New Football Field Drainage and Turf
Brad Henderson Memorial Stadium

For Macon-Bibb Parks and Recreation
2172 Anthony Road, Macon, GA

Project No: 2018-091

Dec. 29th, 2018

ISSUED FOR CONSTRUCTION
PREPARED BY:

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Level II Certified

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STATE OF GEORGIA CHARLES M. GREEN, JR. CERTIFICATE NO. RA006677 REGISTERED ARCHITECT

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Owner-furnished products.
4. Contractor-furnished, Owner-installed products.
5. Access to site.
6. Work restrictions.
7. Specification and drawing conventions.
8. Miscellaneous provisions.

B. Related Requirements:

1. Section 01 5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Brad Henderson Memorial Stadium Renovations.

1. Project Location: 2172 Anthony Road, Macon, GA.

B. Owner: Macon-Bibb County.

C. Architect: WM2A Architects; 348 Cotton Avenue, Suite 500; Macon, GA 31201; 478-745-4945

D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. MEP Engineering: NBP Engineers 478-745-1691
2. Structural Engineering: Kornegay Engineering 478-745-6161
3. Civil Engineering: Carter Engineering Group 478-477-3923

E. Contractor: Will be engaged after award.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The existing football field is to be removed and rebuilt. The existing turf is to be stripped and removed. A 4” layer of sand is to be added and tilled into the parent topsoil. The field is to receive a new underground drainage system. Afterwards, the soil is to be fine graded per specifications. New Bermuda sod is to be installed inside the field fence. The existing field’s irrigation system is to be reused. A bid alternate is part of the documents to: add an additional 1" layer of sand. The contractor is to maintain the new turf for sixty days during the grow-in transition.

B. Type of Contract:

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

1.5 PHASED CONSTRUCTION

A. The Work shall be conducted in the spring of 2019 and be ready for competitive football in mid-August.

B. Before commencing Work of each phase, submit an updated copy of Contractor's construction schedule showing the sequence, commencement and completion dates, and move-out and -in dates of Owner's personnel for all phases of the Work.

1.6 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.7 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.8 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

B. Owner-Furnished Products:

1. As indicated within the drawings.

1.9 CONTRACTOR-FURNISHED, OWNER-INSTALLED PRODUCTS

A. Contractor shall furnish products indicated. The Work includes unloading, handling, storing, and protecting Contractor-furnished products as directed and turning them over to Owner at Project closeout.

1.10 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet beyond building perimeter; 10 feet beyond surface walkways, patios, surface parking, and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.
2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Field: Maintain portions of existing facility affected by construction operations in a working condition throughout construction period. Underground sewer pipes are to be protected. The existing goals are to be protected and remain. Repair damage caused by construction operations.

1.11 COORDINATION WITH OCCUPANTS

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

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.

2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.12 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 6 a.m. to 6 p.m., Monday through Friday, unless otherwise indicated.

1. Weekend Hours: Same as times permitted for weekday work.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

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

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

E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

F. Employee Identification: Provide identification apparel for Contractor personnel working on Project site.

1.13 SPECIFICATION AND DRAWING CONVENTIONS

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

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SECTION 01 2300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

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

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

1.3 PROCEDURES

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

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1 Additional Sand:

1. Alternate: Add an additional 1”thickness to the layer of sand for the entire field.

END OF SECTION 01 2300

SECTION 02 4119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Salvage of existing turf.

1.2 DEFINITIONS

A. Remove and Salvage: Carefully remove all turf inside the field fence.

B. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

1.3 FIELD CONDITIONS

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

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

C. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

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

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

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

1. Comply with requirements for existing services/systems interruptions specified in Section 01 1000 "Summary."

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

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

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

b. Drain Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.3 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 and Controls."

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

3.4 SELECTIVE DEMOLITION, GENERAL

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

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

B. Removed and Salvaged Items:

1. Remove existing turf and turn over to owner.
2. Remove any unwanted turf and dispose of in a lawful manner.

C. Removed and Reinstalled Items:

1. Clean and repair irrigation items to functional condition adequate for intended reuse.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

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.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

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

END OF SECTION 02 4119

SECTION 31 2300
EARTHWORK

1. GENERAL:

1.1 Related Documents:

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary:

A. This Section includes the following

1. Preparing subgrades for lawns and fields.

4. Excavating and backfilling for utility trenches.

8. Spreading and finish grading of topsoil on all site areas including lawn and landscape areas.

1.1 Definitions:

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

1. Initial Backfill: Backfill placed beside and over pipe to a minimum of 12 inches in a trench, including haunches to support sides of pipe.

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

B. C. Borrow Sand: Satisfactory soil imported from off-site for use as fill or backfill. Offsite borrow areas shall be approved by the Architect prior to use.

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

E. Fill: Soil materials used to raise existing grades.
2.

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

I. 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 non-soil materials.

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

1.2 Submittals:

A. 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.

A. Verify and comply with all Federal, OSHA, State, County, City or local requirements concerning earthwork, excavation, and related activities.

B. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

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

2. The Contractor, and all sub-contractors, shall be responsible for all safety measures, procedures, or devices as required by OSHA, Federal, State or local authorities. No person shall enter a manhole or other underground structure without protective breathing apparatus, and at least one other person present for safety. All earthwork, trenching, and grading operations shall conform to minimum OSHA requirements for safety, shoring, bracing, and protective measures.

C. Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.

1.3 Project Conditions:

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Architect not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Architect's written permission.

B. Field verify conflicting piping prior to starting trenching.

2. PRODUCTS:

2.1 Materials:

E. Backfill and Fill Materials for Trench Backfill: Satisfactory, suitable soils are defined as course sand:

1. Initial Backfill: Initial backfill shall not contain non-soil and rock fragments exceeding one inch in any dimension.

2. Final Backfill: Final backfill shall not contain non-soil and rock fragments exceeding 2 inches in any dimension.

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.

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing," during earthwork operations.

3.5. Excavation, General:

A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by the Geotechnical Engineer. The Contract Sum will be adjusted for rock excavation according to the provisions of the Contract.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

2. Intermittent ram hammering; or ripping of material not classified as rock excavation is earth excavation.

B. Rock excavation includes removal and off-site disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction.

3.6 Excavation for Structures:

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10 feet. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

3.7 Excavation for Walks and Pavements:

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

3.8

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

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to follow upper slopes of turf.

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 trees to remain.

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, sub-drainage.

2. Surveying locations of underground utilities for Record Documents.

B. Place backfill on subgrades free of mud, frost, snow, ice, vegetation, or other deleterious matter.

3.13 Drainage Trench Backfill:

A. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the Engineer or authorities having jurisdiction.

G. Backfill voids with satisfactory soils while installing and removing shoring and bracing.

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

I. Install warning/locator tape directly above utilities, one to two feet below finished grade.

3.14 Soil Fill:

A. Plow, scarify, bench, or till so fill material will bond with existing material.

C. Place soil fill on subgrades free of mud, frost, snow, ice, vegetation or deleterious matter.

3.15 Soil Moisture Control:

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 3 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 1 percent and is too wet to compact to specified dry unit weight.

3.16 Compaction of Soil Backfills and Fills:

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure to prevent wedging.

2. Lawn or Landscape Areas: Compact each layer of backfill or fill soil material to 95%.

3.

3.17 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, allowing for minimum depth of topsoil. Compact with uniform levels or slopes between points where elevations are shown or between such points and existing grades.

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 hashmarks and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Fields, Lawns, and Unpaved Areas: Plus or minus 1/2 inch. Backfill against curbs and pavement edges flush to provide smooth finish in areas to grassed.

3.18 Grading of All Lawn and Fields:

A. General: Uniformly grade areas including adjacent transition areas. Smooth finish surfaces within specified to within plus or minus 0.10' between points where elevations are shown or between such points and existing grades. Grade areas adjacent pavement to slope as indicated on the drawings and to prevent ponding of water or sudden changes of grade.

B. Sand Placement:

1. All areas of the site that are graded and are to be sodded shall have a uniform layer of sand spread prior to final grading. Smooth and compact finished surface with uniform levels between points where elevations are shown or between such points and existing grades.

3.21 Protection:

A. Protect 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 required; 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.

3.22 Disposal of Surplus and Waste Materials:

A. Disposal: Remove waste material, trash, and debris, and legally dispose of it off Owner's property.

3.23 Insufficient Fill Material:

A. If the quantity or classification of onsite grading material is insufficient to meet project specifications or requirements for each phase of work, the Contractor shall obtain the required borrow material from offsite sources. No additional payment will be made to balance the earthwork or to compensate the Contractor for furnishing and placing suitable materials obtained from offsite sources.

3.24 Excess Cut Material:

A. If the quantity of grading material is in excess of the quantities necessary to provide subgrade and finish grade elevations indicated on the drawings for each phase of work, the excess material shall be disposed of offsite. No additional payment will be made for offsite disposal.

END OF SECTION 31 2300

SECTION 31 2500
EROSION, SILTATION AND DUST CONTROL

1. GENERAL:

1.1 Related Sections:

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this section.

1.2 Scope:

A. This work shall consist of control measures during construction until final acceptance to control water runoff, erosion, siltation, and unreasonable amounts of dust. Permanent measures, which will remain in place after completion, are shown on the plans. Temporary measures are also shown on the plans or required by notes on the plans or project specifications. Measures to adequately control erosion and siltation throughout project construction, at different stages of construction, are required whether or not shown on the plans. This control shall be accomplished through the use of berms, dikes, sediment basins, sediment barriers, sediment traps, slope drains, grasses, and other devices.

B. All requirements of complying with NPDES General Permit No. GAR 100001 are listed in the Drawings and shall be the sole responsibility of General Contractor including all filing with GA EPD and fees to state and local governments.

1.3 General:

A. Comply with all applicable federal, state (GA Erosion and Sedimentation Control Act) and local ordinances.

B. In general, the work required to accomplish the planned facilities will be performed in a way which will minimize even temporary increase in suspended matter or pollutants in local streams or storm drains.

C. Clearing and grubbing operations shall be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter, if the Project conditions permit; otherwise temporary erosion control measures will be required between successive construction stages, as described in Division 31 Section "Site Clearing."

D. During construction the Contractor shall maintain careful scheduling and performance to ensure that land stripped of its natural ground cover is exposed only in small quantities and for durations not exceeding 14 days. Areas left exposed for periods greater than 14 days shall be seeded with temporary grass and/or mulched.

E. The erosion control measures described herein shall be continued until the permanent drainage facilities have been constructed and until the grass on planted slopes is sufficiently established to be an effective erosion deterrent.

F. The Contractor shall be responsible for maintenance of erosion control measures until final stabilization of the site, and the Contractor shall remove and dispose of erosion control devices after maintenance responsibilities are concluded.

1.4 Sediment Barriers:

A. Temporary sediment barriers shall be installed where shown on the plans or directed by the Engineer. Sediment barriers shall be fabric fence. Sediment shall be removed periodically during construction to ensure continued satisfactory performance as intended.

1.5 Temporary Grassing & Mulching:

A. Where staged construction or other conditions prohibit the completion of the project in a continuous manner the Contractor shall temporary grass and/or temporary mulch all areas disturbed.

B. Temporary grass shall consist of sowing a quick growing species of grass suitable to the area and season. Seeding shall be done in accordance with the Landscape Work Section and the Drawings.

C. Temporary mulch shall be applied to deter surface erosion. The mulched areas may be placed on slopes as steep as 2:1 using a tractor to imbed the mulch into the slope.

1.7 Run Off, Erosion and Sedimentation Controls:

A. During construction, route run off through sedimentation barriers, check dams and sediment basins.

B. The Contractor shall maintain sedimentation devices in functional condition. Sediment ponds, sediment barriers, sediment traps, and check dams shall be cleaned out when these devices are at last 60 percent of their capacity. Defective materials in the barriers and check dams shall be replaced.

C. Silts and deposits removed from control barriers shall be placed in eroded areas, compacted and stabilized with vegetation.

D. The Contractor shall establish sediment barriers at the toe of slopes under construction. These barriers may be relocated and reused after permanent slope stabilization becomes established. As they are relocated, any defective material in the barrier shall be replaced. In addition, all debris and silt at the previous location shall be removed.

1.8 Dust Control:

A. Dust shall be controlled by keeping dry areas damp by sprinkling with water, or other means.

END OF SECTION 31 2500

SECTION 328400

TURF IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Piping.
2. Pressure-reducing valves.
3. Automatic control valves.
4. Sprinklers.
5. Quick couplers.
6. Controllers.
7. Boxes for automatic control valves.

1.3 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be **automatic operation with controller and automatic control**]valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:

1. Irrigation Main Piping: **200 psig**.
2. Circuit Piping: **150 psig**.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, **electrical characteristics,** and furnished specialties and accessories.

B. Wiring Diagrams: For power, signal, and control wiring.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For **controllers and automatic control valves** to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

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

1. Notify **Architect** no fewer than one day in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without **Architect's** written permission.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. PVC Pipe: ASTM D1785, PVC 1120 compound, **Schedule 40**.

1. PVC Socket Fittings: ASTM D2466, **Schedule 40**.
2. PVC Threaded Fittings: ASTM D2464, Schedule 80.
3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.

C. PVC Pipe, Pressure Rated: ASTM D2241, PVC 1120 compound, **SDR 21**.

1. PVC Socket Fittings: ASTM D2467, Schedule 80.
2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

2.2 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

D. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

E. Solvent Cements for Joining PVC Piping: ASTM D2564. Include primer according to ASTM F656.

F. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.3 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valve:

1. Description: Molded-plastic body by RainBird, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

2.4 SPRINKLERS

A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.

B. Plastic, Pop-up, Gear-Drive Rotary Sprinklers:
   1. Description:
      a. Body Material: ABS.
      b. Nozzle: **ABS**.
      c. Retraction Spring: Stainless steel.
      d. Internal Parts: Corrosion resistant.
   2. Capacities and Characteristics:
      a. Pop-up Height: **4 inches** aboveground to nozzle.
      b. Arc: **Full**. **Half**, **Quarter** circle.
      c. Radius: 60’.
      d. Inlet: **NPS 3/4 (DN 20)**.

2.5 QUICK COUPLERS

A. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.

   1. Locking-Top Option: Vandal-resistant locking feature. Include **one** matching key(s).

2.6 CONTROLLERS

A. Description:

   1. Controller Stations for Automatic Control Valves: Each station is variable from approximately **5 to 60** minutes. Include switch for manual or automatic operation of each station.
   2. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and **two** matching keys; include provision for grounding.
      a. Body Material: **Molded plastic**.
      b. Mounting: **Surface type for wall**.
   3. Control Transformer: 24-V secondary, with primary fuse.
   4. Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, or to operate two or more times daily.
      a. Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic operation.
      b. Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during power outages.

c. Surge Protection: Metal-oxide-varistor type on each station and primary power.

5. Smart Controllers: Use ET, tested in accordance with IA SWAT Climatological Based Controllers 8th Draft Testing Protocol and compliant with ASHRAE Standard 189.1.
6. Wiring: UL 493, Type UF multiconductor, with solid-copper conductors; insulated cable; suitable for direct burial.

a. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
b. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.
c. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

2.7 BOXES FOR AUTOMATIC CONTROL VALVES

A. Plastic Boxes:

1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.

a. Size: As required for valves and service.
b. Shape: **Rectangular**.
c. Sidewall Material: **PE**.
d. Cover Material: **PE**.

1) Lettering: "**VALVE BOX"**

B. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch (19 mm) minimum to 3 inches (75 mm) maximum.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 22 **inches** below finished grade, or not less than [**18 inches (450 mm)**] <**Insert value**> below average local frost depth, whichever is deeper.
2. Circuit Piping: **12 inches**.

3.2 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

3.3 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.

B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

C. Install piping free of sags and bends.

D. Install groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

F. Install unions adjacent to valves and to final connections to other components with NPS 2 (DN 50) or smaller pipe connection.

G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 (DN 65) or larger pipe connection.

H. Install underground thermoplastic piping according to ASTM D2774.

I. Install expansion loops in control-valve boxes for plastic piping.

J. Lay piping on solid subbase, uniformly sloped without humps or depressions.

K. Install ductile-iron piping according to AWWA C600.

L. Install PVC piping in dry weather when temperature is above 40 deg F (5 deg C). Allow joints to cure at least 24 hours at temperatures above 40 deg F (5 deg C) before testing.

M. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet. Install aboveground or in control-valve boxes.

N. Water Hammer Arresters: Install between connection to building main and circuit valves aboveground or in control-valve boxes.

O. Install piping in sleeves under parking lots, roadways, and sidewalks.

P. Install sleeves made of **Schedule 40** PVC pipe and socket fittings, and solvent-cemented joints.

Q. Install transition fittings for plastic-to-metal pipe connections according to the following:

1. Underground Piping:

a. NPS 1-1/2 (DN 40) and Smaller: Plastic-to-metal transition fittings.
b. NPS 2 (DN 50) and Larger: AWWA transition couplings.
c.

R. Install dielectric fittings for dissimilar-metal pipe connections according to the following:

1. Underground Piping:

a. NPS 2 (DN 50) and Smaller: Dielectric coupling or dielectric nipple.
b. NPS 2-1/2 (DN 65) and Larger: Prohibited except in control-valve box.

2. Piping in Control-Valve Boxes:

a. NPS 2 (DN 50) and Smaller: Dielectric union.
b. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Dielectric flange.
c. NPS 5 (DN 125) and Larger: Dielectric flange kit.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join schedule number, ASTM D1785, PVC pipe and PVC socket fittings according to ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D2855.
3. PVC Nonpressure Piping: Join according to ASTM D2855.

3.5 VALVE INSTALLATION

A. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.

B. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.

1. Install valves and PVC pipe with restrained, gasketed joints.

C. Aboveground Valves: Install as components of connected piping system.

D. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves.

E. Throttling Valves: Install in underground piping in boxes for automatic control valves.

F. Drain Valves: Install in underground piping in boxes for automatic control valves.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and 2 inches (50 mm) from other boundaries unless otherwise indicated.

3.7 DRIP IRRIGATION SPECIALTY INSTALLATION

A. Install freestanding emitters on pipe riser to mounting height indicated.

B. Install manifold emitter systems with tubing to emitters. Plug unused manifold outlets. Install emitters on off-ground supports at height indicated.

C. Install multiple-outlet emitter systems with tubing to outlets. Plug unused emitter outlets. Install outlets on off-ground supports at height indicated.

D. Install drip tubes with direct-attached emitters on ground.

E. Install drip tubes with remote-discharge on ground with outlets on off-ground supports at height indicated.

F. Install off-ground supports of length required for indicated mounted height of device.

G. Install **application pressure regulators** in piping near device being protected.

3.8 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

A. Equipment Mounting: Install interior controllers on **fence**.

1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.

B. Equipment Mounting: Install exterior freestanding controllers on precast concrete bases.

1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Install control cable in same trench as irrigation piping and at least 2 inches (51 mm) below **or beside** piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.9 CONNECTIONS

A. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

B. Connect wiring between controllers and automatic control valves.

3.10 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.

1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Section 312000 "Earth Moving" for warning tapes.

3.11 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Any irrigation product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.12 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than **1/2 inch** above, finish grade.

3.13 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.14 DEMONSTRATION

A. **Train** Owner's maintenance personnel to adjust, operate, and maintain **automatic control valves and controllers**.

3.15 PIPING SCHEDULE

A. Install components having pressure rating equal to or greater than system operating pressure.

B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.

C. Underground irrigation main piping, **NPS 4** shall be the following:

1. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.
2. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent-cemented joints.

D. Underground irrigation main piping, **NPS 5**, shall be the following:

1. NPS 6 (DN 150) and larger ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings, glands, bolts, and nuts; and gasketed joints.
2. NPS 6 (DN 150) and larger ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings and gaskets; and gasketed joints.
3. PE pressure pipe; PE butt, heat-fusion fittings; and heat-fusion joints.
4. [**Schedule 40**] [**Schedule 80**], PVC pipe and socket fittings; and solvent-cemented joints.
5. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent-cemented joints.

E. Circuit piping, **NPS 2**, shall be the following:

1. SDR 26, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.

F. Circuit piping, **NPS 2-1/2 to NPS 4**, shall be the following:

1. SDR 26, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.

3.16 VALVE SCHEDULE

A. Underground, Shutoff-Duty Valves: Use the following:

1. NPS 2 (DN 50) and Smaller: Curb valve, curb-valve casing, and shutoff rod.
2. NPS 3 (DN 80) and Larger: Iron gate valve, resilient seated; iron gate valve casing; and operating wrench(es).

END OF SECTION 328400

SECTION 32 9210
FINISHING LAWN AND LANDSCAPE AREAS

1. GENERAL:

1.2 Description:

A. This section includes provisions for the following items:

1. Fine grading of all areas to be landscaped.

2. Cleanout of sediment filled areas around inlets and in detention ponds.

3. Finish grade at all sidewalks and paved areas.

4. Finish grade at all storm structures, electrical devices, walks and curbs.

5. Finish grades of swales, inlets, and all other yard areas.

1.3 Quality Control:

A. General: Review plans to familiarize equipment operators, foremen, and superintendent of requirements for final grading.

B. Visit site to review conditions prior to starting work. Starting work shall mean that conditions are acceptable as they exist.

1.4 Job Conditions:

A. Utilities: Determine location of underground utilities, manholes, water valves, sanitary cleanouts, and perform work in a manner which will avoid possible damage. Hand rake and hand excavate, as required.

1.5 Sequencing and Scheduling:

A. Do not begin finish grading operations until conditions allow for permanent vegetative covers to be planted.

B. Proceed with final grassing and mulching as rapidly as portions of the site are fine graded.

C. Maintain finish grading and final grassing to prevent washing and rill erosion until a complete stand of grass is growing and accepted by the Owner.

2. PRODUCTS: Solid sod, 98% pure, TifTuf bermuda ONLY.

3. EXECUTION:

3.1 Preparation, General:

A. Review plans to identify low points, catchment areas, swales, conveyances, berms, diversions, detention ponds, cut and fill slopes, etc.

B. Review graded site to identify all areas which hold water or store sediment.

C. Review plans to identify all paved areas, utility boxes, manholes, sanitary cleanouts, storm water cleanouts, valve boxes, utility vaults, etc.

D. Review installed location of each item and check elevations as necessary to identify each item that needs to be adjusted to grade and coordinate rework of paving and utilities or mark utility for future grade adjustments.

3.2 Low Points & Catchment Areas:

A. Clean out around each inlet to ensure that sediment build up from construction is removed and firm ground is exposed.

B. Backfill around all inlets to compensate for removal of sediment and to build up the grade to allow positive drainage to the inlet.

C. In low points and catchment areas formed by a series of inlets, transition grade between inlets and at each end of the catchment areas to allow for high points that break the water to the inlet.

3.3 Swales and Conveyances:

A. Remove all sediment build up from construction from all swales prior to beginning work.

B. Smooth grade swales and conveyances shown on plans to remove high points and backfill low points.

C. Swales and conveyances shall be graded to prevent standing water.

D. Swales within catchment areas shall be graded with high points between inlets as described above.

3.4 Berms and Diversions:

A. Grade berms and diversions to the width and height indicated on the plans.

B. Finish grading of berms and diversions shall include correcting all points weakened during construction activities by concentrated runoff, construction traffic, etc.

C. Finish grading of berms and diversions shall include rounding out the tops of berms to prevent sharp grade transitions which will hamper later maintenance.

3.5 Fill Slopes:

A. Smooth grade and compact all cut and fill slopes to remove all rill erosions and washes.

B. Reapply erosion control blankets, as necessary.

3.7 Field Areas:

A. Playing field areas shall be graded to avoid any sudden changes in grade, waviness, moguls, hillocks, low points, etc., unless specifically noted on the plans.

B. All sideline areas shall be graded to allow lawn maintenance equipment to freely operate with "skinning" the ground or jostling and bounding the operator.

3.8 Valve Boxes & Cleanouts:

A. All manholes, inlets, valve boxes and cleanouts shall be set flush with finish grade unless specifically detailed to protrude above finished grade.

B. Finish grader shall coordinate with installer to correct faulty grades or grade to top elevations of structures.

C. Water Vaults shall be set above grade to prevent water from entering and flooding these vaults.

END OF SECTION 32 9210

SECTION 32 9220

SUBSURFACE DRAIN SYSTEM

1. GENERAL:

1.1 This work shall consist of providing and placing a drainage system comprised of a geo-composite, prefabricated, water collection system (collection system) and the associated water transport system (transport pipe) as described in the plans. The drainage system shall be installed in accordance with these specifications and in close conformity with the locations and dimensions as shown on the plans or specified by the engineer. The quantities of drainage system materials as shown on the plans may be increased or decreased at the discretion of the engineer based on actual site conditions that occur during construction of the project. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

2.1 MATERIALS

2.2 The collection system shall be of a flexible, prefabricated, rounded rectangular shaped, composite product, consisting of an inner core described in 2.1.1 and an outer geotextile wrap described in 2.1.2. The outer wrap shall function only as a filter and shall not be a structural component of the core.

2.2.1 The collection system core shall be made of a high-density polyethylene. The core shall be constructed using interconnected corrugated pipes that define and provide the flow channels and structural integrity of the collection system. Perforations shall be evenly distributed on both faces of the core. The core of the collection system shall conform to the following physical property requirements. Basis of design is manufactured by Varicore Technologies, Inc.

At gradient = 0.1, pressure = 10 psi for 100 hours.

2.2.2 The collection system shall be wrapped with a non-woven geotextile. The non-woven wrap shall be of a needle-punched construction consisting of long-chain polymeric fibers composed of polypropylene, polyethylene or polyamide. The fibers shall be oriented into a multi-directional stable network whereby they retain their positions relative with each other and allow the passage of water as specified. The fabric shall be free of any chemical treatment or coating, which reduces permeability and it shall be inert to chemicals commonly found in soil. The geotextile shall conform to the following minimum average roll values.

2.2.3 Multi-Flow meets or exceeds these specifications.

2.3 The connectors used with the collection system shall be of a snap together design. In no case shall any product be joined without the use of the manufacturer's connector designed specifically for the purpose.

2.4 Transport pipe shall be either PVC pipe meeting the requirements of ASTM D- 2729 or ASTM F-949, or high-density polyethylene pipe meeting the requirements of AASHTO M252.2.4

3.1 CONSTRUCTION REQUIREMENTS

3.2 The amount of trench excavated at any time shall not exceed the amount of drain that can be set and backfilled completely in one working day. The trench shall be 4 inches wide and at the depth specified in the plans. The collection system shall be centered in the trench, and backfilled with clean coarse sand or an alternate selected by the engineer. Coarse sand is typically comprised of particles ranging from a # 8 to a # 30
U. S. Standard Sieve.

3.3 The trench excavations for the collection system and transport pipe shall be to the lines and grades shown on the plans. Over excavation in the bottom of the excavation shall be backfilled to the proper grade with excavated material or sand prior to the placement of the collection system.

3.4 The collection system shall be securely connected to the transport pipe using connectors approved by the manufacturer.

3.5 Backfill shall be consolidated in accordance with the plans or as directed by the engineer.

3.6 Any damaged collection system or transport pipe shall be replaced or repaired by splicing in an undamaged section of like material.

END OF SECTION 32 9220