BOB TAYLOR ENGINEERING, INC.
Geotechnical Services • Materials Testing

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www.bobtaylorengineering.com
Robert F. Taylor, P.E., President

SOIL INVESTIGATION REPORT

CLIENT: St. Mary's College of Maryland
PO# 25934

PROJECT: Tennis Court Condition Survey
Attn: Brad Newkirk, Director of the Physical Plant
18952 East Fisher Road
St. Mary's City, Maryland

JOB NUMBER: 22-200

DATE OF REPORT: 10/31/22

INSPECTION DATES: 10/06/22 and 10/07/22

TYPE(S) OF INSPECTION: Asphalt Cores, Soil Borings and Classification of Soils

SUMMARY OF ENCLOSURES:

As per the client's request, six (06) asphalt cores and soil borings, labeled C-1 through C-6 inclusive, were performed within the three (03) existing tennis courts, located at St. Mary's College of Maryland. These asphalt cores were performed with a mechanical coring machine combined with soil borings using a hand auger to a depth of three and one-half feet (3.5') beneath the existing site elevations. To aid in future renovations, the purpose of the excavation was to determine the existing in place asphalt and subbase material depths for each tennis court. A vicinity map plus the asphalt core and soil boring locations are shown within this report as APPENDIX A VICINITY MAP and APPENDIX B CORE/HAND AUGER BORING LOCATION PLAN.

Beneath the asphalt surface stratum, soil samples were obtained via hand auger per ASTM D-1452 from each stratum encountered. Within all of the soil borings, friction cone tests were performed to determine the degree of soil density at a depth of six inches (6") and two feet (2') below the existing site elevations. The soils from the borings were visually inspected, classified in the field and returned to the Bob Taylor Engineering, Inc. certified laboratory for further analyses. The description of the soil is based upon the information from the Unified Soil Classification System (ASTM Designation D-2487 and/or ASTM C-136). Reports of the various soils encountered and the results of the friction cone tests are included in APPENDIX C RECORD OF SOIL EXPLORATION as well as the natural moisture contents of the on-site soils are shown in APPENDIX D LABORATORY TEST RESULTS.

Listed on the following page are the asphalt and bank run gravel thicknesses, visual and laboratory classifications per ASTM D-2488/ASTM D-2487, as well as soil strength for each stratum of soil borings labeled C-1 through C-6 inclusive.

SOIL INVESTIGATION REPORT

(Page Two of Three)

CLIENT: St. Mary's College of Maryland
PO# 25934

PROJECT: Tennis Court Condition Survey
Attn: Brad Newkirk, Director of the Physical Plant
18952 East Fisher Road
St. Mary's City, Maryland

JOB NUMBER: 22-200 DATE OF REPORT: 10/31/22

INSPECTION DATES: 10/06/22 and 10/07/22

SUMMARY OF ENCLOSURES: (Continued)

Asphalt, Crushed Rock, and Subgrade Soil Information					
Core/Soil Boring	Depth of Excavation	Asphalt Thickness (inches)	Crushed Rock Thickness (inches)	Subgrade USDA Soil Classification	Soil Density
C-1	3.5'	4.50"	4.0"	Tan Clayey Sand (SC)	Stiff
C-2	3.5'	4.25"	4.0"	Tan Clayey Sand (SC)	Stiff
C-3	3.5'	4.50"	4.0"	Tan Sandy Lean Clay (CL)	Stiff
C-4	3.5'	5.25"	4.0"	Tan Clayey Sand (SC)	Stiff
C-5	3.5'	5.00"	4.0"	Brown Clayey Sand (SC)	Stiff
C-6	3.5'	4.50"	4.0"	Brown Lean Clay with Sand (CL)	Stiff

During the excavation, ground water was encountered within soil borings labeled C-1 at a depth of 1 foot and C-2 at a depth of 0.8 feet. It should be noted that the soil borings were backfilled upon completion. Therefore, a twenty-four-hour water level reading and cave-in depth were not recorded.

CLOSING

Extra care should be taken during the construction phases of this project due to the existing utilities and improvements on and around this site. In all cases, due to surface runoff, site grading should provide positive drainage at all times throughout the construction phases of the project.

This report is based upon my analyses of the subsurface conditions as obtained by the asphalt cores and soil borings. Extra care must be exercised during the construction phases due to the existing utilities present on site.

SOIL INVESTIGATION REPORT

(Page Three of Three)

CLIENT: St. Mary's College of Maryland
PO# 25934

PROJECT: Tennis Court Condition Survey
Attn: Brad Newkirk, Director of the Physical Plant
18952 East Fisher Road
St. Mary's City, Maryland

JOB NUMBER: 22-200

DATE OF REPORT: 10/31/22

INSPECTION DATES: 10/06/22 and 10/07/22

CLOSING (Continued)

These findings were developed from the subsurface conditions only at the specified locations and particular times designated on the logs furnished within this report. Differences in soil conditions may occur within the boundaries of this site. A change in the soil conditions at the specified core/boring locations may emerge with the passage of time. My company is not responsible for the conclusions, opinions or recommendations made by others based upon this data.

During construction, should the conditions of the soil diverge from the contents of this report, please contact Bob Taylor Engineering, Inc. as soon as possible. Boring samples will be stored at our Lexington Park office for a period of thirty days from the date of this report. Should you desire the samples to be stored for a longer duration, written notice must be given to this office prior to November 30, 2022.

Thank you for allowing Bob Taylor Engineering, Inc. to be of service to you. Should you have any questions, please do not hesitate to call.

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 11043, expiration date: 08/09/24.

Respectfully Submitted,

Robert F. Taylor, P.E.
President

STATE OF MARYLAND
ROBERT FULTON TAYLOR
No. 11043
PROFESSIONAL ENGINEER

Bob Taylor Engineering, Inc.

APPENDIX A

VICINITY MAP

SOIL INVESTIGATION
TENNIS COURT CONDITION SURVEY
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND

REPORT TO
ST. MARY'S COLLEGE OF MARYLAND
ATTN: BRAD NEWKIRK, DIRECTOR OF THE PHYSICAL PLANT
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND 20650

OCTOBER 31, 2022

VICINITY MAP

TENNIS COURT CONDITION SURVEY
ST. MARY'S CITY, MARYLAND

APPENDIX B

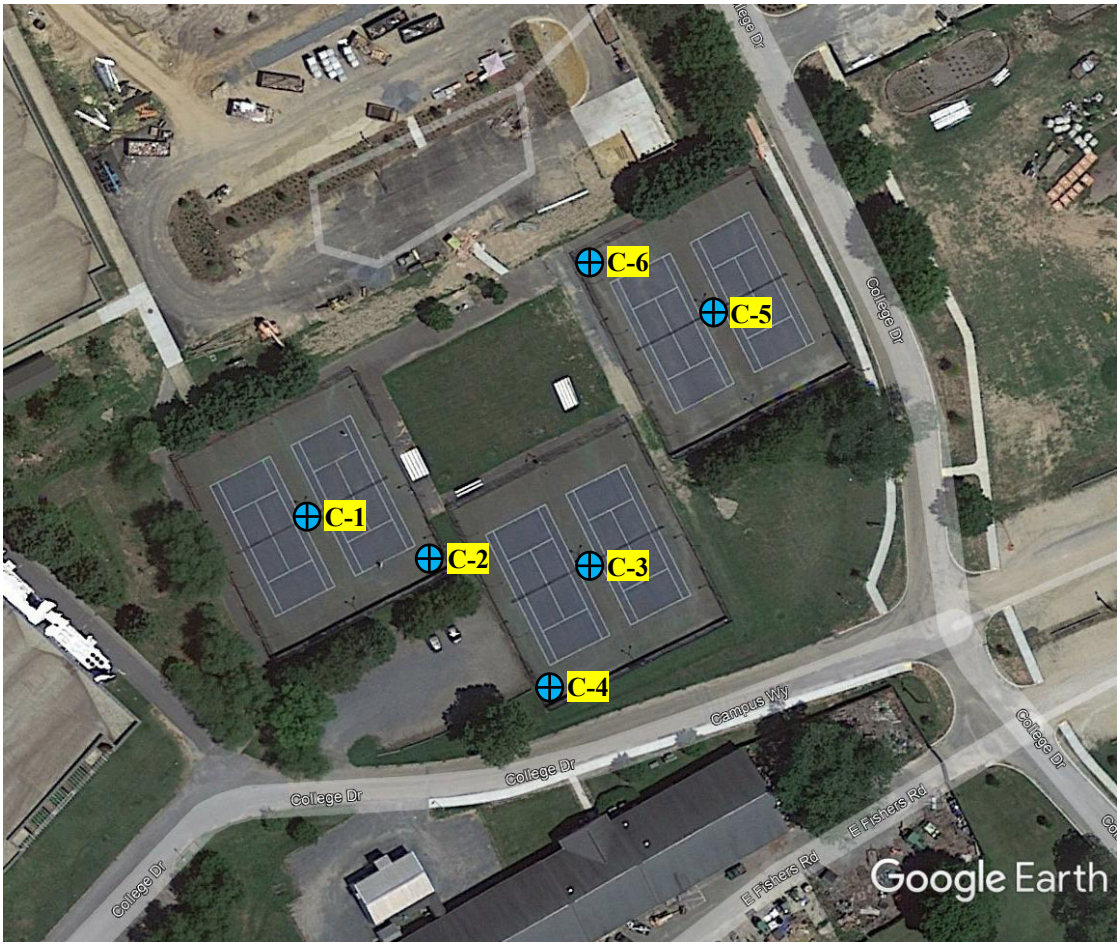
CORE/HAND AUGER BORING LOCATION PLAN

SOIL INVESTIGATION
TENNIS COURT CONDITION SURVEY
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND

REPORT TO
ST. MARY'S COLLEGE OF MARYLAND
ATTN: BRAD NEWKIRK, DIRECTOR OF THE PHYSICAL PLANT
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND 20650

OCTOBER 31, 2022

CORE/HAND AUGER BORING LOCATION PLAN



⊕ = Asphalt Core/Hand Auger Boring Location

TENNIS COURT CONDITION SURVEY
ST. MARY'S CITY, MARYLAND

APPENDIX C

RECORD OF SOIL EXPLORATION

SOIL INVESTIGATION
TENNIS COURT CONDITION SURVEY
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND

REPORT TO
ST. MARY'S COLLEGE OF MARYLAND
ATTN: BRAD NEWKIRK, DIRECTOR OF THE PHYSICAL PLANT
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND 20650

OCTOBER 31, 2022

BOB TAYLOR ENGINEERING, INC.
Geotechnical Services • Materials Testing

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Lexington Park, MD 20653
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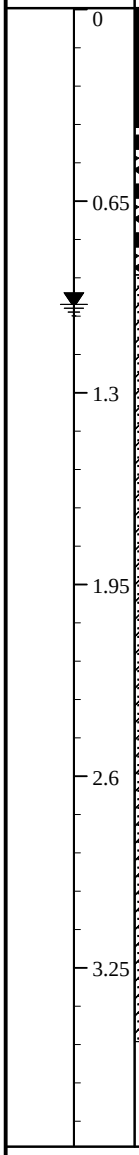
Fax 301-862-5764 • bte@somd.net
www.bobtaylorengineering.com

Robert F. Taylor, P.E., President

Client: St. Mary's College of Maryland | Job No.: 22-200

Project: Tennis Court Condition Survey | Boring No.: C-1

RECORD OF SOIL EXPLORATION



Elevation/ Depth (ft.)	Description	Rec.	Sample Type	Sampling Notes	SPT Blows	AVG SPT Blows/FT N Value	Curve 10 20 30 40 50
0	2 1/4" Surface Asphalt 2 1/4" Base Asphalt						
			DCP		29-17-20	37	
0.65	4" Crushed Rock Compact						
			DCP		16-18-18	36	
1.3	Wet Tan Clayey Sand (SC) Compact						
3.25	End Of Test Pit 3.5'						

Date Performed: 10/07/22	Weather: Cloudy	
Start:	Finish:	Drill Equipment: Hand Auger
Surface Elevation:	Terminating Elevation:	Chief Driller: James Beavers
Drilling Method: DCP	Hole Diameter, In.:	Assistant 1: Casey Curley
▽ Ground Water @ 1'	Cave-In Depth After Drilling, ft.: 2.0	Assistant 2: Dave Selvidge
▼ Water Level After Drilling: 1'		Assistant 3:

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Robert F. Taylor, P.E., President

Client: St. Mary's College of Maryland | Job No.: 22-200

Project: Tennis Court Condition Survey | Boring No.: C-2

RECORD OF SOIL EXPLORATION

Elevation/ Depth (ft.)	Soil Symbols	Description	Rec.	Sample Type	Sampling Notes	SPT Blows	AVG SPT Blows/FT N Value	AVG SPT Blows/FT Curve 10 20 30 40 50
0		1 3/4" Surface Asphalt 2 1/2" Base Asphalt						
				DCP		30@3"		
0.65		4" Crushed Rock Compact						
				DCP		11-13-15	28	
1.3								
1.95		Wet Tan Clayey Sand (SC) Hard						
2.6								
3.25								
		End Of Test Pit 3.5'						

Date Performed: 10/07/22	Weather: Cloudy	
Start:	Finish:	Drill Equipment: Hand Auger
Surface Elevation:	Terminating Elevation:	Chief Driller: James Beavers
Drilling Method: DCP	Hole Diameter, In.:	Assistant 1: Casey Curley
▽ Ground Water @ 0.8'	Cave-In Depth After Drilling, ft.: 2.0	Assistant 2: Dave Selvidge
▼ Water Level After Drilling:		Assistant 3:

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Robert F. Taylor, P.E., President

Client: St. Mary's College of Maryland | Job No.: 22-200

Project: Tennis Court Condition Survey | Boring No.: C-3

RECORD OF SOIL EXPLORATION

Elevation/ Depth (ft.)	Soil Symbols	Description	Rec.	Sample Type	Sampling Notes	SPT Blows	AVG SPT Blows/FT N Value	AVG SPT Blows/FT Curve 10 20 30 40 50
0		2 1/2" Surface Asphalt 2" Base Asphalt		DCP		43		
0.65		4" Crushed Stone Compact						
1.3								
1.95				DCP		4-8-11	19	
2.6		Moist Tan Sandy Lean Clay (CL) Compact						
3.25								
		End Of Test Pit 3.5'						

Date Performed: 10/07/22	Weather: Cloudy	
Start:	Finish:	Drill Equipment: Hand Auger
Surface Elevation:	Terminating Elevation:	Chief Driller: James Beavers
Drilling Method: DCP	Hole Diameter, In.:	Assistant 1: Casey Curley
▽ Ground Water @ Dry	Cave-In Depth After Drilling, ft.: 2.0'	Assistant 2: Dave Selvidge
▼ Water Level After Drilling: Dry		Assistant 3:

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Robert F. Taylor, P.E., President

Client: St. Mary's College of Maryland | Job No.: 22-200

Project: Tennis Court Condition Survey | Boring No.: C-4

RECORD OF SOIL EXPLORATION

Elevation/ Depth (ft.)	Soil Symbols	Description	Rec.	Sample Type	Sampling Notes	SPT Blows	AVG SPT Blows/FT N Value	AVG SPT Blows/FT Curve (10 20 30 40 50)
0		2 1/2" Surface Asphalt 2 3/4" Base Asphalt		DCP		48		
0.65		4" Crushed Rock Compact						
1.3		Moist Tan Clayey Sand (SC) Hard		DCP		13-16-17	33	
1.95								
2.6								
3.25								
		End Of Test Pit 3.5'						

Date Performed: 10/07/22	Weather: Cloudy	
Start:	Finish:	Drill Equipment: Hand Auger
Surface Elevation:	Terminating Elevation:	Chief Driller: James Beavers
Drilling Method: DCP	Hole Diameter, In.:	Assistant 1: Casey Curley
▽ Ground Water @ Dry	Cave-In Depth After Drilling, ft.: 2.0'	Assistant 2: Dave Selvidge
▼ Water Level After Drilling: Dry		Assistant 3:

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Robert F. Taylor, P.E., President

Client: St. Mary's College of Maryland | Job No.: 22-200

Project: Tennis Court Condition Survey | Boring No.: C-5

RECORD OF SOIL EXPLORATION

Elevation/ Depth (ft.)	Soil Symbols	Description	Rec.	Sample Type	Sampling Notes	SPT Blows	AVG SPT Blows/FT N Value	AVG SPT Blows/FT Curve (10 20 30 40 50)
0		2 1/2" Surface Asphalt 2 1/2" Base Asphalt		DCP		49		
0.65		4" Crushed Rock Compact						
1.3		Moist Brown Clayey Sand (SM) Compact		DCP		16-17-17	34	
1.95								
2.6								
3.25		End Of Test Pit 3.5'						

Date Performed: 10/07/22	Weather: Cloudy	
Start:	Finish:	Drill Equipment: Hand Auger
Surface Elevation:	Terminating Elevation:	Chief Driller: James Beavers
Drilling Method: DCP	Hole Diameter, In.:	Assistant 1: Casey Curley
▽ Ground Water @ Dry	Cave-In Depth After Drilling, ft.: 2.0'	Assistant 2: Dave Selvidge
▼ Water Level After Drilling: Dry		Assistant 3:

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Robert F. Taylor, P.E., President

Client: St. Mary's College of Maryland | Job No.: 22-200

Project: Tennis Court Condition Survey | Boring No.: C-6

RECORD OF SOIL EXPLORATION

Elevation/ Depth (ft.)	Soil Symbols	Description	Rec.	Sample Type	Sampling Notes	SPT Blows	AVG SPT Blows/FT N Value	AVG SPT Blows/FT Curve (10 20 30 40 50)
0		2 1/4" Surface Asphalt 2 1/4" Base Asphalt						
0.65				DCP		45		
		4" Crushed Rock Compact		DCP		12-14-14	28	
1.3								
1.95								
		Moist Brown Lean Clay With Sand (CL) Hard						
2.6								
3.25								
		End Of Test Pit 3.5'						

Date Performed: 10/07/22	Weather: Cloudy	
Start:	Finish:	Drill Equipment: Hand Auger
Surface Elevation:	Terminating Elevation:	Chief Driller: James Beavers
Drilling Method: DCP	Hole Diameter, In.:	Assistant 1: Casey Curley
▽ Ground Water @ Dry	Cave-In Depth After Drilling, ft.: 2.0'	Assistant 2: Dave Selvidge
▼ Water Level After Drilling: Dry		Assistant 3:

APPENDIX D

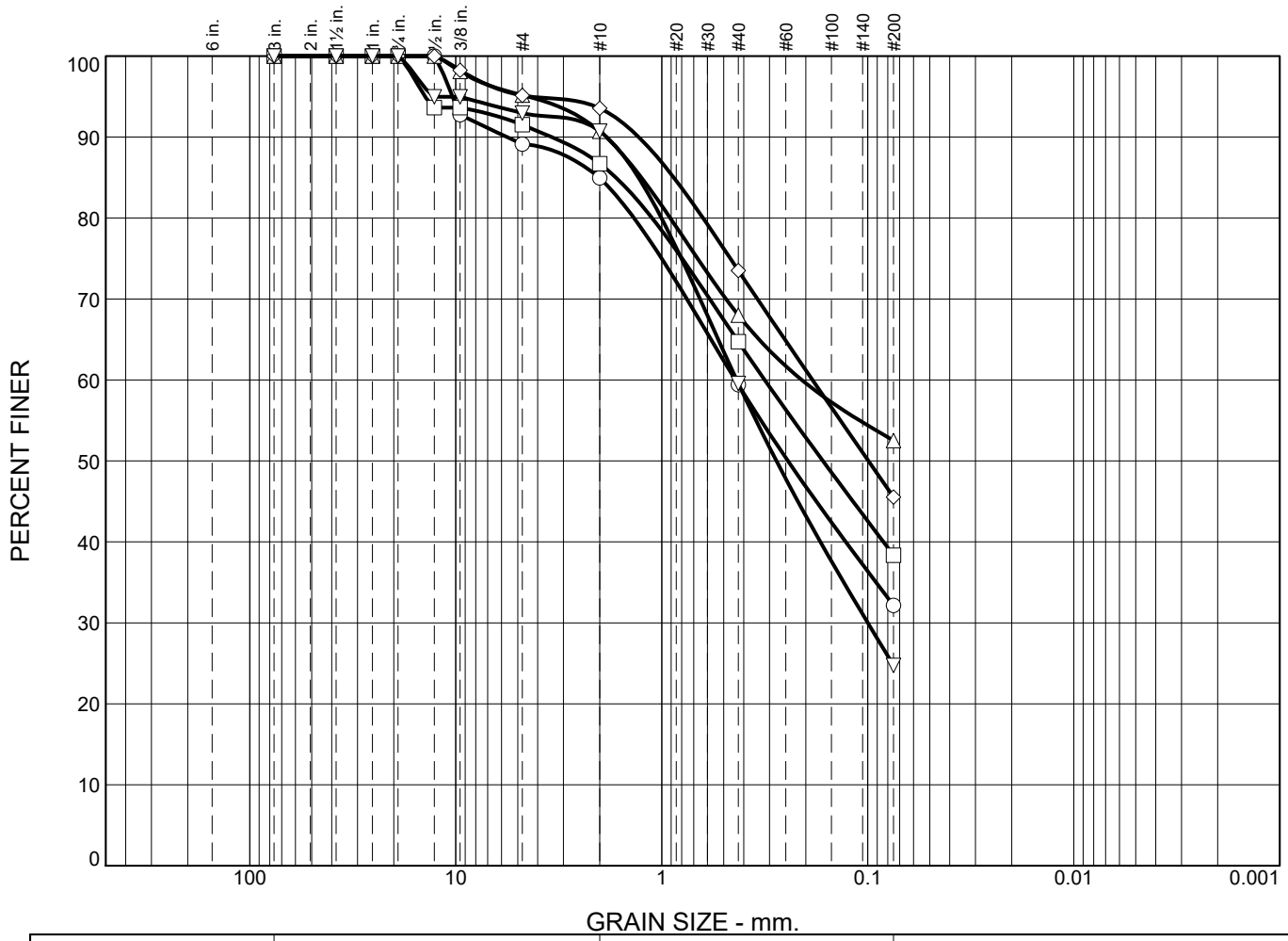
LABORATORY TEST RESULTS

SOIL INVESTIGATION
TENNIS COURT CONDITION SURVEY
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND

REPORT TO
ST. MARY'S COLLEGE OF MARYLAND
ATTN: BRAD NEWKIRK, DIRECTOR OF THE PHYSICAL PLANT
18952 EAST FISHER ROAD
ST. MARY'S CITY, MARYLAND 20650

OCTOBER 31, 2022

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	15	26	27	32	
□	0	13	22	27	38	
△	0	9	23	15	53	
◇	0	6	20	28	46	
▽	0	9	31	35	25	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	C-1	01	.9'	Wet Tan Clayey Sand	SC
□	C-2	02	.9'	Wet Tan Clayey Sand	SC
△	C-3	03	2'	Moist Tan Sandy Lean Clay	CL
◇	C-4	04	.9'	Moist Tan Clayey Sand	SC
▽	C-5	05	.9'	Moist Brown Clayey Sand	SC

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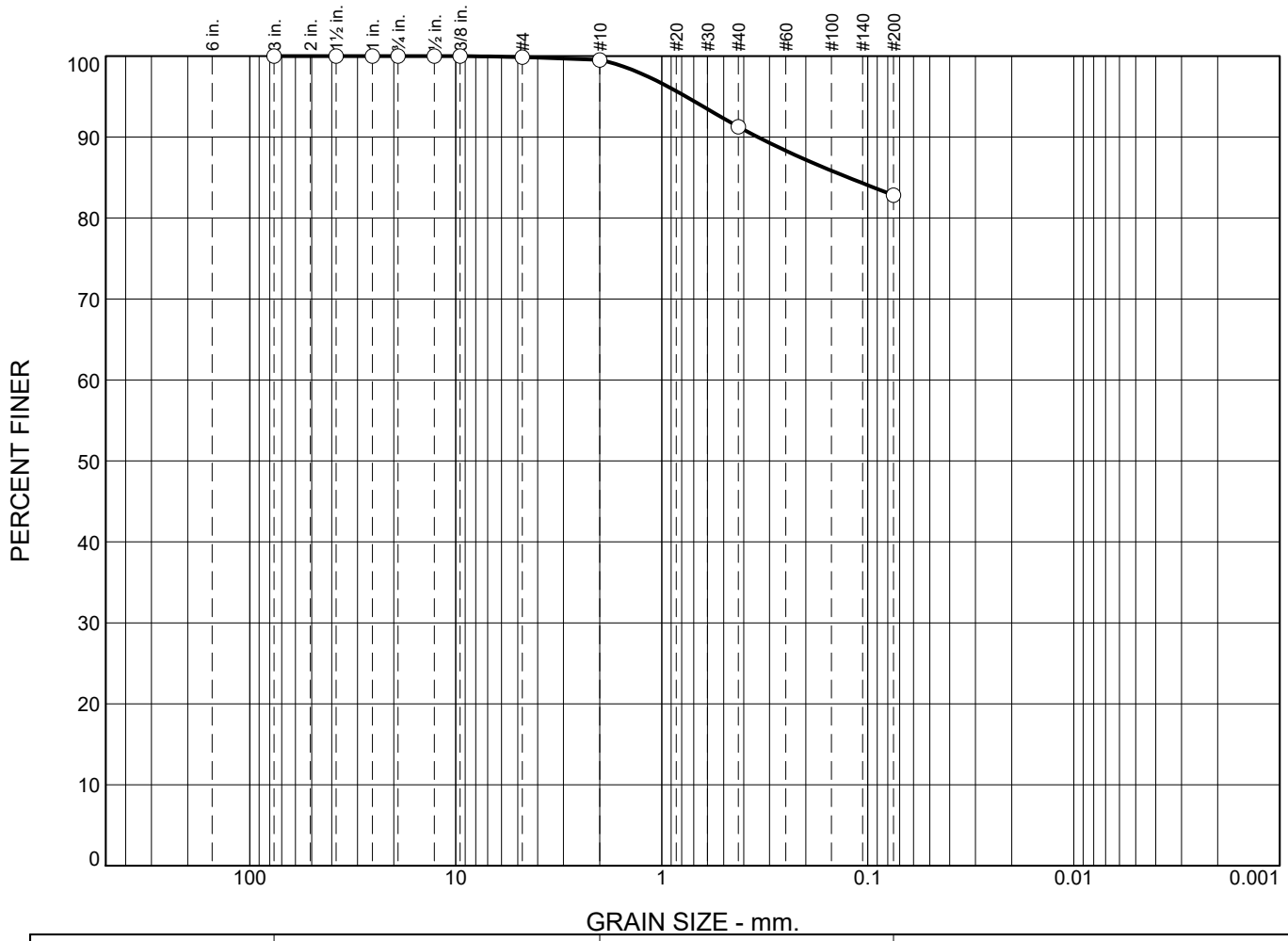
Client: St. Mary's College of Maryland

Project: Tennis Court Condition Survey

Project No.: 22-200 **Figure** 1

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	0	9	8	83	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	C-6	06	2'	Moist Brown Lean Clay With Sand	CL

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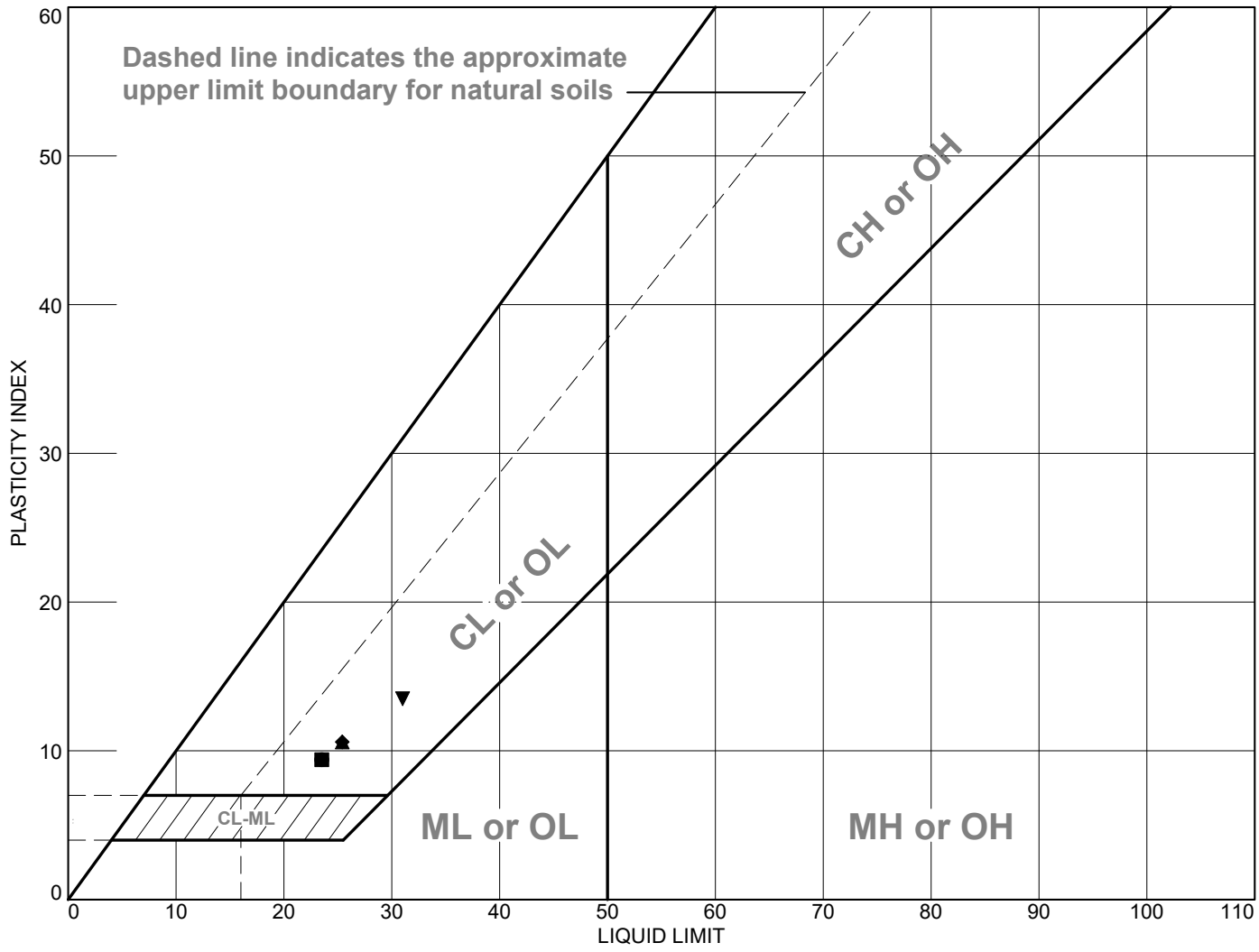
Client: St. Mary's College of Maryland

Project: Tennis Court Condition Survey

Project No.: 22-200 **Figure** 2

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Wet Tan Clayey Sand	23.5	14.1	9.4	59	32	SC
■	Wet Tan Clayey Sand	23.5	14.1	9.4	65	38	SC
▲	Moist Tan Sandy Lean Clay	25.4	14.8	10.6	68	53	CL
◆	Moist Tan Clayey Sand	25.4	14.8	10.6	74	46	SC
▼	Moist Brown Clayey Sand	31.0	17.5	13.5	60	25	SC

Project No. 22-200 **Client:** St. Mary's College of Maryland

Project: Tennis Court Condition Survey

● **Source of Sample:** C-1 **Depth:** .9' **Sample Number:** 01

■ **Source of Sample:** C-2 **Depth:** .9' **Sample Number:** 02

▲ **Source of Sample:** C-3 **Depth:** 2' **Sample Number:** 03

◆ **Source of Sample:** C-4 **Depth:** .9' **Sample Number:** 04

▼ **Source of Sample:** C-5 **Depth:** .9' **Sample Number:** 05

Remarks:

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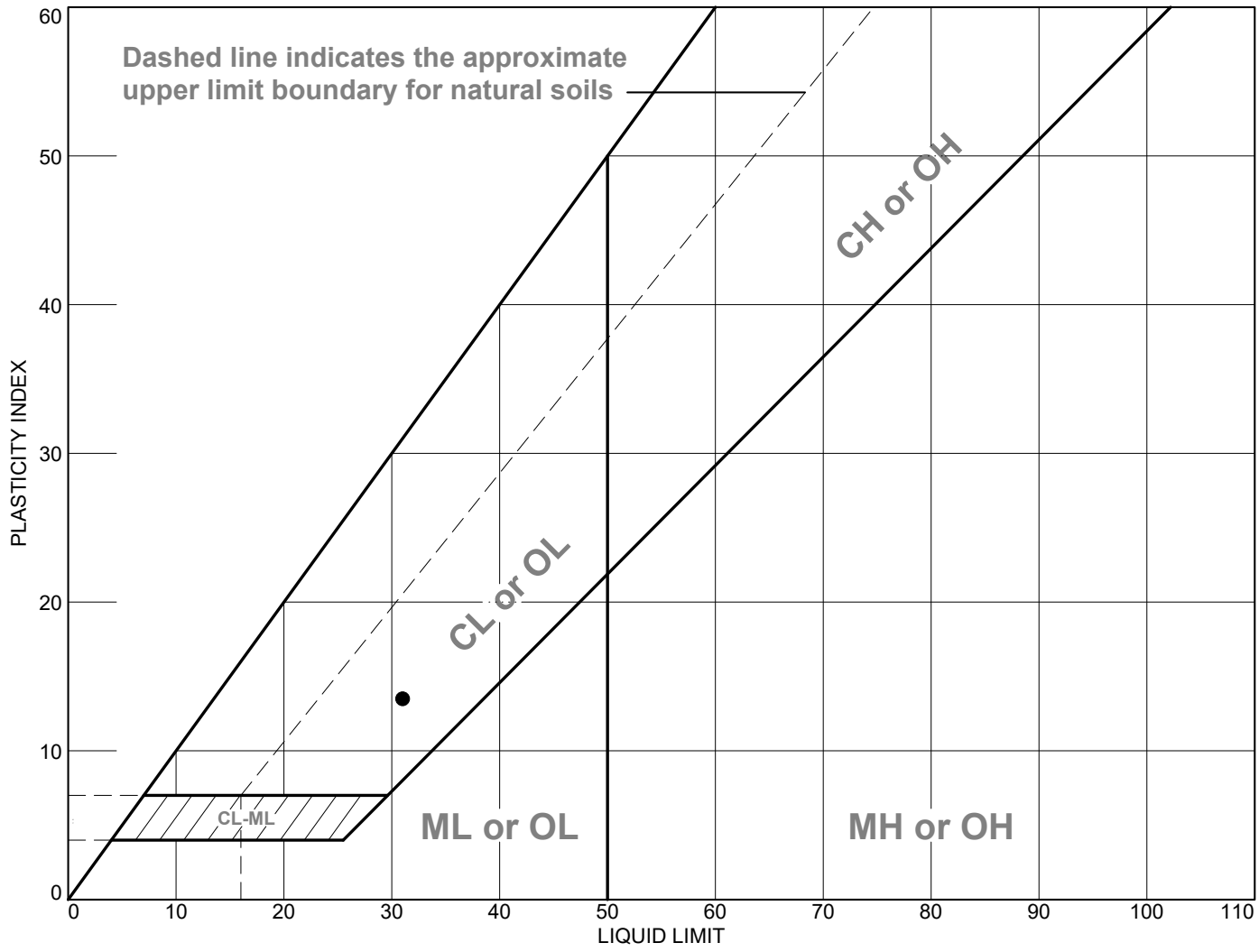
Figure 1

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Moist Brown Lean Clay With Sand	31.0	17.5	13.5	91	83	CL

Project No. 22-200 **Client:** St. Mary's College of Maryland

Project: Tennis Court Condition Survey

● **Source of Sample:** C-6 **Depth:** 2' **Sample Number:** 06

Remarks:

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Figure 2