



APPENDIX E
PROJECT MANUAL - VOLUME 3

**CIVIL/SITE CONTRACT DOCUMENTS
& TECHNICAL SPECIFICATIONS**

FOR

**PORT WENTWORTH RECREATIONAL
COMPLEX PHASE 2**

**PREPARED FOR:
CITY OF PORT WENTWORTH**

J – 25412.0029

AUGUST 4, 2025

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DOCUMENT 00 41 43**BID FORM**

PROJECT IDENTIFICATION: PORT WENTWORTH ANCHOR PARK PHASE 2**THIS BID IS SUBMITTED TO: THE CITY OF PORT WENTWORTH**

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.
3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
 - a. BIDDER has examined and carefully studied the Plans and Specifications for the work and contractual documents relative thereto, and has read all Technical Provisions, Supplementary Conditions, and General Conditions, furnished prior to the opening of Bids and can fulfill the requirements of the work to be performed.
 - b. BIDDER further acknowledges hereby acknowledges the receipt of the all project Addenda.
 - c. BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions possibly affecting cost, progress, performance and furnishing of the Work.
 - d. BIDDER is familiar with and is satisfied as to all federal, state, and local Laws and Regulations possibly affecting cost, progress, performance and furnishing of the Work.
 - e. BIDDER has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structure at or contiguous to the site (except underground Facilities) have been identified in the Supplementary Conditions. BIDDER acknowledges such reports and drawings are not Contract Documents and may not be complete for BIDDER's purposes. BIDDER acknowledges OWNER and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations,

explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto. BIDDER does not consider any additional examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Bidding Documents.

- f. BIDDER is aware of the general nature of Work to be performed by Owner and others at the site relating to Work for which this Bid is submitted as indicated in the Bidding Documents.
 - g. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Bidding Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
 - h. BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies BIDDER has discovered in the Bidding Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.
 - i. This bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.
4. BIDDER will complete the Work in accordance with the Contract Documents for the following price(s):

**PORT WENTWORTH RECREATIONAL PARK COMPLEX
PHASE 2
BID FORM**

ITEM	DESCRIPTION	QUANTITY		COST	
		NUMBER OF UNITS	UNIT MEASURE	PER UNIT	TOTAL COST
GENERAL					
1	Mobilization	1	LS		
2	Project Management	1	LS		
3	Bonds	1	LS		
4	Survey & Staking	1	LS		
5	3/4" Schedule 40 PVC Conduit	55	LF		
6	1" Schedule 40 PVC Conduit	2200	LF		
7	1-1/4" Schedule 40 PVC Conduit	1785	LF		
8	4" Schedule 40 PVC Conduit	1000	LF		
9					
10					
11					
12					
13					
SUB-TOTAL, GENERAL					
PAVING & GRADING					
1	Clearing & Grubbing	1.5	AC		
2	Grading Complete	Job	LS		
3	Remove & Haul Unsuitable Material Offsite	1000	CY		
4	Unclassified Excavation	Job	LS		
5	Borrow (Clean Sands)	34,200	CY		
6	1.5" Surface Course(9.5 mm Superpave)(HD)	9,950	SY		
7	2" Binder Course(19 mm Superpave)(HD)	9,950	SY		
8	8" Graded Aggregate Base Course(HD)	10,945	SY		
9	2" Surface Course(9.5 mm Superpave)(LD)	28,050	SY		
10	6" Graded Aggregate Base Course(LD)	40,320	SY		
11	Prime Coat	10,500	GAL		
12	6" Concrete Pavement	580	SY		
13	8" Graded Aggregate Base Course (Vehicular Concrete Pavement)	580	SY		
14	4" Gravel Driveway	665	SY		
15	Pervious Pavers (Full Section)	3,170	SY		
16	Concrete Sidewalk	8,455	SY		
17	6" Flush Header Curb	5,500	LF		
18	18 " Curb and Gutter	12,295	LF		
19	Detectable Warnings	1,075	SF		
20	Concrete Wheel Stops	956	EA		
21	Traffic Signs, Poles and Mounting	Job	LS		
22					
23					
24					
25					
26					
SUB-TOTAL - PAVING & GRADING					

**PORT WENTWORTH RECREATIONAL PARK COMPLEX
PHASE 2
BID FORM**

DRAINAGE SYSTEM

1	12" RCP	585	LF		
2	15" RCP	155	LF		
3	18" RCP	820	LF		
4	24" RCP	2,025	LF		
5	30" RCP	1,260	LF		
6	36" RCP	685	LF		
7	42" RCP	465	LF		
8	48" RCP	985	LF		
9	6" HDPE	40	LF		
10	10" HDPE	40	LF		
11	12" HDPE	1485	LF		
12	15" HDPE	1045	LF		
13	12" x 12" HDPE Tee	1	EA		
14	15" x 6" HDPE Tee	4	EA		
15	15" x 10" HDPE Tee	2	EA		
16	15" x 12" HDPE Tee	1	EA		
17	12" AdvanEdge Corrugated Pipe & Trench (Complete)	8645	LF		
18	ACO Sport System 4000 - Open Channel Trench Drain	720	LF		
19	ACO Sport System 4000 - In-line Catch Basin	4	EA		
20	Bio-Retention Facility (Complete)	1	LS		
21	Grate Inlet	2	EA		
22	Roof Inlet	36	EA		
23	Storm Manhole	3	EA		
24	Curb Inlet - Type A	2	EA		
25	Curb Inlet - Type C	4	EA		
26	Yard Inlet	12	EA		
27	2' Concrete Flumes	20	EA		
28					
29					
30					
31					
32					

SUB-TOTAL - DRAINAGE SYSTEM

WATER SYSTEM

1	Abandon Existing 12" Valves and Manhole Frames	3	EA		
2	4" PVC Water Main	145	LF		
3	4" Water Meter	1	EA		
4	4" Backflow Preventer	1	EA		
5	6" Water Main	65	LF		
6	6" Gate Valve & Box	1	EA		
7	12" PVC Water Main	555	LF		
8	12" x 6" Tapping Sleeve with 6" Gate Valve	1	EA		
9	16" Steel Casing	20	LF		
10	Fire Hydrant	1	EA		
11	Fittings	986	LBS		
12					
13					

SUB-TOTAL - WATER SYSTEM

**PORT WENTWORTH RECREATIONAL PARK COMPLEX
PHASE 2
BID FORM**

SANITARY SEWER SYSTEM

1	4" PVC Sewer Lateral	288	LF		
2	6" PVC Sewer Lateral	10	LS		
3	6" x 4" Wye	1	EA		
4	4" Sewer Clean out	6	EA		
5	5000 Gallon Gravity Grease Interceptor	1	EA		
6	2" PVC Force Main	20	LF		
7	3" PVC Force Main	375	LF		
8	Grinder Pump Station (Complete)	1	EA		
9	Fittings	150	LBS		
10					
11					
SUB-TOTAL - SANITARY SEWER SYSTEM					

MULTI-USE FIELDS

1	4' High Black Vinyl Coated Chain Link Fence (Fields)	2,500	LF		
2	4' Chain Link Single Swing Gate with Appurtenances	4	EA		
3	6' Chain Link Double Swing Gate with Appurtenances (12' Total)	5	EA		
4	15' Multi Sport Backstop System	240	LF		
5	TifTuf Bermuda Sod	225,000	SF		
6	12" Greens Mix (80% Sand/20% Organic)	225,000	SF		
7	Musco Field Lighting (Complete)	Job	LS		
8	Irrigation System (Design, Permit and Installation - Complete)	Job	LS		
9			EA		
10			EA		
11			EA		
12			EA		
13			EA		
SUB-TOTAL, MUTLI-USE FIELDS					

EROSION & SEDIMENTATION CONTROL

1	Construction Exit (incl. maint.)	2	EA		
2	Temporary Silt Fence (Non-Sensitive)	800	LF		
3	Temporary Silt Fence (Sensitive)	3,510	LF		
4	Inlet Protection (Type F)	60	EA		
5	Inlet Protection (Type P)	18	EA		
6	Inlet Protection (Type G)	2	EA		
7	Temporary Grassing	55,000	SY		
8	Permanent Vegetation	30,000	SY		
9	GA NPDES - Erosion Control Maintenance, Water Quality Sampling & Testing	1	LS		
10	Concrete Washdown	2	EA		
SUB-TOTAL, BASE - EROSION & SEDIMENTATION CONTROL					

**PORT WENTWORTH RECREATIONAL PARK COMPLEX
PHASE 2
BID FORM**

LANDSCAPE

1	Acer Rubrum 'Red Sunset' - Red Sunset Maple	16	EA		
2	Betula Nigra 'Dura Heat' - Dura Heat River Birch	16	EA		
3	Ilex Cassine - Dahoon Holly	11	EA		
4	Quercus Phellos - Willow Oak	87	EA		
5	Quercus Virginiana - Live Oak	104	EA		
6	Taxodium Distichum - Bald Cypress	116	EA		
7	Ulmus Parvifolia 'Allee' - 'Allee' Elm	56	EA		
8	Ilex Cornuta 'Burfordii' - Burford Holly	222	EA		
9	Ilex Cornuta 'Carissa' - Carissa Holly	190	EA		
10	Ilex Glabra - Inkberry	86	EA		
11	Loropetalum Chinense 'Ruby' - Loropetalum Ruby	307	EA		
12	Myrica Cerifera - Wax Myrtle	140	EA		
13	Myrica Cerifera - Wax Myrtle; MC-6	35	EA		
14	Podocarpus Macrophyllus	45	EA		
15	Viburnum Odoratissimum - Sweet Viburnum	86	EA		
16	Cynodon Dactylon 'Tif-Tuff' - Tif-Tuff Bermudagrass	395,500	SF		
17	Muhlenbergia Capillaris - Pink Muhly Grass	2924	EA		
18	Pennisetum Alopecuroides 'Hameln' - Fountain Grass	663	EA		
19	Spartina Bakeri - Cord Grass	4672	EA		

SUB-TOTAL, LANDSCAPE

PORT WENTWORTH RECREATIONAL PARK COMPLEX PHASE 2 PROJECT TOTAL:

Bidder hereby acknowledges the schedule of values above shall sum to the total lump sum bid and be used as the basis for a change of scope above and beyond the contract documents.

LUMP SUM BID

LUMP SUM BID PRICE: _____
(Use words)

(\$ _____)
(Figures)

5. BIDDER agrees the Work will be substantially complete and complete and ready for final payment in accordance with paragraph 14.07 of the General Conditions within 180 calendar days after the date when the Contract Times commence to run.
6. BIDDER accepts provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within times specified in the Agreement.
7. The following documents are attached to and made a condition of this Bid:
 - a. Required Bid Security in the form of 5 percent of the Bid Total Price.
8. The undersigned further agrees in case of failure on his/her part to execute the said contract and the Bond within 15 consecutive calendar days after written notice being given of the award of the contract, the check or bid bond accompanying this bid, and the monies payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure, otherwise, the check or bid bond accompanying this proposal shall be returned to the undersigned.
9. Communications concerning this Bid shall be addressed to:

Mr. David Stahl
Deputy City Manager
City of Port Wentworth
CLIC, 2 Magnolia Boulevard, Suite C
Port Wentworth, Georgia 31407
10. Terms used in this Bid which are defined in the General Conditions or Instructions will have the meanings indicated in the General Conditions of Instructions.

SUBMITTED on _____, 20__.

CONTRACTOR'S NAME

ADDRESS:

BY: _____

State Contractor License No. _____

State Utility Contractor License No. _____

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on

Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;
2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and

contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

- c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the

consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also

meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

- a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors,

members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.
- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's

interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
- b. Contractor certifies that, if approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

- c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 Concerning Subcontractors, Suppliers, and Others

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be

required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner,

Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
- 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
- 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought

by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and

shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is

required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

- a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
- c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
- d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 - 6. any inspection, test, or approval by others; or
 - 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 3. the extent of such authority and responsibilities will be provided.

- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or

continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise

or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data

shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of

said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not

limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:*
 1. Contractor agrees that:
 - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance:*
 1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to

the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or

neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
 2. correct such defective Work; or
 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments:

- 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an

Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or

- involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
- b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before

final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying

documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
 1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when

so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days

to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 - 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

DOCUMENT 00 73 00**SUPPLEMENTARY CONDITIONS**

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, Section 00 72 43, (EJCDC C-700, 2007 Edition) and other provisions of the Contract Documents as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

SC-1 The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract, Section 00 72 43, (EJCDC C-700, 2007 Edition) have the meanings assigned to them in the General Conditions.

SC-2.05.A.4 Add the following new paragraph to the General Conditions after paragraph 2.05.A.3:

4. "A schedule of anticipated shipping dates for materials and equipment. It is intended that equipment and materials be so scheduled as to arrive at the job site just prior to time for installation to prevent excessive materials on hand for inventory and necessity for extensive storage facilities at the job site."

SC-5.04.B.7 Add the following new paragraph to the General Conditions after paragraph 5.04.B.6:

7. Bonding surety shall be located in the state in which the work is being performed.

The Contractor shall not commence work under this contract until it has obtained all the insurance required under this paragraph and such insurance has been accepted by the Owner, nor shall the Contractor allow any Subcontractor to commence work on its subcontract until the insurance required of the Subcontractor has been so obtained and accepted.

- a. Compensation and Employer's Liability Insurance: The Contractor shall take out and maintain during the life of the contract, the statutory Worker's Compensation and Employer's Liability Insurance for all of its employees to be engaged in work on the project under the contract and, in case such work is sublet, the Contractor should require the Subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all the latter's employees to be engaged in such work.
- b. Bodily Injury Liability and Property Damage Liability Insurance: The Contractor shall take out and maintain during the life of the contract, Bodily Injury Liability and Property Damage Liability Insurance. The policy shall protect Contractor and any Subcontractor performing work covered by the contract from claims for damages or personal injury, including accidental death, as well as from claims for property damage, which may arise from

operations under the contract, whether such operations be by Contractor, Subcontractor, or by anyone directly or indirectly employed by either of them and the amount of such insurance should be not less than:

- (1) Bodily Injury Liability Insurance, in an amount not less than \$1,000,000.00 for injuries, including wrongful death to any one person and subject to the same limit for each person in an amount not less than \$2,000,000.00 on account of one accident. Contractual liability should be endorsed on the policy.
- (2) Property Damage Insurance in an amount not less than \$1,000,000.00 for damages on account of any one accident, and in an amount not less than \$2,000,000.00 for damages on account of all accidents.

- c. Builder's Risk Insurance (Fire and Extended Coverage): The Contractor shall have adequate fire and standard extended coverage, with a company or companies acceptable to the Owner, in force on the project.

The provisions with respect to Builder's Risk Insurance shall in no way relieve the Contractor of its obligation of completing the work covered by the Contract.

- d. Proof of Carriage of Insurance: The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations, effective dates, and date of expiration of policies. Such certificates shall contain substantially the following statement: "The insurance covered by this certification shall not be canceled or materially altered, except after 10 days written notice has been received by the Owner."

SC-6.02.B Add the following:

The Contractor shall provide in writing any requests to work on weekends. Requests shall be submitted to the Owner and Engineer for consideration a minimum of 48 hours prior to the requested weekend.

SC-6.08 Add the following:

The Contractor shall not proceed until all encroachment permits, curb cut permits, highway crossing permits, and railroad crossing permits have been secured. Contact Owner to ascertain status of permits.

SC-6.09.D Add a new paragraph after paragraph 6.09.C of the General Conditions that reads as follows:

"D. The Contractor shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 as amended through January 1, 2004 (PL

91–596) and under Section 107 of the Contract Work and Safety Standards Act (PL 91–54). The regulations are administered by the Department of Labor and the Contractor shall allow access to the project to personnel from that Department.

The Bidder's attention is directed to the fact all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout and they will be deemed to be included in the contract the same as though herein written in full.

The Contractor shall keep fully informed of all laws, ordinances and regulations of Federal, State, City and County, in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. Contractor shall at all times, observe and comply with all such existing and future laws, ordinances, and regulations."

SC–6.12.B Add a new paragraph after paragraph 6.12.A of the General Conditions that is to read as follows:

"B. Record Data Drawings:

1. The Contractor shall keep accurate, legible records of the elevations, locations, types, and sizes of sanitary sewage lines, service laterals, manholes, cleanouts, water lines, fittings, valves, hydrants, drainage pipes, drainage structures, and other related work performed under this project. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors of pipes. On a set of project prints provided by the Owner, the Contractor shall prepare a set of "record" drawings from the data stated above. The horizontal locations of all portions of items installed on this project shall be accurately tied down to the Georgia State Plane Coordinate System. Invert and frame elevations of all manholes, storm sewers and structures, sanitary sewers and lift stations shall be clearly indicated. These "record" drawings shall be kept clean and dry and maintained in a current state with the progress of the work. If at any time, a copy of this plan or portion of it is requested by the Owner, such copy shall be made available within 24 hours after the request is made.
2. Before final acceptance of the completed installation and before final payment by the Owner, the Contractor shall deliver to the Engineer a completed set of "record" drawings accurately depicting the data described above. The horizontal and vertical locations as shown on the "record" drawings for the items installed on this project shall be certified by a licensed surveyor, other than Thomas & Hutton, registered in the State in which the project is located. "Record" Drawings shall be submitted on a marked up set of project construction prints or electronically. Thomas & Hutton shall prepare

original "record" drawings from the submitted data. When completed, Thomas & Hutton shall have the licensed surveyor stamp and sign the original "record" drawings before making copies available to the Owner or other appropriate agencies."

SC-6.13.A.3 Add the following:

"Safely guard the Owner's property from damages, injury, or loss in connection with this contract. Contractor shall at all times guard and protect its own work and all materials of every description both before and after being used in the work.

Contractor shall provide any enclosing or special protection from weather deemed necessary by Engineer without additional cost to the Owner. Partial payments under the contract will not relieve the Contractor from responsibility for protection of material, work, and property."

SC-9.02.C Add a new paragraph after paragraph 9.02.B of the General Conditions that is to read as follows:

"C. If at any time before the commencement or during the progress of the work, tools, plant or equipment appear to the Engineer to be insufficient, inefficient, or inappropriate to secure the quality of the work required or the proper rate of progress, the Engineer may order the Contractor to increase their efficiency, to improve their character, to augment their number, or to substitute new tools, plant or equipment as the case may be, and the Contractor must conform to such order; but a failure of the Engineer to demand such increase or efficiency, number, or improvements, shall not relieve the Contractor's obligation to secure the quality of work and the rate of progress necessary to complete the work within the time required by this contract to the satisfaction of the Owner."

SC-9.05 Add the following sentence at the end of paragraph 9.05 of the General Conditions:

"Owner and Engineer have the right to reject defective materials. Defective materials shall not be used in the work."

SC-13.03.A Add the following sentences to paragraph 13.03.A of the General Conditions:

"The Contractor will be required to maintain all work in a condition acceptable to the Engineer for a 30 day operating period after the same has been completed as a whole, and the Engineer has notified the Contractor in writing that the work has been finished. The Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations and tests."

END OF SUPPLEMENTARY CONDITIONS

DOCUMENT 00 80 00**SPECIAL CONDITIONS**

SC-1 DESCRIPTION OF THE WORK: The proposed work consists of two (2) multi-purpose fields, field lighting, bleachers, concession stand, team building and parking bays in the City of Port Wentworth, Georgia. This involves earthwork, paving, drainage, stormwater, water distribution, sewer and erosion control measures and incidental construction in accordance with the plans and specifications.

SC-2 COMMENCEMENT AND COMPLETION OF WORK: The Contractor shall commence work within ten (10) days after Notice to Proceed is issued. Work shall be completed within 180 calendar days.

If the Contractor fails to prosecute the work with such diligence as will insure the completion of each portion of the work within the time shown on the above schedule, plus any extensions made in accordance with Article 12 of the General Conditions; and, if the Owner does not exercise reservations as set forth in Article 13 of the General Conditions, the Contractor shall continue the work in which event liquidated damages for the delay will be impossible to determine. In lieu thereof, liquidated damages in the amount of \$500.00 per each day of delay of the work until the work is completed.

SC-3 DRAWINGS: The work shall conform to the following drawings, all of which form a part of, and are included in, these specifications and are available in the office of Thomas & Hutton Engineering Co., 50 Park of Commerce Way, Savannah, Georgia 31402-2727.

Sheet	Description	Job No.
CO	Cover Sheet	25412.0029
G1.1	General Notes & Legends	25412.0029
G1.2	Index	25412.0029
EX1.0 – EX1.5	Overall Existing Conditions Plan	25412.0029
C1.0 – C1.5	Staking & Signage Plan	25412.0029
C1.6 – C1.10	Site Accessibility Plan	25412.0029
C1.11 – C1.15	Fire Accessibility Plan	25412.0029
C2.0 – C2.5	Water & Sewer Plan	25412.0029
C2.6	Water Profiles	25412.0029
C2.7	Sewer & Forcemain Profiles	25412.0029
C2.8-C2.9	Water & Sewer Details	25412.0029
C3.0	Overall Paving, Grading, and Drainage Plan	25412.0029
C3.1 – C3.5	Drainage Plan	25412.0029
C3.6 – C3.10	Paving & Grading Plan	25412.0029
C3.11-C3.23	Drainage Profiles	25412.0029
C3.24 – C3.25	Road Profiles	25412.0029
C3.26 – C3.32	Paving, Grading & Drainage Details	25412.0029
EC0.1 – EC0.3	ES & PC Notes	25412.0029
EC1.0	Overall ES & PC – Initial Phase	25412.0029
EC1.1 – EC1.5	ES & PC – Initial Phase	25412.0029
EC2.0	Overall ES & PC – Intermediate Phase	25412.0029
EC2.1-EC2.5	ES & PC – Intermediate Phase	25412.0029

EC3.0	Overall ES & PC – Final Phase	25412.0029
EC3.1 – EC3.5	ES & PC – Final Phase	25412.0029
EC4.1 – EC4.2	ES & PC Details	25412.0029
L1.0	Overall Landscape Plan	25412.0029
L1.1-L1.8	Planting Plan	25412.0029
L2.1	General Notes & Details	25412.0029
L2.2	Landscaping Specifications	25412.0029
L2.3	Grassing Specifications	25412.0029

SC-4 LAYOUT OF WORK: Control lines and master benchmarks will be furnished by the Owner. The Contractor will lay out work and will be responsible for all measurements in connection therewith.

SC-5 OBSERVATIONS AND TESTS: Before acceptance of the whole or any part of the work, it shall be subjected to observation and tests to determine it is in accordance with the plans and specifications. The Contractor will be required to maintain all work in a first class condition for a 30 day operating period after the same has been completed as a whole and the Engineer has notified the Contractor in writing the work has been finished. The Contractor shall pay for all testing and shall engage a mutually acceptable laboratory or qualified individual to conduct the tests in accordance with these specifications. No portion of the work will be accepted until tests prove it has been satisfactorily completed. The Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

SC-6 BONDS: The Performance Bonds in the amount of 100% of the contract amount and Payment Bonds in the amount of 100% of the contract amounts shall be furnished in accordance with Article 5 of the General Conditions.

SC-7 CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE: The Contractor shall not commence work under this contract until obtaining all the insurance required under this paragraph and such insurance has been accepted by the Owner, nor shall the Contractor allow any Subcontractor to commence work on a subcontract until the insurance required of the Subcontractor has been so obtained and accepted.

- a. Compensation and Employer's Liability Insurance: The Contractor shall take out and maintain during the life of the contract the statutory Worker's Compensation and Employer's Liability Insurance for all of its employees to be engaged in work on the project under the contract and, in case and such work is sublet, the Contractor should require the Subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all the latter's employees to be engaged in such work.
- b. Bodily Injury Liability and Property Damage Liability Insurance: The Contractor shall take out and maintain during the life of the contract Bodily Injury Liability and Property Damage Liability Insurance to protect itself and any Subcontractor performing work covered by the contract from claims for damages or personal injury, including accidental death, as well as from claims for property damage, which may arise from operations under the contract, whether such operations be by the Contractor, Subcontractor, or anyone directly or indirectly employed by either of them and the amount of such insurance should be not less than:

- (1) Bodily Injury Liability Insurance, in an amount not less than \$1,000,000.00 for injuries, including wrongful death to any one

person and subject to the same limit for each person in an amount not less than \$2,000,000.00 on account of one accident. Contractual liability should be endorsed on the policy.

- (2) Property Damage Insurance in an amount not less than \$1,000,000.00 for damages on account of any one accident, and in an amount not less than \$2,000,000.00 for damages on account of all accidents.

- c. Builder's Risk Insurance (Fire and Extended Coverage): The Contractor shall have adequate fire and standard extended coverage, with a company or companies acceptable to the Owner, in force on the project.

The provisions with respect to Builder's Risk Insurance shall in no way relieve the Contractor of its obligation of completing the work covered by the Contract.

- d. Proof of Carriage of Insurance: The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations, effective dates, and date of expiration of policies. Such certificates shall contain substantially the following statement: "The insurance covered by this certification shall not be cancelled or materially altered, except after ten (10) days written notice has been received by the Owner."

SC-8 HOLD HARMLESS CLAUSE: The Contractor agrees to hold harmless, indemnify and defend the Owner and its agents, architects, engineers and employees from and against any and all claims, losses, damages, demands, causes of action and any and all related costs and expenses, of every kind and character, growing out of, incidental to, or resulting directly or indirectly from the Contractor's performance of the work described herein, whether such loss, damage, injury, or liability is contributed to by the negligence of the Owner, its agents, architects, engineers, or employees, except the Contractor shall have no liability for damages or the costs incidental thereto caused by the sole negligence of the Owner, its agents, architects, engineers, or employees. The Contractor will require any and all subcontractors to conform with the provisions of this clause prior to commencing any work and agrees to ensure this clause is in conformity with the insurance provisions of the contract.

SC-9 CONTRACTOR'S STATUS: It is agreed the Contractor shall occupy the status of an Independent Contractor and the Contractor's employees are not employees of the Owner.

SC-10 CONTRACTOR'S AFFIDAVIT: Upon completion of the work and prior to final payment and settlement of all sums due hereunder, Contractor will furnish to Owner a Contractor's Affidavit in the usual form submitted by Contractor under the laws of the State of Georgia to the effect all bills for labor, materials and services in connection with said contract have been paid in full, acknowledging receipt of the contract price and averring there are no outstanding claims under said contract which could become a lien on the real estate arising out of said contract.

SC-11 RESIDENT PROJECT ENGINEER: The Owner reserves the right to furnish a Resident Project Engineer as deemed necessary to insure the Project quality control and conformance to Plans and Specifications, who will act as the Owner's Representative on the Project and will have the authority of the Engineer as set forth in the Contract Documents.

- SC-12 BARRICADES, DANGER AND WARNING SIGNS:** The Contractor shall install and maintain barricades, suitable and sufficient lights, danger signals, signs, and other traffic control devices and shall take all necessary precautions for the protection of the work and safety of the public. Lanes closed to traffic shall be protected by effective barricades, lighted during hours of darkness. Suitable warning signs shall be provided to control, direct traffic, and warn pedestrians. Upon completion all barricades, signs and the like shall be removed.
- SC-13 TOOLS, PLANT AND EQUIPMENT:** If at any time before the commencement or during the progress of the work, tools, plant or equipment appear to the Engineer to be insufficient, inefficient or inappropriate to secure the quality of the work required or the proper rate of progress, the Engineer may order the Contractor to increase their efficiency, to improve their character, to augment their number, or to substitute new tools, plant, or equipment, as the case may be, and the Contractor must conform to such order; but a failure of the Engineer to demand such increase of efficiency, number, or improvement shall not relieve the Contractor of its obligation to secure the quality of work and the rate of progress necessary to complete the work within the time required by the contract to the satisfaction of the Owner.
- SC-14 ACCIDENTS:** The Contractor shall provide, at the site, such equipment and medical facilities as are necessary to supply first-aid service to anyone who may be injured in connection with the work. The Contractor must report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work, whether on or adjacent to the site, which causes death, personal injury or property damages, giving full details and statement of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Contractor and any subcontractor on account of any accident, the Contractor shall promptly report the facts to the Engineer, giving full details in writing of the claim. The Contractor shall advise its superintendent and foreman, who are on the site of the work, the name of the hospital and phone number and the name and phone number of the doctor to use in case of an accident.
- SC-15 SANITARY PROVISIONS:** The Contractor shall provide temporary sanitary facilities for the use of the workmen during the progress of the work. The sanitary facilities shall conform to the requirements of the County health Engineer. All facilities shall be removed at the completion of the contract.
- SC-16 MODIFICATION OF QUANTITIES:** The itemized quantities shall be considered by the Contractor as the quantities required to complete the work for the purpose of bidding. Should actual quantities required in the construction of the work be greater or less than the quantities shown on the items, an amount equal to the difference in quantities at the unit prices for the item will be added to or deducted from the contract price.
- When itemized quantities are not given in the Proposal, the work shown on the plans or specified shall be considered by the Contractor to be included in the contract for the lump sum prices bid.
- SC-17 RESPONSIBILITY REGARDING EXISTING UTILITIES AND STRUCTURES:** The existence and location of underground utilities will be investigated and verified in the field by the Contractor before starting work. The Contractor shall call for underground utility locations. Underground utilities location service can be contacted at 1-800-282-7411 (GA) or 811. The location of all known interferences based on the best information available has been

shown on the drawings, but this information may not be complete. Excavation in the vicinity of existing structures and utilities shall be carefully done by hand. The Contractor shall be held responsible for any damage to and for maintenance and protection of existing utilities and structures. The Contractor is responsible for coordinating with the utility companies any relocation, adjustment, or replacement of utility facilities.

SC-18 INTERRUPTION OF UTILITY SERVICE: The Contractor's operations shall be conducted to interfere as little as possible with utility services. Any proposed interruption by the Contractor must be accepted in advance by the Engineer.

SC-19 OMISSION: The drawings and specifications shall both be considered as a part of the contract. Any work and material shown in the one and omitted in the other, or described in the one and not shown in the other, or which may fairly be implied by both or either, shall be furnished and performed as though shown in both, in order to give a complete and first class job.

SC-20 MEASUREMENT AND PAYMENT: Measurement and payment shall be made for the units and at the lump sum contract price. Direct payment shall only be made for those items or work specifically listed in the proposal and the cost of any other work must be included in the contract price for the applicable items to which it relates.

Additional measurement items not detailed on construction plans can be found below:

SC-20.1 MULTI-PURPOSE FIELD STRIPING. Measurement shall include all materials and fabrication required to install the Multi-purpose Field Striping for two completed and finished fields. Payment will be included in the contract lump sum price and will include labor, materials, and any other incidental expenses to install the striping. Contractor to provide submittal for Owner and Engineer review prior to ordering materials.

SC-20.2 MULTI SPORT BACKSTOP SYSTEM. The details for Soccer Backstop Netting can be found on the construction plans. Measurement shall include full installation of Soccer Backstop Netting, as indicated on plans (or approved equivalent). Payment will be included in the contract lump sum price and will include labor, materials, and all connecting appurtenances per manufacturer's recommendations completely. Manufacturer shall be Jaypro Sports, or Owner approved equivalent. Contractor to provide submittal for Owner and Engineer review prior to ordering materials.

SC-20.3 IRRIGATION (DESIGN, PERMIT & CONSTRUCTION). The Contractor shall provide an irrigation design that provides 100% field coverage in accordance with industry standards using lagoon stormwater re-use with backup shallow well and pump to fill stormwater ponds to normal water level. Contractor responsible for design, permit and construction of irrigation system. Payment shall include all Contractor work required to design, permit, and construct the irrigation system for the fields, including full design, permit, permit fees and materials, labor, equipment, testing, and incidental costs required to construct the irrigation system and shallow well re-fill system. Payment shall be included in the contract lump sum price. Contractor to provide submittal for Owner and Engineer review prior to ordering materials.

SC-20.4 MUSCO LED FIELD LIGHT SYSTEM. Payment will be included in the contract lump sum price for MUSCO LED Light Systems (or approved equivalent) and will include all fabrication, materials, labor, footings/foundations, utility coordination, user controls,

materials, labor, disposal costs, and incidental costs required to construct the field lighting system. Contractor to provide submittal for Owner and Engineer review prior to ordering materials.

SC-20.5 48" TALL BLACK VINYL COATED CHAIN LINK FENCE. Measurement shall include full installation of 48" Tall Black Vinyl Coated Chain Link Fence, as indicated on plans. Payment will be included in the contract lump sum price and will include labor, materials, foundations, post, and all connecting appurtenances per manufacturer's recommendations (complete). Contractor to provide submittal for Owner and Engineer review prior to ordering materials.

SC-20.6 CHAIN LINK SINGLE SWING GATE. Measurement shall include full installation of 4' Tall Black Vinyl Coated Chain Link Swing Gate, as indicated on plans. Payment will be included in the contract lump sum price and will include labor, materials, foundations, post, and all connecting appurtenances per manufacturer's recommendations (complete). Contractor to provide submittal for Owner and Engineer review prior to ordering gates.

SC-20.7 48" TALL CHAIN LINK DOUBLE SWING GATE (12' TOTAL WIDTH).

Measurement shall include full installation of 6' Tall Black Vinyl Coated Chain Link Double Swing Gate (12' Total Width), as indicated on plans. Payment will be included in the contract lump sum price and will include labor, materials, foundations, post, and all connecting appurtenances per manufacturer's recommendations (complete). Contractor to provide submittal for Owner and Engineer review prior to ordering gates.

SC-21 "OR EQUIVALENT," CLAUSE: Although the plans and specifications make reference to particular manufacturers and model numbers for various products, such reference is made only to establish function and quality of such products. If it is desired to use materials or equipment of trade names or of manufacturer's names that are different from those mentioned in the contract documents, information pertaining to such items must reach the hands of the Engineer at least 10 days prior to the date set for the opening of bids. The burden of proving equality of a proposed substitute to an item designated by trade name or by manufacturer's name in the contract document rests on the party submitting the request for acceptance. The written application for review of a proposed substitute must be accompanied by technical data that the party requesting review desires to submit in support of its application. The Engineer will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed product with previous users or any other written information that is reasonable in the circumstances. The application to the Engineer for review of a proposed substitute must be accompanied by a schedule setting forth in what respects the material or equipment submitted for consideration differs from the materials or equipment designated in the contract documents. The degree of proof required for acceptance of a proposed substitute as equivalent to a named product is the amount of proof necessary to convince the Engineer beyond all doubt. To be acceptable, a proposed substitute must, in addition, meet or exceed all express requirements of the contract documents.

If submittal is accepted by the Engineer, an addendum will be issued to all prospective bidders at least five days prior to the date set for the opening of bids.

The Engineer shall be the final judge on questions of similarity and equality.

SC-22 SAFETY AND HEALTH REGULATIONS: The Contractor shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 as amended through January 1, 2004 (PL 91–

596) and under Section 107 of the Contract Work and Safety Standards Act (PL 91–54). The regulations are administered by the Department of Labor and the Contractor shall allow access to the project to personnel from that Department.

SC–23 RECORD DATA AND DRAWINGS: The Contractor shall keep accurate, legible records of the locations, types, and sizes of sanitary lines, service laterals, manholes, cleanouts, water lines, fittings, valves, hydrants, drainage pipes, drainage structures, and other related work performed under this project. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors of pipes. On a set of project prints provided by the Owner, the Contractor shall prepare a set of "record" drawings from the data stated above. The horizontal locations of all portions of items installed on this project shall be accurately tied down to features that are physical and visible, such as property corner markers and/or permanent type structures. Invert elevations of all manholes, storm sewers and structures, sanitary sewers and lift stations shall be clearly indicated. These "record" drawings shall be kept clean and dry and maintained in a current state with the progress of the work. If at any time, a copy of this plan or portion of it is requested by the Owner, such copy shall be made available within 24 hours after the request is made.

Before final acceptance of the completed installation and final payment by the Owner, the Contractor shall deliver to the Engineer, four sets of "Record" Drawings accurately depicting the horizontal and vertical as-built data described in the above paragraph. "Record" drawings for the items installed on this project shall be certified by a licensed surveyor, other than Thomas & Hutton, registered in Georgia. The size of the drawings shall be 24" x 36". The "Record" drawings shall have a coordinate system based on the Georgia State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD83). Elevations shall be based on the North American Vertical Datum of 1988 (NAVD 88). All measurements and coordinates shown shall use the U.S. Survey flood definition. Coordinates shall be shown on all drainage structures, sanitary sewer manholes, storm manholes/boxes, valve boxes/vaults, valve manholes, valves, fire hydrants, fittings, and all other related work performed under this contract. Vertical data including but not limited to, structure and manhole frame and inverts, pipe inverts, lift station frame, inverts, control levels, bottom, site grading, and as-built grading shall be shown. In addition to the "Record" drawings, Contractor shall deliver to Engineer electronic AutoCAD (v. 14 or later) files of all the data described above on a CD-ROM.

SC–24 PROPERTY CORNERS: The Contractor shall be responsible for restoring any property corners or monuments disturbed during construction. They shall be restored by a professional surveyor registered in the State of Georgia.

SC–25 VIDEO: A video showing existing site conditions shall be made by the Contractor prior to start of construction. Contractor shall provide Owner and Engineer a copy of the video. Contractor is encouraged to record any existing damaged facilities that could be questioned later by property owners. A written or recorded narrative shall be provided with the video. Engineer shall be notified 72 hours in advance making the video. Contractor is responsible for all costs associated with video and shall be considered a subsidiary part of the contract.

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SECTION 01 11 00
SUMMARY OF WORK

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1.6	Work Schedule	01 11 00 – 2

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

SECTION 01 11 00

SUMMARY OF WORK

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Contract Description.
- B. Work required by Contract.
- C. Contract Drawings.
- D. Contract Technical Specifications.
- E. Work Schedule.
- F. Owner occupancy.

1.2 CONTRACT DESCRIPTION

- A. Contract Type: 00 52 43 – Agreement Form – Unit Price (Single – Prime Contract)

1.3 WORK REQUIRED

- A. Consists of Contractor furnishing all labor, materials, tools, equipment and incidentals to complete the Work generally described below:
 - 1. The proposed work consists of two (2) multi-purpose fields, field lighting, bleachers, concession stand, team building and parking bays in the City of Port Wentworth, Georgia. This involves earthwork, paving, drainage, stormwater, water distribution, sewer and erosion control measures and incidental construction in accordance with the plans and specifications.
- B. All work shall be performed as shown on the Drawings and as described in the Contract Documents and Technical Specifications.
- C. All work shall comply with standards described by the Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926, Subpart P, latest revision.

1.4 CONTRACT DRAWINGS

Sheet	Description	Job No.
CO	Cover Sheet	25412.0029
G1.1	General Notes & Legends	25412.0029
G1.2	Index	25412.0029
EX1.0 – EX1.5	Overall Existing Conditions Plan	25412.0029
C1.0 – C1.5	Staking & Signage Plan	25412.0029

C1.6 – C1.10	Site Accessibility Plan	25412.0029
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1.5 CONTRACT TECHNICAL SPECIFICATIONS

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02 30 00	Subsurface Investigation
02 41 13	Selective Site Demolition
03 00 00	Concrete
10 14 53	Traffic Signage
31 00 00	Earthwork
31 10 00	Site Clearing
31 25 00GA	Erosion and Sedimentation Controls (GA)
31 37 00	Rip-Rap
32 11 23	Aggregate Base Courses
32 11 26	Asphaltic Base Course
32 12 16GA	Asphalt Paving
32 17 23.13	Painted Pavement Markings
32 17 23.43	Thermoplastic Pavement Markings
32 90 00	Planting
32 92 00	Turf and Grasses
33 10 00	Water Utilities
33 30 00	Sanitary Sewerage Utilities
33 40 00	Storm Drainage Utilities
33 47 26.15	Bioretention Facilities

1.6 WORK SCHEDULE

- A. Construct Work in stages to accommodate Owner's requirements during the construction period, coordinate construction schedule and operations with Owner. Contractor shall provide a comprehensive schedule for Owner review and approval prior to commencing construction.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not used

END OF SECTION

INDEX TO
SECTION 01 22 00
UNIT PRICES

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1.4	Measurement of Quantities	01 22 00-1
1.5	Payment	01 22 00-2

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

SECTION 01 22 00

UNIT PRICES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Criteria applicable to the Work performed under and executed contract change order. Change order pricing shall conform to the contract line item bid form.

1.2 AUTHORITY

- A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
- B. Take all measurements and compute quantities. The Engineer will verify measurements and quantities.
- C. Assist by providing necessary equipment, workers, and survey personnel as required.

1.3 UNIT QUANTITIES SPECIFIED

- A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer determine payment.
- B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted.

1.4 MEASUREMENT OF QUANTITIES

- A. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
- B. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
- C. Measurement by Area: Measured by square dimension using mean length and width or radius.
- D. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

- E. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.5 PAYMENT

- A. Payment Includes: Full compensation for all required labor, products, tools, equipment, plant, transportation, services, and incidentals; erection, application or installation of an item of the Work including overhead and profit.
- B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

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SECTION 01 33 00
SUBMITTAL PROCEDURES

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PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

DIVISION I – GENERAL REQUIREMENTS**SECTION 01 33 00****SUBMITTAL PROCEDURES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Product Data.
- D. Shop Drawings.
- E. Samples.
- F. Design data.
- G. Test reports.
- H. Certificates.
- I. Manufacturer's instructions.
- J. Manufacturer's field reports.
- K. Erection drawings.

1.2 RELATED SECTIONS

- A. Section 01 45 00 – Quality Control: Manufacturers' field services and reports.
- B. Section 01 77 00 – Closeout Procedures: Contract warranties, bonds, manufacturers' certificates, and closeout submittals.

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer accepted form.
- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix. Resubmit as specified for initial submittal. Indicate on revised drawings all changes that have been made other than those requested by the Engineer.
- C. Identify Project, Contractor, Subcontractor, or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

- D. Apply Contractor's stamp, signed or initialed verifying review, approval, products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. Submittal without the Contractor's stamp will be returned to Contractor without Engineer's review.
- E. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery. In scheduling, allow sufficient time for the Engineer's review following the receipt of the submittal. Coordinate submission of related items. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- F. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed Work.
- G. Provide space for Contractor and Architect/Engineer review stamps.
- H. When revised for resubmission, identify all changes made since previous submission.
- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

1.4 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedule in duplicate within 15 days after date of Owner-Contractor Agreement.
- B. Revise and resubmit as required.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- D. Submit a computer generated or horizontal bar chart with separate line for each section of Work, identifying first work day of each week.
- E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
- F. Indicate estimated percentage of completion for each item of Work at each submission.
- G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by allowances.

1.5 PRODUCT DATA

- A. Product Data For Review:
 - 1. Submitted to Engineer for review and conformance with information given in specifications and the design concept expressed in contract documents.
 - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above.
- B. Submit the number of copies Contractor and Owner require, plus two copies retained by Engineer.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, distribute in accordance with the Submittal Procedures article above.

1.6 SHOP DRAWINGS

- A. Contractor shall submit a minimum 6 copies of each shop drawing to the Engineer for review.
- B. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents. Review of shop drawings by Engineer shall not relieve Contractor of its responsibility for accuracy of shop drawings nor for furnishing of all materials and equipment required by the contract even though such items may not be indicated on shop drawings reviewed by Engineer.
- C. Shop drawings shall include applicable technical information, drawings, diagrams, performance curves, schedules, templates, calculations, instructions, measurements, and similar information as applicable to the specific item for which shop drawing is prepared.
- D. Do not use Engineer's Drawings for shop or erection purposes.
- E. Each shop drawing copy shall bear a Contractor's stamp showing they have been checked. Shop drawings submitted to the Engineer without Contractor's stamp will be returned to Contractor without review.

No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to

assemble shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to Engineer.

Schedule of Submittals: Within 30 days of Contract award and prior to any shop drawing submittal, Contractor shall submit a schedule showing the estimated submittal date and desired acceptance date for each shop drawing anticipated. Time lost due to unacceptable submittals shall be the Contractor's responsibility.

1.7 SAMPLES

- A. Samples For Review:
 - 1. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents.
 - 2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above.
- B. Samples For Information:
 - 1. Submitted for Engineer's knowledge as contract administrator or for the Owner.
- C. Include identification on each sample, with full product information.
- D. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.
- E. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- F. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.8 DESIGN DATA

- A. Submit for Engineer's knowledge as contract administrator or for the Owner.
- B. Submit for information and conformance with information given in specifications and design concept expressed in contract documents.

1.9 TEST REPORTS

- A. Submit for Engineer's knowledge as contract administrator or for the Owner.
- B. Submit test reports for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

1.10 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- C. Refer to Section 01 45 00 – Quality Control, Manufacturers' Field Services article.

1.12 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for Engineer's benefit as contract administrator or for the Owner.
- B. Submit report in duplicate within 30 days of observation to Engineer for information.
- C. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

1.13 ERECTION DRAWINGS

- A. Submit drawings for Engineer's benefit as contract administrator or for the Owner.
- B. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by the Engineer or Owner.

1.14 REVIEWED SHOP DRAWINGS

- A. Engineer Review.
 - 1. Acceptable submittals will be marked "No Exceptions Taken." A minimum of three copies will be retained by the Engineer for Engineer's and Owner's use and remaining copies will be returned to Contractor.

2. Submittals requiring minor corrections before the product is acceptable will be marked "Furnish as Corrected." Contractor may order, fabricate, and ship items included in submittals, provided the indicated corrections are made.
 3. Submittals marked "Revise and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.
 4. The "Rejected" notation is used to indicate products not acceptable. Upon return of a submittal so marked, Contractor shall repeat the initial review procedure utilizing acceptable products.
 5. Only two copies of items marked "Revise and Resubmit" and "Rejected" will be reviewed and marked. One copy will be retained by Engineer and the other copy with all remaining unmarked copies will be returned to Contractor for resubmittal.
- B. No Work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" or "Furnish as Corrected" notation. Contractor shall maintain at the job site a complete set of shop drawings bearing Engineer's stamp.
- C. Substitutions: In the event Contractor obtains Engineer's acceptance for use of products other than those listed first in Contract Documents, Contractor shall, at Contractor's own expense and using methods accepted by Engineer, make any changes to structures, piping and electrical work necessary to accommodate these products.
- D. Use of "No Exceptions Taken" or "Furnish as Corrected" notation on shop drawings or other submittals is general and shall not relieve Contractor of the responsibility of furnishing products of proper dimension, size, quality, quantity, materials, all performance characteristics, and to efficiently perform requirements and intent of Contract Documents. Engineer's review shall not relieve Contractor of the responsibility of errors of any kind on shop drawings. Review is intended only to assure conformance with design concept of the project and compliance with information given in Contract Documents.

1.15 SUBMITTAL CHECKLIST

- A. This checklist is not necessarily complete. Contractor is responsible to submit all items and materials as specified in each section.

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
03 00 00 – Concrete					
	Mix Design				
	Curing Compounds				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Joint Filler				
	Reinforcing Steel				
	Welded Wire Fabric				
	Dowels				
	Fiber Reinforcement				
03 30 00 – Cast-In-Place Concrete					
	Mix Design				
	Reinforcing Steel				
	Welded Wire Fabric				
	Curing Compound				
	Fiber Reinforcement				
	Non-Shrink Grout				
	Joint Filler				
05 05 23 –Metal Fastenings					
	Tie Rods				
	Bearing Plates				
	Turnbuckles				
	Bolts				
	Coating Certification				
09 90 00 – Painting and Coating					
	Paint				
31 00 00 – Earthwork					
	Borrow				
31 09 16.23 – Driven Pile Load Tests					
	Test Method & Equipment				
	Piles				
31 25 00 – Soil Erosion Control					
	Silt Fence				
31 37 00 – Rip-Rap					
	Stone				
	Sand-Cement Bag				
	Filter Fabric				
32 11 23 – Aggregate Base Course					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Aggregate				
	Prime				
32 12 16 – Asphalt Paving					
	Tack Coat				
	Asphalt Cement				
	Anti-Stripping Agent				
	Mix Designs				
32 92 00 – Turf and Grasses					
	Seed Mix – Temporary				
	Seed Mix – Permanent				
	Fertilizer				
	Lime				
33 10 00 – Water Utilities					
	PVC Pipe – 4"Ø and Larger				
	PVC Pipe – Smaller than 4"Ø				
	D.I. Pipe				
	Tubing for Service Lateral				
	Fittings – PVC				
	Fittings – Compact D.I.				
	Gate Valve				
	2" Ball Valves				
	Air Release Valve				
	Air/Vacuum Valve				
	Combination Air Valve				
	Corporation Stops				
	Curb Stops				
	Magnetic Marking Tape				
	Valve Boxes				
	Valve Box Collar				
	Hydrant Tees				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Threaded Rod with Bitumastic Coating and Painting				
	Fire Hydrants				
	Restrained Joint Fittings				
	Service Saddles				
	Tapping Sleeves/Crosses				
	Tapping Valves				
	Backflow Prevention Devices				
	Tracing Wire				
	Service Pipe/Tubing				
	Casing Pipe				
33 30 00 – Sanitary Sewage Utilities					
	Wetwell				
	Manholes & Interior Coating				
	Boots and S.S. Straps				
	Joint Wrap				
	Joint Sealant				
	Steps				
	Piping – PVC – Gravity				
	Piping – PVC – Force Main				
	Piping – DI – Gravity				
	Piping – DI – Force Main				
	Fittings – PVC – Gravity				
	Fittings DI – Force Main				
	Frames & Covers				
	Valve Pit and Steps				
	Valve Pit Hatch Cover				
	Wetwell Hatch Cover				
	Pumps and Controls				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Control Panel Enclosure and Mounting Materials				
	Frost-Proof Hydrant				
	Backflow Prevention Device				
	Fencing and Gate Hardware				
	Gate Valves/Plug Valves				
	Check Valves				
	Air Release/Vacuum Valves				
	Vent Pipe				
	Hoist and Hoist Sockets				
	Lifting Chain/Cable				
	Pumps Mounts/Intermediate and Upper Guide Brackets				
	Quick Disconnect				
	Electrical W/Generator Hook-up				
	Tracing Wire				
	Magnetic Tape				
	Force Main Gauges				
	Signage (Emergency #'s etc.)				
33 40 00 – Storm Drainage Utilities					
	Reinforced Concrete Pipe				
	Aluminum Pipe				
	Polyethylene Pipe				
	Gaskets				
	Drainage Structures				
	Fiberglass Grating				
	Frames, Covers & Grates				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Subgrade Drainpipe				
	Filter Fabric				
	Tracing Wire				

The contractor shall be responsible for all other testing as required by construction plans and all other contract documents.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO
SECTION 01 45 00 – QUALITY CONTROL

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SECTION 01 45 00**QUALITY CONTROL****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Quality assurance – control of installation.
- B. Tolerances
- C. References and standards.
- D. Testing laboratory services.
- E. Manufacturer's field services.

1.2 RELATED SECTIONS

- A. Section 01 33 00 – Submittal Procedures: Submission of manufacturer's instructions and certificates.
- B. Section 01 45 23 – Testing and Inspecting Services.

1.3 QUALITY ASSURANCE – CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturer's instructions, including each step in sequence.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.4 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

- B. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions and position before securing in place.
- D. Accessible routes shall not exceed maximum ADA allowable slopes.

1.5 REFERENCES AND STANDARDS

- A. For products or workmanship specified by association, trade, or other consensus standards, complies with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current with date specified in the individual specification sections, except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. Neither the contractual relationships, duties, nor responsibilities of the parties in Contract or those of the Architect/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.6 TESTING SERVICES

- A. Contractor will appoint and employ services of an independent firm to perform testing. Contractor shall pay for testing services required by the specifications.
- B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Owner.
- C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Owner.
- D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Reports shall be submitted within two (2) weeks of the date of testing. Reports not received within two weeks from the date of testing will be rejected, and Contractor shall have the test re-performed at Contractor's expense and provide test reports within two (2) weeks of the date the test was performed.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 48 hours prior to expected time for operations requiring services.

- 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing does not relieve Contractor to perform Work to contract requirements.
- G. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer. Payment for re-testing will be made by the Contractor.

1.7 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations. Observer subject to approval of Owner.
- C. Report observations and site decisions or instructions given to applicators or installers supplemental or contrary to manufacturer's written instructions.
- D. Refer to Section 01 33 00 – SUBMITTAL PROCEDURES, MANUFACTURER'S FIELD REPORTS article.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

INDEX TO
SECTION 01 45 23
TESTING AND INSPECTING SERVICES

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PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

SECTION 01 45 23**TESTING AND INSPECTING SERVICES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Selection and payment.
- B. Contractor submittals.
- C. Testing agency responsibilities.
- D. Testing agency reports.
- E. Limits on testing authority.
- F. Contractor responsibilities.
- G. Schedule of tests.

1.2 RELATED SECTIONS

- A. Testing and acceptance required by public authorities.
- B. Section 01 33 00 – Submittal Procedures: Manufacturer's certificates.
- C. Section 01 77 00 – Closeout Procedures: Project record documents.

1.3 REFERENCES (LATEST REVISION)

- A. ASTM C 802 – Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials.
- B. ASTM C 1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- C. ASTM C 1093 – Practice for Accreditation of Testing Agencies for Masonry.
- D. ASTM D 3740 – Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- E. ASTM D 4561 – Practice for Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials.
- F. ASTM E 329 – Specification for Agencies Engaged in Construction Inspection and/or Testing.
- G. ASTM E 543 – Practice for Agencies Performing Nondestructive Testing.
- H. ASTM E 548 – Guide for General Criteria Used for Evaluating Laboratory Competence.

- I. ASTM E 699 – Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.
- J. ASTM D 2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity–Flow Applications
- K. ASTM F 3080 – Standard Practices for Laser Technologies for Measurement of Cross–Sectional Shape of Pipeline and Conduit by Non–Rotating Laser Projector, Infrared Measurement, and CCTV Camera System.
- L. ASTM F 1417 – Standard Practice for Installation Acceptance of Plastic Non–Pressure Sewer Lines Using Low–Pressure Air

1.4 SELECTION AND PAYMENT

- A. Employment and payment by Contractor for services of an independent testing agency or laboratory to perform specified testing.
- B. Employment of testing agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1.5 QUALITY ASSURANCE

- A. Comply with requirements of practices listed in paragraph 1.3.
- B. Laboratory: Authorized to operate in State in which project is located.
- C. Laboratory Staff: Maintain a full-time registered Engineer on staff to review services.
- D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.6 CONTRACTOR SUBMITTALS

- A. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full-time registered Engineer and responsible officer.
- B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.7 TESTING AGENCY RESPONSIBILITIES

- A. Test samples of mixes and materials submitted by Contractor.
- B. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.

- C. Perform specified sampling and testing of products in accordance with specified standards.
- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
- F. Perform additional tests required by Engineer.
- G. Attend preconstruction meetings and progress meetings.

1.8 TESTING AGENCY REPORTS

- A. After each test, promptly submit one electronic copy of report to Owner, Engineer, and to Contractor. Reports shall be submitted within two (2) weeks of the date of testing. Reports not received within two weeks from the date of testing will be rejected, and Contractor shall have the test re-performed at Contractors expense and provide test reports within two (2) weeks of the date the test was performed.
- B. Include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name of inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and specifications section.
 - 6. Location in the Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Results of tests.
 - 10. Conformance with Contract Documents.
- C. When requested by Engineer, provide interpretation of test results.

1.9 LIMITS ON TESTING AUTHORITY

- A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Agency or laboratory may not approve or accept any portion of the Work.
- C. Agency or laboratory may not assume any duties of Contractor.
- D. Agency or laboratory has no authority to stop the Work.

1.10 CONTRACTOR RESPONSIBILITIES

- A. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used requiring testing, along with proposed mix designs.

- B. Cooperate with laboratory personnel and provide access to the Work and to manufacturer's facilities.
- C. Provide incidental labor and facilities:
 - 1. To provide access to Work to be tested.
 - 2. To obtain and handle samples at the site or at source of products to be tested.
 - 3. To facilitate tests.
 - 4. To provide storage and curing of test samples.
- D. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing services.
- E. Employ services of an independent qualified testing laboratory and pay for additional samples and tests required by Contractor beyond specified requirements.

1.11 SCHEDULE OF TESTS

Section	Test	Frequency	Date	Performed By	Notes
03 00 00 – Concrete					
	Mix Designs	1 per mix design			
	Compressive Strength	3 test cylinders for every 50 cubic yards or less of each mix design placed daily			
		1 cylinder broken at 7 days			
		2 cylinders broken at 28 days			
	Slump	1 test for each set of cylinders taken			
03 30 00 – Cast-in-Place Concrete					
	Materials	As necessary			
	Mix Designs	1 per mix design			
	Strength	4 Test Cylinders for each 50 cy or less or each mix design placed daily			
	Slump	1 test per each set of cylinders			
	Air Content	1 test per each set of cylinders			
	Temperature	1 test per each set of cylinders			
31 00 00 – Earthwork					
	Compaction				
	Unpaved	1 test per horizontal layer per 10,000 sf of fill area			

Section	Test	Frequency	Date	Performed By	Notes
	Paved	1 test per horizontal layer per 5,000 sf of subgrade			
	Building Pad	1 test per horizontal layer per 1,500 sf of fill area			
	Curb & gutter	1 test per 300 lf			
	Proof Rolling	As necessary			
32 11 23 – Aggregate Base Courses					
	Base Density	1 test per 5,000 sf			
32 12 16 – Asphalt Paving					
	Asphalt Extraction & Gradation	1 test for each 250 tons placed			
	Marshall Stability	1 test for each 250 tons placed			
	Field Density	1 test for each 250 tons placed			
	Cores	1 test for each 250 tons placed			
33 10 00 – Water Utilities					
	Hydrostatic & Leakage	1.5 times the working pressure (no less than 150 psi). Conducted for 2 hours with maintained pressure of 150 psi (200 psi on fire main)			
	Bacteriologic al Samples	2 taken 24 hours apart after disinfection			
	Compaction				
	Traffic Areas	1 per 100 lf or less for each 4 ft. of depth			
	Non-Traffic Areas	1 per 500 lf or less for each 4 ft. of depth			
	Fire Flow	1 per permit			
33 30 00 – Sanitary Sewage Utilities					
	Start-up	Prior to acceptance of Pump Station			
	Drawdown	Prior to acceptance of Pump Station			
	Certification	Completion			
	Warranty	Completion			
	Television Inspection of Sewers	As requested			
	Leakage	As necessary			
	Compaction				

Section	Test	Frequency	Date	Performed By	Notes
	Traffic Areas	1 per 100 lf or less for each 4 ft. of depth			
	Non-Traffic Areas	1 per 500 lf or less for each 6 ft. of depth			
	Gravity – Air	All lines			
	Hydrostatic – Force Main	100 psi for 2 hours			
	Deflection	10% of system			
33 40 00 – Storm Drainage Utilities					
	Compaction				
	Traffic Areas (Rigid Pipe)	1 per 100 lf or less for each 4 ft. of depth			
	Non-Traffic (Rigid Pipe)	1 per 500 lf or less for each 6 ft. of depth			
	Traffic Areas (Flexible Pipe)	1 per 20 lf or less for each 4 ft. of depth			
	Non-Traffic (Flexible Pipe)	1 per 100 lf or less for each 4 ft. of depth			
	Deflection (Flexible Pipe)	100% of system			
	Television Inspection	As requested			
	Leakage	As requested			
	Warranty	Completion			

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO
SECTION 01 55 26 – TRAFFIC CONTROL

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3.2	Delays to Traffic	01 55 26–2
3.3	Temporary Traffic Lanes	01 55 26–2
3.4	Signs and Barricades	01 55 26–2

SECTION 01 55 26**TRAFFIC CONTROL****PART 1 – GENERAL****1.1 DESCRIPTION**

- A. This section covers furnishing, installation, and maintenance of all traffic control devices, portable signal equipment, warning signs, and temporary traffic lanes used during construction of the project.

1.2 RELATED WORK

- A. Section 33 30 00 – Sanitary Sewerage Utilities

1.3 RESPONSIBILITY

- A. The Contractor shall furnish, install, and maintain all necessary automated signals, barricades, concrete traffic barriers, warning signs, traffic barriers, traffic lanes, and other protective devices. Ownership of these temporary warning devices shall remain with the Contractor provided devices are removed promptly after completion and acceptance of work to which devices pertain. If such warning devices are left in place for more than 30 days after specified time for removal, Owner shall have the right to remove such devices and to claim possession thereof.

1.4 MEASUREMENT AND PAYMENT

- A. There will be no measurement for this item. Payment shall be subsidiary to the contract price.

PART 2 – PRODUCTS**2.1 MATERIALS**

- A. All barricades, signs, and traffic control signal devices shall conform to requirements of the current Georgia Manual on Uniform Traffic Control Devices except as may be modified in these project specifications.
- B. Portable traffic control signal devices, barricades, signs and other Control Devices shall be either new or in acceptable condition when first erected on Project and shall remain in acceptable condition throughout the construction period.
- C. All signs shall have a black legend and border on an orange reflectorized background and will be a minimum of engineering grade reflective.

PART 3 – EXECUTION

3.1 ERECTION

- A. Prior to commencement of any actual construction on the project, Contractor shall erect appropriate advance warning signs and place concrete traffic barriers where necessary. Subsequently, as construction progresses and shifts from one side of road to the other, temporary lanes must be installed to provide continuous two-way traffic and bike thoroughfare. All appropriate signs and traffic control devices pertinent to the work shall be erected ahead of construction site to advise and warn travelling public of activity and any necessary detours.

3.2 DELAYS TO TRAFFIC

- A. Except in rare and unusual circumstances, two-way traffic shall be maintained at all times by temporary and/or permanent roads. There are to be no traffic delays during the hours between 7 AM – 10 AM and 4 PM – 10 PM. Between the hours of 10 AM and 4 PM the maximum delay is to be 15-minutes.
- B. When traffic is halted temporarily due to transition procedures including the ingress and egress of construction vehicles, Contractor shall provide necessary flagging personnel with proper equipment and clothing to hold such traffic.
- C. If Contractor's proposed traffic control plan involves more than occasional disruption to alternating one way traffic through the work, then temporary, signalized control equipment will be required.

3.3 TEMPORARY TRAFFIC LANES

- A. Two-lane traffic shall be maintained at all times unless prior written permission has been given, and all necessary flagging personnel and/or signage has been installed. Temporary lane line stripes shall be applied to the detour paving, as agreed to by Engineer and Owner's representative. The no-passing double center-line stripes shall be yellow. Such stripes shall be a temporary, degradable, reflectorized tape strip. All temporary striping shall be maintained throughout the period traffic control is needed.
- B. Contractor is responsible for installation and removal of all temporary roads and trails throughout the construction process. These detour roads are to be in accordance with the Pavement Specifications herein.

3.4 SIGNS AND BARRICADES

- A. Contractor shall provide a detailed map showing location and verbiage of all traffic control signs and methods for the project. All critical warning signs for the project will be a minimum of engineering grade reflective material and include appropriate flashing lights.
- B. Appropriate Safety Barricades shall be installed between bicycle trails, sidewalks, and the temporary traffic lanes. These barricades shall be impact resistant for passenger vehicles with a travelling speed of 40 mph.

1. Advance warning signs: These signs shall be placed approximately 500 feet in advance of the construction site and detour on each approach to the construction area with subsequent warning signs every 250 feet, until construction site is met.
2. Road Construction Signs: Before and during construction of the detour, advance road construction signs shall be located as already stated above. The construction site detour lanes will have reflective trestle type barricade with flashing lights spaced a maximum of 25 feet apart to delineate each side of any temporary roadway. Additional signage shall be placed to indicate a reduced speed limit of 15 mph for the entire construction area. Other signs as appropriate to a particular activity in the work area shall be erected in advance of that activity.
3. Barricades: While detour is open to traffic, a line of concrete traffic barricades shall be placed across the closed roadway to channelize traffic onto detour. They shall be spaced across the blocked roadway end to end so no vehicle will be able to pass between any two adjacent barricades.
4. Barriers: Shall be wooden having a minimum of three horizontal 6 inch rails spaced 20 inches on center. Markings for barrier rails shall be 6 inches wide alternate orange and white reflectorized stripes sloping downward at 45 degrees in the direction traffic is to pass.

During hours of darkness, the Contractor shall place and maintain flashing warning lights on tops of all barriers.

5. Direction Arrow Signs: At each change in traffic direction along the detour, Contractor shall install a sign with an arrow indicating change in traffic direction. This sign is to be located across the pavement from and facing on-coming traffic.
6. End Construction Sign: This sign shall be 60 inches x 24 inches and erected approximately 200 feet beyond end of construction area on the right-hand side.

END OF SECTION

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SECTION 01 56 39 – TEMPORARY TREE AND PLANT PROTECTION

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3.4	Fines	01 56 39-2
3.5	Mitigation	01 56 39-2

SECTION 01 56 39**TEMPORARY TREE AND PLANT PROTECTION****PART 1 – GENERAL****1.1 QUALITY ASSURANCE**

- A. Contractor shall provide at least one person who shall be present at all times during planting and pruning, thoroughly familiar with types of plants and trees involved and direct the digging, cutting, planting and maintenance of designated plant and tree materials.

Qualifications: Repair of tree damage shall be completed or supervised by a tree surgeon who is a member of the National Arborist Association.

Pre-Work Conference – Review on site with the Owner.

Trees to be removed will be marked with green flagging. Trees to remain will be marked with red flagging. Trees designated as "SPECIMEN" will be marked with yellow flagging.

1.2 MEASUREMENT AND PAYMENT

- A. Payment for protective tree fencing will be included in the contract lump sum price. Payment shall include the cost of all materials and labor necessary to complete the work as detailed on the construction drawings.

PART 2 – PRODUCTS**2.1 MATERIALS**

- A. Provide tree protection materials as detailed on the construction drawings.

PART 3 – EXECUTION**3.1 PROTECTION OF SPECIMEN TREES**

- A. Any irreparable damage to roots, trunk or bark, or any unauthorized cutting or pruning of limbs to trees designated by the Owner as "specimen" will result in a fine. This fine shall be levied through the Application for Payment as retainage and shall be used to supplement "specimen" with tree of similar value and/or to perform extensive "state of the art" tree surgery in an attempt to save the tree.

3.2 METHODS OF PROTECTION

- A. Use the following method to protect specimen trees. Actual determination of extent and combination of methods shall be determined on site.

- B. Temporary Fence Enclosures: Construct protective fencing where indicated on the construction drawings. Protective fencing shall be installed a minimum of three feet beyond the dripline. No grading, trenching, pruning, or storage of materials shall be allowed inside this area.

3.3 REPAIR OF TREES INJURED DURING CONSTRUCTION

- A. Repair damaged trees promptly to prevent progressive deterioration caused by damage.

Repair to trees damaged during construction according to standard arboricultural techniques recognized by International Society of Arboriculture.

Remove trees damaged beyond satisfactory repair as determined by Owner. Refer to FINES AND MITIGATION in this section for loss of specimen trees.

Temporarily cover roots exposed during construction with wet burlap to prevent roots from drying out. Cover roots with earth as soon as possible.

- B. Roots Cut During Construction: Coat roots 1 1/2 inches diameter or larger with antiseptic paint.

3.4 FINES

- A. Fine values for designated "**SPECIMEN**" vegetation shall be determined by the following:

<u>Caliper</u>	<u>Fine</u>
1" – 2"	\$ 150.00
2" – 3"	\$ 200.00
3" – 4"	\$ 250.00
4" – 5"	\$ 400.00
5" – 6"	\$ 500.00
6" – 7"	\$ 600.00
7" – 8"	\$ 750.00
8" – 11"	\$ 1,500.00
12" – 20"	\$ 2,000.00
21" & larger	\$ 2,500.00

3.5 MITIGATION

- A. Mitigation shall be in the form of tree transplantation. Plant materials shall be from off-site (for smaller sites) or from remote areas on site. Trees shall be comparable in size, form, and species to lost "specimen" tree. Tree species, size, and planting location shall be approved by the Owner and City of Port Wentworth Park & Tree Department.

END OF SECTION

INDEX TO
SECTION 01 77 00 – CLOSEOUT PROCEDURES

Paragraph	Title	Page
PART 1 – GENERAL		
1.1	Section Includes	01 77 00–1
1.2	Related Sections	01 77 00–1
1.3	Closeout Procedures	01 77 00–1
1.4	Final Cleaning	01 77 00–1
1.5	Adjusting	01 77 00–1
1.6	Project Record Documents	01 77 00–2
1.7	Operation and Maintenance Data	01 77 00–2
1.8	Spare Parts and Maintenance Products	01 77 00–3
1.9	Warranties and Bonds	01 77 00–3
1.10	Maintenance Service	01 77 00–4
PART 2 – PRODUCTS		
	Not Used	
PART 3 – EXECUTION		
	Not Used	

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Project record documents.
- C. Operation and maintenance data.
- D. Warranties and bonds.
- E. Maintenance service.

1.2 RELATED SECTIONS

- A. Section 01 33 00 – Submittal Procedures.
- B. Operation and Maintenance Data.
- C. Warranties.
- D. Bonds.

1.3 CLOSEOUT PROCEDURES

- A. Submit written verification Contract Documents being reviewed, Work has been observed at appropriate times, and Work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to Engineer and Owner required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 FINAL CLEANING

- A. Execute final cleanup prior to final project assessment.
- B. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.5 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.6 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Equipment Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Project Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 3. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors and pipes.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract drawings.
 - 6. Piling data locations, tip and cut-off elevations, and driving records.
- G. Submit documents to Engineer with claim for final Application for Payment.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit data on 8-1/2 x 11 inch text pages, bound in D ring binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," title of project. Indicate subject matter of binder when multiple binders are required.

- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on white paper, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Originals of warranties and bonds.
- E. Submit one (1) draft copy of completed volumes 15 days with prior to final walk through. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
- F. Submit two sets of revised final volumes, within 10 days after final walk through.

1.8 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

1.9 WARRANTIES AND BONDS

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

- C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
- D. Submit prior to final Application for Payment.
- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.10 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections during the warranty period.
- B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO
SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

Paragraph	Title	Page
PART 1 – GENERAL		
1.1	Section Includes	01 78 23–1
1.2	Related Sections	01 78 23–1
1.3	Quality Assurance	01 78 23–1
1.4	Format	01 78 23–1
1.5	Contents of Each Volume	01 78 23–2
1.6	Manual for Materials and Finishes	01 78 23–2
1.7	Manual for Equipment and Systems	01 78 23–3
1.8	Instruction of Owner Personnel	01 78 23–4
1.9	Submittals	01 78 23–4

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

SECTION 01 78 23**OPERATION AND MAINTENANCE DATA****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Format and content of manuals.
- B. Instruction of Owner's personnel.
- C. Schedule of submittals.

1.2 RELATED SECTIONS

Section 01 33 00 – Submittal Procedures: Submittals procedures.

- A. Section 01 45 00 – Quality Control.
- B. Section 01 77 00 – Closeout Procedures: Contract closeout procedures, project record documents.
- C. Section 01 78 33 – Bonds.
- D. Section 01 78 36 – Warranties.
- E. Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.4 FORMAT

- A. Prepare data in the form of an instructional manual.
- B. Binders: Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers. When multiple binders are used, correlate data into related consistent groupings.
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- D. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- E. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

- F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- G. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

1.5 CONTENTS OF EACH VOLUME

- A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect/Engineer, Subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- F. Warranties: Bind in copy of each.
- G. Bonds: Bind in photocopy of each.

1.6 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured Products.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual Product specification sections.
- E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.7 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; by label machine.
- C. Include color-coded wiring diagrams as installed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Include test and balancing reports.
- O. Additional Requirements: As specified in individual product specification sections.
- P. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.8 INSTRUCTION OF OWNER PERSONNEL

- A. Before final walk through, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.9 SUBMITTALS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit 1 copy of completed volumes 15 days prior to final walk through. This copy will be reviewed and returned, with Architect/Engineer comments. Revise content of all document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form within 10 days after final walk through.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO
SECTION 01 78 33
BONDS

Paragraph	Title	Page
PART 1 – GENERAL		
1.1	Section Includes	01 78 33 – 1
1.2	Related Sections	01 78 33 – 1
1.3	Form of Submittals	01 78 33 – 1
1.4	Preparation of Submittals	01 78 33 – 1
1.5	Time of Submittals	01 78 33 – 2

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

SECTION 01 78 33**BONDS****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Preparation and submittal of bonds.
- B. Time and schedule of submittals.

1.2 RELATED SECTIONS

- A. Document General Conditions – EJCDC: Performance bond and labor and material payment bonds.
- B. Section 01 77 00 –Closeout Procedures: Contract closeout procedures.
- C. Section 01 78 23 – Operation and Maintenance Data.
- D. Individual Specifications Sections: Bonds required for specific Products or Work.

1.3 FORM OF SUBMITTALS

- A. Bind in commercial quality 8–1/2 x 11 inch three D side ring binders with durable plastic covers.
- B. Cover: Identify each binder with typed or printed title BONDS with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of Product or work item.
- D. Separate each bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of principal responsible.

1.4 PREPARATION OF SUBMITTALS

- A. Obtain bonds executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of bond until the Date of Substantial completion is determined.
- B. Verify documents are in proper form, contain full information, and are notarized.

- C. Co-execute submittals when required.
- D. Retain bonds until time specified for submittal.

1.5 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
- B. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
- C. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the bond period.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO
SECTION 01 78 36
WARRANTIES

Paragraph	Title	Page
PART 1 – GENERAL		
1.1	Section Includes	01 78 36–1
1.2	Related Sections	01 78 36–1
1.3	Form of Submittals	01 78 36–1
1.4	Preparation of Submittals	01 78 36–1
1.5	Time of Submittals	01 78 36–2

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

SECTION 01 78 36

WARRANTIES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Preparation and submittal of warranties.
- B. Time and schedule of submittals.

1.2 RELATED SECTIONS

- A. General Conditions – EJCDC: Warranties and correction of work.
- B. Section 01 77 00 – Closeout Procedures: Contract closeout procedures.
- C. Section 01 78 23 – Operation and Maintenance Data.
- D. Individual Specifications Sections: Warranties required for specific Products or Work.

1.3 FORM OF SUBMITTALS

- A. Bind in commercial quality 8–1/2 x 11 inch three D side ring binders with durable plastic covers.
- B. Cover: Identify each binder with typed or printed title WARRANTIES with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which it is specified, and the name of Product or work item.
- D. Separate each warranty with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of principal responsible.

1.4 PREPARATION OF SUBMITTALS

- A. Obtain warranties executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify documents are in proper form, contain full information, and are notarized.

- C. Co-execute submittals when required.
- D. Retain warranties until time specified for submittal.

1.5 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
- B. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
- C. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 02 30 00
SUBSURFACE INVESTIGATION

Paragraph	Title	Page
PART 1 – GENERAL		
1.1	Description	02 30 00–1
1.2	Soil Investigation Data	02 30 00–1

PART 2 – PRODUCTS

See attached report.

PART 3 – EXECUTION

None in this Section

SECTION 02 30 00**SUBSURFACE INVESTIGATION****PART 1 – GENERAL****1.1 DESCRIPTION**

- A. This section includes subsurface data logs for information only.

1.2 SOIL INVESTIGATION DATA

- A. Subsurface data logs are available for information only. Actual conditions may vary. If bidders are not satisfied with accuracy and completeness of all available data, they are at liberty to make borings or perform soil investigation work for their own use at its expense. If Contractor chooses to perform their own investigation, work shall be coordinated with the Engineer. Any results from Contractor's investigation shall be shared promptly with the Engineer. Owner reserves the right to share Contractor's investigation data with other potential bidders if information could affect bidding process.
- B. The boring logs and test results are for information of the Contractor. Owner and Engineer assume no responsibility for the information.

PART 2 – PRODUCTS

See attached report.

PART 3 – EXECUTION

None this Section.

END OF SECTION

Our ref: 12610450-00 | City of Port Wentworth Fire Station

June 05, 2023

Mr. Steven Davis
City of Port Wentworth
7224 GA Highway 21
Port Wentworth, Georgia 31407

Report of Subsurface Exploration and Geotechnical Evaluation

Dear Mr. Davis

GHD is pleased to present the results of our subsurface exploration and geotechnical evaluation for the above-referenced project. Our services were performed in general accordance with our Proposal No. 12610450 dated May 15, 2023.

1. Site Description / Project Understanding

GHD received project information via email and telephone correspondence with Mr. Kevin Smith, P.E. of Thomas & Hutton that included a preliminary exhibit titled 'Initial Geotech Boring Locations, Port Wentworth Park' prepared by Thomas & Hutton, dated April 26, 2023, which provides specified test locations and coordinates for those locations. According to the exhibit provided, the project site is located within the northwestern portion of the future Port Wentworth Recreation Park within the City of Port Wentworth, Georgia, and includes the portion of the northern entrance road to the park from GA Highway 30 leading to and in front of the subject site. At the time of our fieldwork, the project site was heavily wooded.

It is our understanding that the project site is proposed to be developed to support a fire station with associated paved parking and driveway areas and underground utilities. The purpose of the geotechnical site investigation and evaluation was to provide 1) site preparation and foundation design recommendations for the proposed fire station building (including potential 'static' settlement estimates, seismic design parameters and potential liquefaction including settlement estimates), and 2) site preparation and preliminary cross-section design recommendations for concrete and asphalt pavements.

We have assumed for the purpose of our analyses that the structure will be constructed of structural steel framing with either metal stud walls and exterior metal wall panels or concrete masonry unit (CMU) walls. We have assumed that the structure will be supported on shallow foundation systems having isolated and/or continuous foundation loads not exceeding 60 kips and 3.0 kips, respectively. Further, we have assumed that fill thickness of up to approximately 3 to 4 feet will be required in order to bring the proposed building portion of the site to final subslab elevation. We further anticipate that top of pavement elevations will be on the order of 2 to 3 feet higher than the existing ground surface.

2. Subsurface Explorations

Our scope of services has included three (3) soil test borings, within the approximate proposed building footprint, and eight (8) hand-auger borings dispersed within the proposed pavement and entrance areas. A GHD professional transferred the coordinates on the provided documents to hand-held global positioning unit (GPS) devices which were utilized in the field to locate the exploration locations. Given the method of locating the explorations in the field, the locations indicated on **Figure 1** should be considered approximate. Details of the explorations performed are provided in the sections that follow.

2.1 Soil Test Borings

The three soil test borings (designated B-1 through B-3) were performed within the approximate footprint of the proposed structure on May 24, 2023. As current International Building Code (IBC) requirements dictate that the geotechnical evaluation/foundation design process include a seismic analysis; which requires at least one boring be performed to sufficient depth to provide the necessary subsurface soils parameter information, one of the borings (B-2) was performed to a depth of 50 feet below the existing ground surface. The remaining two borings (B-1 and B-3) were advanced to a pre-determined termination depth of 25 feet.

The soil test borings were advanced utilizing mud rotary drilling methods. Closely spaced soil sampling was performed in the upper ten feet and at five-foot intervals thereafter in each boring. During the sampling procedure, Standard Penetration Tests (SPT's) were conducted in general accordance with ASTM D1586 to obtain the standard penetration value of the soil. The standard penetration value (N) is defined as the number of blows of a 140-pound hammer, falling thirty inches, required to advance the split spoon sampler one foot. The sampler is lowered to the bottom of the drill hole and the number of blows recorded for each of three successive increments of six inches penetration. The "N" value is obtained by adding the second and third incremental values. The "N" values are reported on each boring log. The results of the SPT testing indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating relative strength and compressibility of the soil profile components. The logs of each of the soil test borings are presented as **Appendix A, Soil Test Boring Logs**.

2.2 Hand-Auger Borings

The eight hand-auger borings (designated HA-1 through HA-8) were performed on May 22, 2023. The hand-auger borings were manually advanced to depths of approximately 4 feet below the existing ground surface using a steel auger. The soils encountered were examined by retrieving samples of the auger cuttings at regular depth intervals during boring advancement. Our personnel visually classified the soils encountered in the field. The logs of the hand-auger borings are presented as **Appendix B, Hand-Auger Boring Logs**.

2.3 Soil Sample Handling

The soil samples obtained from the explorations were placed in individual containers, properly sealed and marked for identification. The soils samples were then transported to our laboratory for analysis and classification by a GHD professional in general accordance with ASTM D2487 (Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)).

2.4 Laboratory Analyses

Selected samples of the soils collected from the borings were tested in our laboratory to determine their percent fines (ASTM D1140), natural moisture content (ASTM D2216), and Atterberg limits (ASTM D4318). The laboratory data was used to aid in the classification of the soils in accordance with ASTM D2487 and to further define their engineering properties. The laboratory test results are presented on the soil test boring logs and hand-auger boring logs in **Appendices A and B**.

3. Subsurface Conditions Encountered

3.1 Stratigraphy

A GHD professional developed the final boring log information from the field boring logs and visual review of the recovered soil samples in our laboratory. Similar soils were grouped into strata, with each stratum described in general accordance with the nomenclature used in ASTM D2487. Although indicated on the boring logs as distinct changes, the transition from one soil type or stratum to another may be gradual or may occur at slightly differing elevations than indicated between soil samples. Soil conditions may also vary from our findings at locations in areas of the site not explored.

For reference, a generalized stratigraphic profile developed from the explorations is provided in **Table 1**. For a more detailed description, please refer to the Appendices to this report. The logs include the SPT “N” values (where applicable), Unified Soil Classification System (USCS) symbols and groundwater levels at the time of our study.

Table 1 Generalized Stratigraphic Profile

Approximate Depth Below Ground Surface (feet)	Material Description	Relative Density / Consistency from SPT Testing
0 to 2	Up to 8 inches TOPSOIL / Very clayey and silty fine SAND (SC, SM)	Loose to Medium Dense
2 to 8	Fine sandy clay (CL, CH) and clayey fine SAND (SC)	<u>Varies</u> : Stiff to Very Stiff / Medium Dense
8 to 42	<u>Varies</u> : Fine SAND with trace to moderate amounts of silt / clay (SP, SP-SM, SM, SC) / Fine sandy CLAY (CL)	<u>Varies</u> : Very Loose to Medium Dense / Stiff to Very Stiff
42 to 50	Silty fine SAND (SM)	Dense to Very Dense

3.2 Groundwater

Groundwater was measured to be at approximately 3.5 to 4 feet below the ground surface after a stabilization period of approximately 5 days. *Please note that the stabilization readings were performed after a heavy rainfall event.* We expect groundwater levels will fluctuate depending upon recent rainfall intensity and duration, the season, and other temporary factors.

4. Conclusions and Recommendations

The following conclusions and recommendations are based on the assumed general project characteristics as previously described, the data obtained in our field exploration, and our experience with sites having similar subsurface soil conditions. If the elevating fill heights within the proposed structures are to be significantly different from our understanding of them as stated earlier in this report, we should be notified so that we might review and possibly alter the following recommendations. Further, if structure loads exceed those assumed for our analyses, please notify us so that we can confirm the site preparation recommendations and/or foundation design parameters provided herein.

4.1 General

In general, it is our opinion that the subsurface conditions encountered by the explorations are suitable for support of the future development using conventional shallow foundations and conventional pavements following implementation of the site preparation and design recommendations discussed in the following sections of this report. However, the results of our study indicate that high plasticity soils (CH) which are unsuitable for direct support of structures and pavements are prevalent across the area of the proposed structure and should be removed and replaced with suitable soils at the initiation of site development to establish a separation of at least 5 feet from top of building pad elevation (or 4 feet below foundation bearing elevation, whichever is greater).

4.2 Site Preparation Recommendations

4.2.1 Moisture Control

Our explorations encountered moisture sensitive silty and clayey soils at the existing ground surface throughout the proposed development area. Strict moisture control will need to be maintained to avoid softening of the soils during site development. Failure to control moisture in silty or clayey soils may result in the need for removal and replacement of otherwise suitable soils. Moisture control methods should also be implemented even where more favorable soils are located within the upper two feet. Moisture control methods should include, but are not necessarily be limited to:

- Staging the work to avoid excessive exposure to inclement weather;
- Maintaining positive drainage at the end of each workday or prior to inclement weather;
- Using a smooth drum roller or bulldozer to seal areas to facilitate runoff;
- And minimizing/limiting rubber-tired vehicle traffic by utilizing low contact pressure or tracked equipment whenever possible across the work area.

We highly recommend that surface water across the area be managed prior to, during and after stripping and grubbing operations to avoid excessive surface moisture which can lead to an unstable working surface and thus, undue mixing of the organic debris with the underlying soils. Therefore, it may be necessary to drain ponded surface water and to reduce the moisture content of the surficial and shallow subgrade soils prior to initiating general site preparation procedures.

4.2.2 Stripping and Grubbing

Site preparation should include the complete clearing, stripping and removal of grasses/weeds, underbrush, surficial topsoil, surficial and shallow subgrade soils containing significant quantities of organic material, stumps, and root systems of existing trees (roots larger than finger size), and other deleterious materials from within and to a minimum distance of three (3) feet beyond the perimeter of the structure footprints and pavement areas. Although we encountered up to approximately 8 inches of surficial organic debris and topsoil in our explorations, it should be anticipated that removal of deleterious material to greater depths may be required due to major root systems of trees, as well as due to disturbance of the surface soils by site preparation equipment during stripping, grubbing, root raking, etc.

During site clearing and earthwork operations, and while excavating for site utilities and foundations, the excavated and exposed soils should be observed for the presence of excessive organic and/or deleterious materials and debris that could be detrimental to the building foundations and/or floor slabs. We recommend that an experienced soils engineering technician be present on site during the stripping and grubbing process in order to determine which surficial and/or shallow subgrade soils must be removed and replaced due to excessive organic content.

4.2.3 Removal of High Plasticity Clays

We recommend the removal of the high plasticity clays (CH) to establish a separation of at least 4 feet from top of building pad elevation (or 3 feet below foundation bearing elevation, whichever is greater). We strongly recommend that an experienced technician or licensed geotechnical engineer be present on the site during the remediation process to verify the complete removal of high plasticity clays and to assist in proper placement of backfill soils.

We strongly encourage the initial backfill be placed on the dry side of its optimum moisture content. If present, a qualified engineer or his representative may authorize an initial 2-foot thick bridge lift to bridge over the moist soils at the bottom of the excavation to facilitate proper densification of the initial fill lift. Backfilling should not occur within an excavation which is inundated with groundwater or rainwater. Small sump excavations may be required to remove the surface water runoff from within these excavations.

4.2.4 Subgrade Proofrolling

Where over-excavation of high plasticity clays to establish the recommended separation (See Section 4.2.3) is not necessary, immediately prior to fill placement, an experienced technician working under the direction of a licensed geotechnical engineer should inspect the disturbed surficial soils in structural areas. Structural areas of the site should be proofrolled utilizing a loaded tri-axle dump truck, or other heavily loaded construction equipment. The purpose of the proofrolling will be to detect any areas where unstable soils are present. Materials that yield excessively during the proofrolling should be investigated to determine the source of the instability.

Care should be taken when scheduling the proofroll to avoid inclement weather as rain will make it necessary to control shallow perched groundwater that may occur within the upper soils. The geotechnical engineer or his or her representative should observe the proofroll and recommend the nature and extent of any necessary remedial work.

4.2.5 Utility Installation

The soils encountered in our explorations are generally suitable for support of the anticipated utility construction, provided moisture control measures are maintained within the utility excavation. We anticipate that the soils to be excavated from utility trenches will be variable, but primarily consisting of consist of low to high plasticity clays (CL) and very clayey fine sand (SC), which are unsuitable for reuse as backfill beneath pavement areas.

Results of our exploration indicate that dewatering will likely be required for utility construction extending to 3.5 feet or more below the existing ground surface. Nevertheless, if encountered, the dewatering system should be installed and operated to maintain the groundwater level at a minimum of 2 feet below the bottom of the excavation.

4.2.6 Excavation Safety

All excavations should be braced in accordance with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations) or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. We recommend that the Contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact, if any, on the construction procedures. Groundwater levels should be maintained at least 2 feet below the excavation bottom.

We recommend that the contractor exercise extreme caution in any decision to place personnel and equipment in unbraced excavations, particularly when wetted or subjected to surcharge loads or vibrational forces.

4.2.7 Fill/Backfill Placement

All fill/backfill soils in building pad and roadway areas should consist of inorganic, granular soils meeting the material and compaction recommendations as summarized in **Table 2**.

Table 2 Fill / Backfill Placement Recommendations

Location of Fill	Maximum Percent Passing the No. 200 Sieve	Compaction Effort as Determined by Modified Proctor Test (ASTM D698 / ASTM D1557)
Building Pads	20%	98% / 95%
Pavement Subbase (within 24 inches below concrete pavement or asphalt / concrete pavement base course)	20%	100% / 98%
Below Pavement Subbase (deeper than 24 inches below concrete pavement or asphalt / concrete pavement base course)	20%	98% / 95%

All fill/backfill should be placed in level lifts not to exceed 12 inches loose thickness. However, in restricted working areas, if compaction is accomplished with lightweight, hand-guided compaction equipment, then the lift thickness should be limited to a maximum of 6 inches loose thickness.

The top surface of the fill should extend a minimum of 3 feet beyond the perimeters of the structures and 2 feet beyond the limits of pavements. Fill slopes should not exceed 2 horizontal to 1 vertical to prevent possible erosion or undermining of slabs, shallow footings and/or pavements. Shallower slopes may be dictated by site grading requirements.

In-place density tests should be performed on each lift by an experienced engineering technician working under the direction of a licensed geotechnical engineer to verify that the recommended degree of compaction has been achieved.

4.3 Seismic Considerations

4.3.1 Liquefaction Potential

The subject property is located within an active seismic zone with its center in the Charleston, South Carolina area. Although the area has not experienced significant earthquake events in the recent past, evidence of seismic event induced liquefaction has been found and geologists have mapped this area as having the potential for recurrence(s) of such an event. Considerable research is ongoing to better determine which local soils are truly liquefiable and the magnitude of settlement that might occur as a result of their liquefaction during a significant seismic event.

Utilizing 'LiquefyPro' modelling software, we have performed a liquefaction analysis of the subject site considering the subsurface soil and groundwater conditions encountered and in reference to the 2018 International Building Code (2018 IBC). Our analysis of the potential magnitude of settlement due to liquefaction indicates that settlement could be on the order of 1/2 inch within the site. The potential liquefaction induced settlement would be due generally to the consolidation of the loose to medium dense sands below the water table. Due to the shallow depth below the ground surface to the upper boundary of liquefiable soils, we estimate that differential liquefaction induced settlement within the building footprint would likely be on the order of 50 to 75 percent of the total.

4.3.2 Seismic Design Parameters

Due to the magnitude of potential liquefaction induced settlement of the soils encountered in the soil test borings at this site, it is our interpretation of the 2018 International Building Code (IBC) that the subject site would be classified as Seismic Site Class “F”. However, based upon the soil conditions encountered, it is our understanding that the designation of the site as Seismic Site Class “D” is allowable by the 2018 IBC for structures having a design fundamental period of less than or equal to 0.5 seconds assuming the risks associated with liquefaction are considered in other design aspects of the structure. The procedure for determining the site-specific seismic design parameters follows that which is outlined in the 2018 International Building Code with reference to ASCE 7-16. Values for Spectral Response Acceleration for short periods (0.2 seconds), S_s , and for long periods (1 second), S_1 , were obtained from the ‘ASCE 7 Hazard Tool’, which is an online tool that queries the United States Geological Survey (USGS) web servers and retrieves the seismic design variables in a report format. The resulting design parameters are presented in **Appendix C, Seismic Design Parameters**.

4.4 Shallow Foundations and Slabs

4.4.1 Shallow Foundation Sizing / Bearing Capacity

Once site preparation as detailed above is completed, our evaluation indicates that the proposed structure can be supported on shallow foundation system bearing in the existing in situ soils or properly compacted fill.

Table 3 summarizes our recommendations for sizing and bearing capacity.

Table 3 Shallow Foundation Design Parameters

Location	Maximum Allowable Bearing Capacity (psf) ^(a)	Foundation Minimum Sizing / Depth Requirements
All Structures	2,000	<u>Continuous Foundations</u> : 12 inches wide; 12 inches deep <u>Isolated Foundations</u> : 12 inches wide; 12 inches deep
^(a) The recommended bearing pressure refers to dead and conventional live loads for a structure of the proposed design and usage and reflects a net increase in pressure over and above that due to the overburden soils. Consequently, the weight of foundation concrete and soil backfill may be neglected in the sizing computations.		

4.4.2 Foundation Construction Recommendations

All foundation elements should be excavated, formed if necessary, and have their concrete cast in the dry. Any fill soils at the bottom of the foundation excavations disturbed during the excavation process should be re-densified prior to placement of reinforcing steel. Softened clayey soils beneath the fill should be removed and replaced with soils meeting the requirements of **Section 4.2.7**.

Dynamic cone penetrometer (DCP) testing and inspections should be performed in the foundation excavations prior to placement of reinforcement steel to verify compliance with project specifications. The testing and inspections should be performed by an experienced engineering technician operating under the direction of a licensed professional geotechnical engineer.

4.4.3 Shallow Foundation “Static” Settlement Potential

Column and continuous wall foundations designed and constructed in the recommended manner are estimated to be subject to a maximum potential total settlement of less than approximately 1 inch, in the absence of a significant seismic event. In the case of structurally independent column footings, total differential settlement could be on the order of 75 percent of the estimated maximum total settlement occurring between any two footings.

4.4.4 Floor Slabs

The floor slab subgrade soils should be compacted to meet the requirements of **Section 4.2.7** and should be recompacted to meet these requirements immediately prior to placement of reinforcing steel, once utility trenches are backfilled.

Based upon the soil conditions encountered at the site, the planned fill placement, and the recommended site preparation operations presented in this report, the modulus of vertical subgrade reaction (k) for the specified fill to constitute the slab bearing soils is expected to be on the order of 150 pounds per square inch per inch of vertical deflection (pci), at the recommended structural fill compaction criteria.

We recommend the installation of a vapor retarder between the base and the concrete floor slabs. The vapor retarder should conform to the requirements of ASTM E1745 (Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs), Class A.

The structural fill soils as specified herein for use in constructing the building pad are considered to be relatively free-draining soils. It is our opinion that these soils would be classified as “drainable” and that an additional aggregate top layer to act as a capillary barrier immediately below the floor slab would not be required. Note that all downspouts/roof drains should be positioned such that stormwater is directed away from the structures and that the site should be constructed to meet the civil design grading requirements.

4.5 Asphalt Pavement Design and Construction

We have based our design recommendations on the following assumptions:

- Site preparation procedures, including removal and replacement of unsuitable or yielding soils, have been completed where necessary.
- All pavements should be constructed in accordance with the guidelines of the latest applicable edition of the Georgia Department of Transportation (GDOT) Standard Specifications.
- Design requirements by City of Port Wentworth which are more stringent will govern over our recommendations.

Our pavement design and construction recommendations are provided below.

4.5.1 Asphalt Pavement Sections

Our review of project requirements indicates two primary asphalt pavement sections are required *within the fire station parcel*: 1) route to provide access to future fire truck traffic and 2) vehicular roads, drives and parking and drives. A third asphalt pavement section is recommended to withstand heavy traffic for the development of the park complex and the future heavy truck traffic that would include fire truck traffic and other anticipated post-construction heavy truck traffic. Recommended asphalt pavement sections are summarized in **Table 4**.

Table 4 **Asphalt Pavement Section Recommendations**

Asphalt Pavement Location	Asphaltic Concrete Surface Course	Asphaltic Concrete Intermediate Course	Asphalt Base Course	Graded Aggregate Base Course	Sand Subbase ^a
Fire Truck Route ^b	1½ inches	2 inches		8 inches	24 inches
Vehicular Routes / Parking ^c	2 inches	-		6 inches	24 inches
Park Entrance Road					
Option 1	1½ inches	2 inches	6 inches	-	24 inches
Option 2	1½ inches	2 inches	-	10 inches	24 inches
^a Sand subbase should consist of inorganic, granular material with a maximum of 20 percent by weight passing the No. 200 sieve. ^b Consideration should be given to the use of concrete pavements where fire trucks will be turning due to increased stress on the surface of the pavement. ^c We recommend that construction traffic be minimized on pavements constructed with this “light duty” pavement section to the extent practical, in an effort to minimize potential distress to this lighter duty pavement section.					

4.5.2 Concrete Pavement Sections

Light Duty Concrete Pavement: Following completion of the site preparation procedures for paved areas as detailed in this report, we recommend minimum thicknesses of rigid concrete pavement of 6 inches bearing directly upon a 24-inch sand subbase (with a maximum of 20 percent by weight passing the No. 200 sieve) for locations receiving occasional truck traffic (e.g. dumpster pad entrances).

Heavy Duty Concrete Pavement: Following completion of the site preparation procedures for paved areas as detailed in this report, we recommend minimum thicknesses of rigid concrete pavement of 6 inches and 8 inches of graded aggregate base course over a 24-inch sand subbase (with a maximum of 20 percent by weight passing the No. 200 sieve) for locations receiving frequent fire truck traffic.

4.5.3 Base Course / Prime Coat

The aggregate base course should comply with the GDOT Standard Specifications. The material should be compacted to at least 98 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557), or 100 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D698).

We recommend the placement of a prime coat on the aggregate base course. A prime coat helps fill voids, stabilize the fines, protect the base course, and promotes bonding to the asphalt course.

4.5.4 Suitability of Shallow Subbase Soils for Impervious Pavement

Silty, very silty, clayey and very clayey sands (SM, SC) and fine sandy clays (CL, CH) having silt/clay content in excess of the recommended maximum of 20 percent will be encountered within the 24-inch subbase layer of the recommended roadways and pavements, such that removal and replacement should be anticipated if site elevating fill does not provide for the necessary separation.

Careful consideration should be given to the potential for the moisture sensitive silty and clayey sands to become unstable due to moisture intrusion from inclement weather while exposed. Where this occurs, additional undercutting would likely be required to facilitate development. We recommend that a representative of GHD be contacted to evaluate the subbase soils during construction to verify areas requiring removal and replacement.

4.5.5 Underdrains

We recommend 100 percent underdrains along the pavements within the project. The underdrain should be installed at a depth of 24 inches below the bottom of concrete or base course elevation. Backfill can be any granular material such as coarse sand, #57 stone or gravel. The anticipated volume of infiltrating stormwater should be evaluated to understand the effectiveness of coarse sand in lieu of more open-graded materials such as #57 stone, if that option is considered. The trench should be lined with a non-woven fabric to minimize the loss of soil fines into the trench. The purpose of the underdrain system is to minimize groundwater intrusion into the subbase section of the roadway thereby reducing the strength of the roadway soils. Therefore, the drain should be positioned above the normal water level of adjacent drainage features to avoid inundating the subbase soils with water on a regular basis.

5. Limitations

This report: has been prepared by GHD for City of Port Wentworth and may only be used and relied on by City of Port Wentworth for the purpose agreed between GHD and City of Port Wentworth as set out in this report.

GHD otherwise disclaims responsibility to any person other than City of Port Wentworth arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD's scope of work for this project has not included investigation, detection, or evaluation related to the presence of any biological pollutants. The term 'biological pollutants' includes, but is not limited to, mold, fungi, spores, bacteria, and viruses, and the by products of any such biological organisms. Further, evaluation or review to determine compliance with State and/or Federal regulatory requirements, assessment of potential contamination migration from or onto the subject site, and/or any similar environmental analyses were beyond the scope of this study.

This report has been prepared with the intent that it not be separated. Information from this report should not be distributed or made available to designers or contractors in partial form. This report should be made available to prospective contractors for information only, and not as a warranty of subsurface conditions.

6. Closure

We appreciate the opportunity to work with you on this project. We trust that the information provided in the report is clear and understandable. Should it require any clarification or amplification, however, please contact us at (912) 235-3021.

Regards

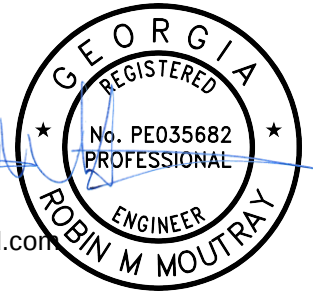


Wesley A. Marshall
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cc: Mr. Kevin Smith, P.E.; Thomas & Hutton



Robin M. Moutray
robin.moutray@ghd.com



6-5-2023

Appendices

Appendix A

Soil Test Boring Logs

Key to Soil Classification

Correlation of Penetration Resistance with Relative Density and Consistency

<u>Sands and Gravels</u>		<u>Silts and Clays</u>	
No. of Blows, N	Relative Density	No. of Blows, N	Relative Density
0 – 4	Very loose	0 – 2	Very soft
5 – 10	Loose	3 – 4	Soft
11 – 30	Medium dense	5 – 8	Firm
31 – 50	Dense	9 – 15	Stiff
Over 50	Very dense	16 – 30	Very stiff
		31 – 50	Hard
		Over 50	Very hard

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	Coarse - 3/4 to 3 inches diameter Fine - 4.76 mm to 3/4 inch diameter
Sand:	Coarse - 2.0 mm to 4.76 mm diameter Medium - 0.42 mm to 2.0 mm diameter Fine - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

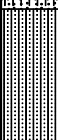
Modifiers

The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

Approximate Content	Modifiers	Field Moisture Description
≤ 5%:	Trace	Saturated: Usually liquid; very wet, usually from below the groundwater table
5% to 12%:	Slightly silty, slightly clayey, slightly sandy	Wet: Semisolid; requires drying to attain optimum moisture
12% to 30%:	Silty, clayey, sandy	Moist: Solid; at or near optimum moisture
30% to 50%:	Very silty, very clayey, very sandy	Dry: Requires additional water to attain optimum moisture

PROJECT: Port Wentworth Fire Station								LOG OF BORING: B-1		
DATE DRILLED: 5/24/2023					DRILLER: A. Nelson			GROUND ELEVATION:		
DRILLING METHOD: Mud Rotary					BORING DEPTH: 25.00 Feet			Notes:		
WATER LEVEL:					WATER LEVEL (24-HRS): 4'					
ANALYSIS					Depth feet	BLOW COUNTS	GROUND WATER	GRAPHIC LOG	USCS	GEOLOGIC DESCRIPTION
Moisture Content	% Passing 200 Sieve	Organic Content	Liquid Limit	Plasticity Index						
21.8	4.5				0				SC	Loose dark brown very clayey fine SAND
					1.4	10			CH	Very stiff brown and orange fine sandy CLAY
					2.8	16			CL	Stiff brown fine sandy CLAY
					4.2	12			SC	Medium dense gray clayey fine SAND
					5.6	20			SP	Medium dense orange fine SAND
					7	18			SP	Medium dense to loose tan and orange fine SAND
					8.4	22				
					9.8	18				
					11.2	6				
					12.6	21				
					14	22.4				
					15.4	23.8				
					16.8	25.2				
					18.2	26.6				
					19.6	28				
					21	29.4				
					22.4	30.8				
					23.8	32.2				
					25.2	33.6				
					26.6	35				
					28	36.4				
					29.4	37.8				
					30.8	39.2				
32.2	40.6									
33.6	42									
35	43.4									
36.4	44.8									
37.8	46.2									
39.2	47.6									
40.6	49									
42	50.4									
43.4	51.8									
44.8	53.2									
Boring terminated at 25 feet										

PROJECT: Port Wentworth Fire Station								LOG OF BORING: B-2			
DATE DRILLED: 5/24/2023					DRILLER: A. Nelson			GROUND ELEVATION:			
DRILLING METHOD: Mud Rotary					BORING DEPTH: 50.00 Feet			Notes:			
WATER LEVEL:					WATER LEVEL (24-HRS): 4'						
ANALYSIS					Depth feet	BLOW COUNTS	GROUND WATER	GRAPHIC LOG	USCS	GEOLOGIC DESCRIPTION	
Moisture Content	% Passing 200 Sieve	Organic Content	Liquid Limit	Plasticity Index							
					0				SC	Loose dark brown very clayey fine SAND	
					1.4	10					
					2.8	17				CH	Very stiff dark brown and orange fine sandy CLAY
					4.2					SC	Medium dense tan and gray clayey fine SAND
					5.6	11					
					7	18					
					8.4					SP- SM	Medium dense orange slightly silty fine SAND
					9.8	14					
					11.2						
					12.6					SP	Medium dense gray fine SAND
					14	14					
					15.4						
					16.8						
					18.2						
					19.6	13					
					21						
					22.4				SP- SM	Medium dense dark gray slightly silty fine SAND	
					23.8						
					25.2	14					
					26.6						
					28						
					29.4	18					
					30.8						
					32.2						
					33.6						
35	24										
36.4											
37.8											
39.2	30										
40.6											
42				SM	Dense to very dense gray silty fine SAND						
43.4											
44.8	33										
46.2											
47.6											
49											
50.4	50/6				Boring terminated at 50 feet						
51.8											
53.2											
34.1	22.6										

PROJECT: Port Wentworth Fire Station									LOG OF BORING: B-3		
DATE DRILLED: 5/24/2023					DRILLER: A. Nelson				GROUND ELEVATION:		
DRILLING METHOD: Mud Rotary					BORING DEPTH: 25.00 Feet				Notes:		
WATER LEVEL:					WATER LEVEL (24-HRS): 3.5'						
ANALYSIS					Depth feet	BLOW COUNTS	GROUND WATER	GRAPHIC LOG	USCS	GEOLOGIC DESCRIPTION	
Moisture Content	% Passing 200 Sieve	Organic Content	Liquid Limit	Plasticity Index							
42.7	35.4				0	13			SM	Medium dense dark brown silty fine SAND	
					1.4				CH	Very stiff to stiff dark brown and orange fine sandy CLAY	
					2.8				CL	Very stiff tan and dark brown fine sandy CLAY	
					4.2						
					5.6						
					7						
					8.4				CL	Stiff tan and brown fine sandy CLAY	
					9.8						
					11.2						
					12.6						
					14				SP-SM	Loose tan and orange slightly silty fine SAND	
					15.4						
					16.8						
					18.2						
					19.6				SM	Very loose light gray very silty fine SAND	
					21						
					22.4						
					23.8						
					25.2			6		SM	Loose dark gray very silty fine SAND
					26.6						
					28						
					29.4						
					30.8						
					32.2						
					33.6						
35											
36.4											
37.8											
39.2											
40.6											
42											
43.4											
44.8											
46.2											
47.6											
49											
50.4											
51.8											
53.2											

Appendix B

Log of Hand-Auger Borings

B-1 Log of Hand-Auger Borings

Project: Port Wentworth Fire Station

Date: May 22, 2023

Personnel: W. Marshall

Reference No: 12610450-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Suitability as Subbase
HA-1	0 – 5"	Topsoil / Pine straw cover	
	5" – 18"	Gray clayey fine SAND (SC)	
	18" – 36"	Orange and gray clayey fine SAND (SC)	
	36" – 48"	Gray and orange fine sandy CLAY (CL) <MC=17.9; -200=66.7>	
HA-2	0 – 8"	Topsoil / Pine straw cover	
	8" – 16"	Orange silty fine SAND (SM)	
	16" – 22"	Gray and orange clayey fine SAND (SC)	
	22" – 48"	Gray and orange very clayey fine SAND (SC) <MC=11.4; -200=49.6>	
HA-3	0 – 4"	Topsoil / Pine straw cover	
	4" – 10"	Dark gray silty fine SAND (SM)	
	10" – 18"	Orange clayey fine SAND (SC)	
	18" – 24"	Orange and gray very clayey fine SAND (SC) <MC=7.2; -200=43.4>	
	24" – 48"	Orange and gray fine sandy CLAY (CL)	
HA-4	0 – 6"	Topsoil / Pine straw cover	
	6" – 18"	Dark gray and gray very silty fine SAND (SM) <MC=5.2; -200=30.3>	
	18" – 48"	Gray and orange fine sandy CLAY (CL)	
HA-5	0 – 4"	Topsoil / Pine straw cover	
	4" – 10"	Dark gray clayey fine SAND (SC)	
	10" – 48"	Orange and gray fine sandy CLAY (CL) <MC=13.8; -200=68.4>	
HA-6	0 – 4"	Topsoil / Pine straw cover	
	4" – 8"	Gray clayey fine SAND (SC)	
	8" – 48"	Brown and orange fine sandy CLAY (CH) <MC=20.6; -200=79.3; LL=77; PI=60>	

Comments: MC = Moisture Content; -200 = Percent Silt / Clay; LL = Liquid Limit; PI = Plasticity Index

Yellow = Suitable as Subbase; Red = Not Suitable as Subbase

B-1 Log of Hand-Auger Borings

Project: Port Wentworth Fire Station

Date: May 22, 2023

Personnel: W. Marshall

Reference No: 12610450-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Suitability as Subbase
HA-7	0 – 5"	Topsoil / Pine straw cover	
	5" – 12"	Dark gray silty fine SAND (SM) with clay nodules	
	12" – 48"	Orange and gray very clayey fine SAND (SC) <MC=4.9; -200=33.9>	
HA-8	0 – 6"	Topsoil / Pine straw cover	
	6" – 18"	Tan silty fine SAND (SM) <MC=2.6; -200=18.5>	
	18" – 40"	Orange and tan silty fine SAND (SM)	
	40" – 48"	Gray and orange clayey fine SAND (SC)	

Comments: MC = Moisture Content; -200 = Percent Silt / Clay; Yellow = Suitable as Subbase;
Red = Not Suitable as Subbase

Appendix C

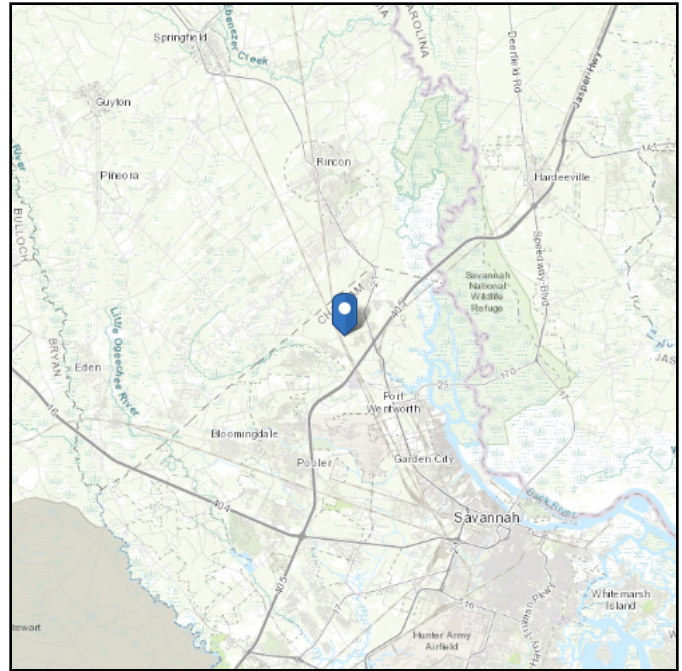
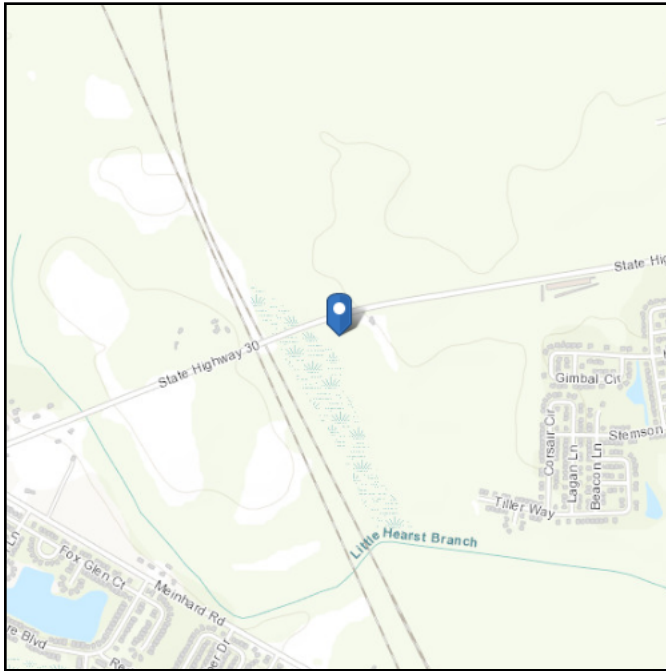
Seismic Design Parameters

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-22
Risk Category: IV
Soil Class: D - Stiff Soil

Latitude: 32.194491
Longitude: -81.215949
Elevation: 18.09651202593876 ft
(NAVD 88)

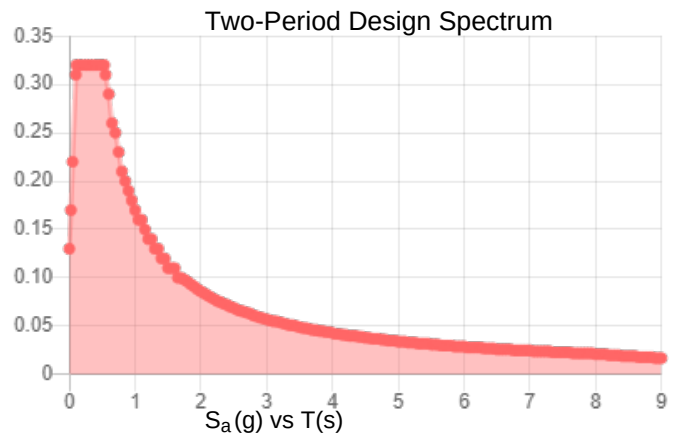
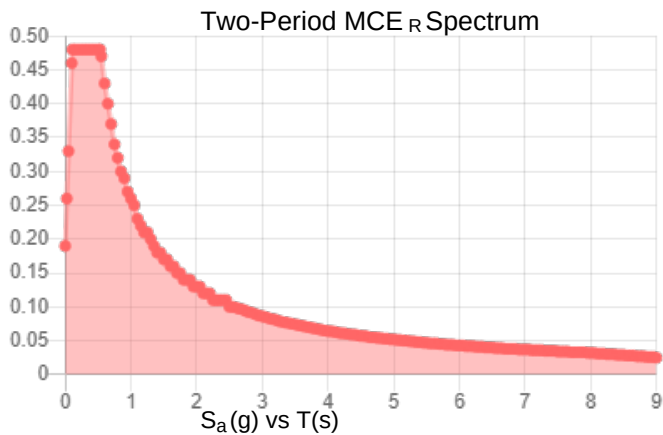
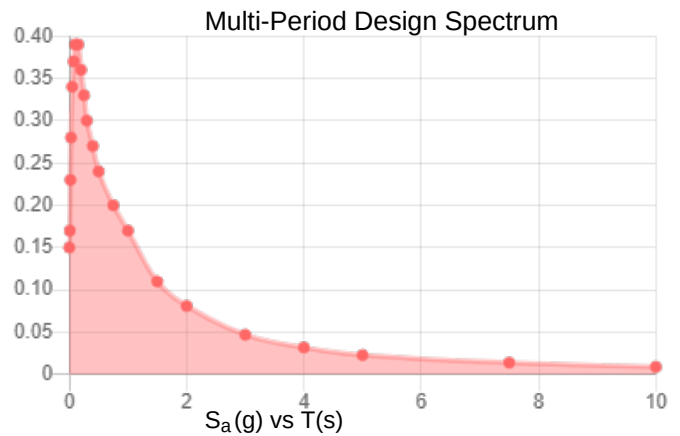
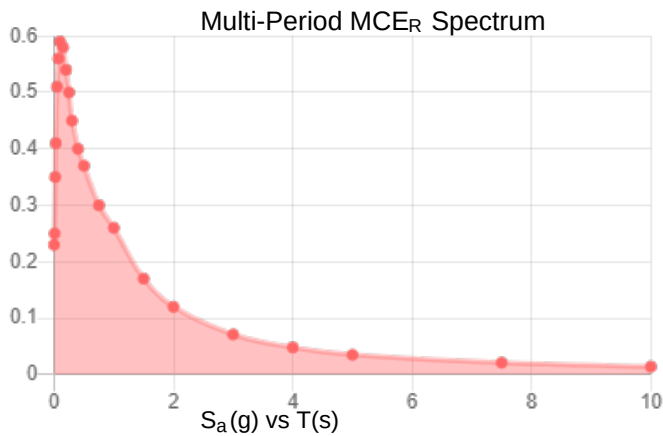


Site Soil Class:

Results:

PGA _M :	0.22	T _L :	8
S _{MS} :	0.48	S _S :	0.46
S _{M1} :	0.26	S ₁ :	0.12
S _{DS} :	0.32	V _{S30} :	260
S _{D1} :	0.17		

Seismic Design Category: D



MCE_R Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.

Data Accessed: Mon Jun 05 2023

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

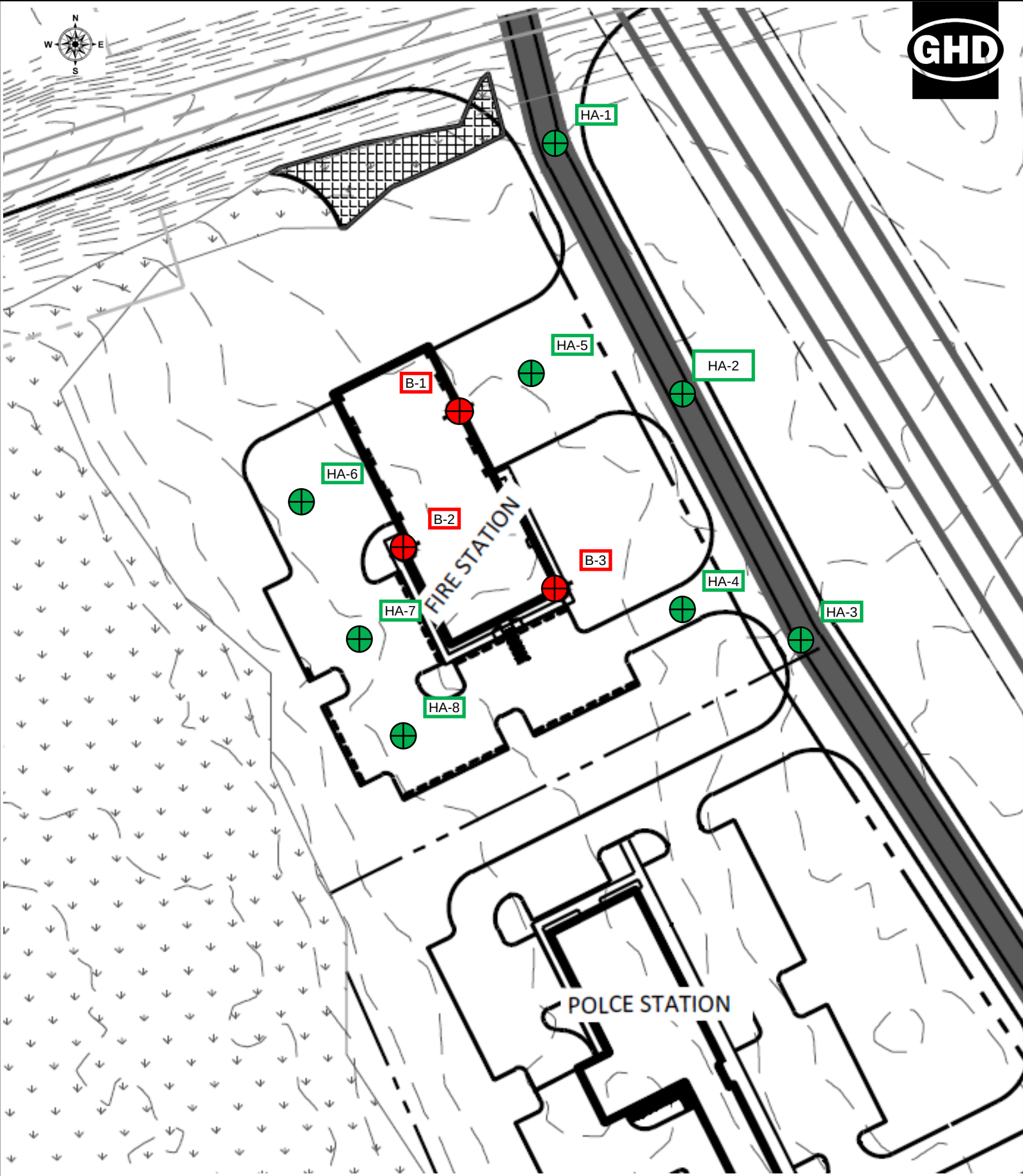
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Appendix D

Figure



B-# Designation / approximate location of Standard Penetration Test (SPT) Boring



HA-# Designation / approximate location of Hand-Auger Boring

EXPLORATION LOCATION DIAGRAM

Port Wentworth Fire Station

Our ref: 12613101-00 | Port Wentworth Recreation Complex

June 06, 2023

Mr. Steven Davis
City of Port Wentworth
7224 GA Highway 21
Port Wentworth, Georgia 31407

Subsurface Explorations and Geotechnical Evaluations

Dear Mr. Davis:

GHD is pleased to present this letter summarizing our subsurface explorations and geotechnical evaluations for the above referenced site. Our services were performed in general accordance with our proposal dated May 15, 2023.

1. Site Description / Project Understanding

GHD received project information via email and telephone correspondence with Mr. Kevin Smith, P.E. of Thomas & Hutton that included a document titled, 'Initial Geotech Boring Locations, Port Wentworth Park', prepared by Thomas & Hutton and dated April 28, 2023. The document provided to us indicates a new recreation park complex is planned for development within the City of Port Wentworth, Georgia. GHD previously provided a "Report of Limited Shallow Subsurface Investigation and Geotechnical Evaluation" (Reference No. 11122323, dated November 4, 2016), which was performed for a portion of the currently proposed recreation park site area. The provided document shows that the property is to include multiple additional parcels which expand the boundaries provided for our previous study of the site toward both the north and southeast which provides road frontages and site entrances along Georgia Highway 30 and Monteith Road, respectively.

It is our understanding that the subject of this investigation is to be select stormwater ponds and pavement areas within the future recreation park. The most recent document provides coordinates of the requested test pit and hand-auger boring locations within these areas.

The subject site extends west from the east side of the Seaboard Coast Line Railway right-of-way between Georgia Highway 30 and Monteith Road. The site can generally be described as having two primary upland areas separated by a wetland in the central portion of the site which also trends along the western site border of the norther upland area. An additional wetland meanders through the northern upland area. Additional site information gathered for the site is summarized below.

- An existing ditch holding stormwater traverses in the east-west direction through the wetland in the central portion of the site that separates the two main upland areas.
- An existing utility easement traverses generally in the north-south direction through the eastern portion of the site.
- Lidar included on the document provided indicates that the site gently undulates between low points in wetland areas to highpoints in upland areas. Our fieldwork found the site to have variable

vegetation but is primarily moderately to heavily wooded with a few narrow earthen paths within the southern upland acreage.

The purpose of our work was to provide geotechnical information concerning 1) the suitability of the on-site soils within the currently proposed stormwater detention pond areas for reuse as structural fill / backfill at the locations and to the depths explored, 2) the suitability of the near surface soils within the currently proposed roadways to remain in place as subbase soils for direct support of pavements, and 3) asphalt pavement section design and construction.

2. Subsurface Explorations / Laboratory Testing

The scope of our geotechnical field explorations included hand-auger borings at the requested locations within select future pavement areas and test pits at the requested locations within select proposed stormwater ponds. The approximate locations of the explorations are shown on **Figures 1 and 2**. A GHD professional transferred the coordinates on the provided documents to hand-held global positioning unit (GPS) devices and utilized in the field to locate the exploration locations. Given the method of locating the explorations in the field, the locations indicated on **Figures 1 and 2** should be considered approximate. Details of the explorations performed are provided in the sections that follow.

2.1 Hand-Auger Borings

Six hand-auger borings (designated HA-1 through HA-6) were performed at the requested locations to depths of approximately 48 inches below the existing ground surface on May 22, 2023. The soils at each hand-auger location were examined by manually twisting a steel auger into the soil and retrieving samples of the cuttings at regular depth intervals. Our personnel visually classified the soils encountered in the field. The logs of the hand-auger borings are presented as **Appendix A, Hand-Auger Boring Logs**.

2.2 Test Pits

Eight test pit excavations (designated TP-1 through TP-8) were performed at the requested locations within select stormwater ponds to depths of between approximately 14 to 17 feet below the existing ground surface on May 19, 2023. The soils encountered at each test pit location were examined during the excavation of each test pit. Our personnel visually classified the soils encountered in the field. The logs of the test pits are presented as **Appendix B, Test Pit Logs**.

2.3 Soil Sample Handling

The soil samples obtained from the explorations were placed in individual containers, properly sealed and marked for identification. The soils samples were then transported to our laboratory for analysis and classification by a GHD professional in general accordance with ASTM D2487 (Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)).

2.4 Laboratory Analyses

Selected samples of the soils collected from the explorations were tested in our laboratory to determine their percent fines (ASTM D1140), natural moisture content (ASTM D2216) and Atterberg limits (ASTM D4318). The laboratory data was used to aid in the classification of the soils in accordance with ASTM D2487 and to further define their engineering properties. The laboratory test results are presented on the logs in **Appendices A and B**.

3. Soil Stratigraphy / Groundwater

A GHD professional developed the final log information from the field logs (hand-auger borings and test pits) and visual review of the recovered soil samples in our laboratory. Similar soils were grouped into strata, with each stratum described in general accordance with the nomenclature used in ASTM D2487. Although indicated on the logs as distinct changes, the transition from one soil type or stratum to another may be gradual or may occur at slightly differing elevations than indicated between soil samples. Soil conditions may also vary from our findings at locations in areas of the site not explored.

For reference, a generalized stratigraphic profile developed from the test pit and hand-auger boring explorations is provided in **Table 1**. For a more detailed description, please refer to the **Appendices** to this report. The logs include the Unified Soil Classification System (USCS) symbols and groundwater levels at the time of our study.

Table 1 Generalized Stratigraphic Profile

Approximate Depth Below Ground Surface (feet)	Material Description
0 to 2	3 to 10 inches Topsoil and Ground Cover / Silty fine SAND (SM)
2 to 17	<u>Variable</u> : Silty, clayey and/or very clayey fine SAND (SM, SC) and/or Fine sandy CLAY (CL)

Groundwater was not encountered at our hand-auger boring locations at the time of exploration. When encountered at our test pit locations, groundwater infiltration depths ranged between 10 and 15 feet below the existing ground surface. We expect groundwater levels will fluctuate depending upon the season, recent rainfall quantities in the area, changing drainage patterns during and post-development of this and surrounding areas, as well as other factors.

4. Pavement Design and Construction

We have based our pavement design recommendations on the following assumptions:

- Heavy construction traffic loads will be part of the traffic using the pavement within the subject site following completion of infrastructure development that will continue until construction of the development is complete.
- The construction of the complete pavement section occurs at the time of road construction.
- Site preparation procedures, including removal and replacement of unsuitable or yielding soils, have been completed where necessary.
- All asphalt and concrete pavements should be constructed in accordance with the guidelines of the latest applicable edition of the Georgia of Transportation (GDOT) Standard Specifications.

Our pavement design and construction recommendations are provided below.

4.1 Asphalt Pavement Design Sections

We consider the entrance roadway in the area of our hand-auger location HA-6 a “primary route” as this route is anticipated to receive heavy truck traffic during the development of the various components of the park complex followed by post-development heavy truck traffic. Driveways and parking areas are anticipated to receive only vehicular traffic during and after the completion of development of the park complex. A third

section should be utilized for any routes within these vehicular areas that would receive occasional heavy truck traffic. Recommended asphalt pavement sections are summarized in **Table 2**.

Table 2 *Asphalt Pavement Section Recommendations*

Asphalt Pavement Location	Asphalt Surface Course	Asphalt Intermediate Course	Asphalt Base Course	Graded Aggregate Base Course	Sand Subbase ^a
Park Entrance Road					
Option 1	1½ inches	2 inches	6 inches	-	24 inches
Option 2	1½ inches	2 inches	-	10 inches	24 inches
Vehicular Routes / Parking ^b	2 inches	-	-	6 inches	24 inches
Routes with Occasional Heavy Trucks	1½ inches	2 inches	-	8 inches	24 inches
^a Sand subbase should consist of inorganic, granular material with a maximum of 20 percent by weight passing the No. 200 sieve. ^b We recommend that construction traffic be minimized on pavements constructed with this “light duty” pavement section to the extent practical, in an effort to minimize potential distress to this lighter duty pavement section.					

4.2 Concrete Pavement Design Sections

4.2.1 Light Duty Concrete Pavement

Following completion of the site preparation procedures for paved areas as detailed in this report, we recommend minimum thicknesses of rigid concrete pavement of 6 inches bearing directly upon a 24-inch sand subbase (with a maximum of 20 percent by weight passing the No. 200 sieve) for locations receiving occasional truck traffic (e.g. dumpster pad entrances).

4.2.2 Heavy Duty Concrete Pavement

Following completion of the site preparation procedures for paved areas as detailed in this report, we recommend minimum thicknesses of rigid concrete pavement of 6 inches and 8 inches of graded aggregate base course over a 24-inch sand subbase (with a maximum of 20 percent by weight passing the No. 200 sieve) for locations receiving frequent fire truck traffic.

4.3 Site Preparation

4.3.1 Stripping / Grubbing

Site preparation should include the complete clearing, stripping and removal of grasses/weeds, underbrush, surficial topsoil, surficial and shallow subgrade soils containing significant quantities of organic material, stumps, and root systems of existing trees (roots larger than finger size), and other deleterious materials from within and to a minimum distance of three (3) feet beyond the perimeter of pavement areas. Although we encountered up to approximately 10 inches of surficial organic debris and topsoil in our explorations, it should be anticipated that removal of deleterious material to greater depths may be required due to major root systems of trees, as well as due to disturbance of the surface soils by site preparation equipment during stripping, grubbing, root raking, etc.

During site clearing and earthwork operations, and while excavating for site utilities, the excavated and exposed soils should be observed for the presence of excessive organic and/or deleterious materials and debris that could be detrimental to the pavements. We recommend that an experienced soils engineering

technician be present on site during the stripping and grubbing process in order to determine which surficial and/or shallow subgrade soils must be removed and replaced due to excessive organic content.

4.3.2 Subbase (Subgrade)

We recommend the use of at least 24 inch thick subbase consisting of inorganic sand having no more than 20 percent silt/clay content, compacted to a minimum of 98 percent of the soil's maximum dry density as determined by Modified Proctor test (ASTM D1557), or 100 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D698). All fill / backfill below the 24-inch subbase layer should also consist of inorganic sand having no more than 20 percent silt/clay content, compacted to a minimum of 95 percent of the soil's maximum dry density as determined by Modified Proctor test (ASTM D1557), or 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D698)

Immediately prior to placing the aggregate base course, the subgrade (subbase) soils should be moisture adjusted and recompacted, if necessary. The subgrade soils should be proofrolled to check for stable conditions.

4.3.3 Suitability of Shallow Subbase Soils for Impervious Pavement

The soils encountered at our hand-auger boring locations contain silt/clay contents in excess of the recommended maximum of 20 percent are anticipated to be encountered within the 24-inch subbase layer of the recommended roadways and pavements, such that removal and replacement should be anticipated if site elevating fill does not provide for the necessary 24-inch subbase thickness.

Careful consideration should be given to the potential for the moisture sensitive silty and clayey sands to become unstable due to moisture intrusion from inclement weather while exposed. Where this occurs, additional undercutting would likely be required to facilitate development. We recommend that a representative of GHD be contacted to evaluate the subbase soils during construction to verify areas requiring removal and replacement.

4.3.4 Aggregate Base Course / Prime Coat

The aggregate base course should comply with the GDOT Standard Specifications. The material should be compacted to at least 98 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557), or 100 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D698).

The base course should be proofrolled to verify stable conditions prior to asphalt paving. We recommend the placement of a prime coat on the aggregate base course if the base will remain exposed to the elements for a period longer than 2 weeks prior to paving. A prime coat helps fill voids, stabilize the fines, protect the base course, and promotes bonding to the asphalt course.

4.3.5 Underdrains

We recommend 100 percent underdrains along the pavements within the development. The underdrain should be installed at a depth of 24 inches below the bottom of concrete or base course elevation. Backfill can be any granular material such as coarse sand, #57 stone or gravel. The anticipated volume of infiltrating stormwater should be evaluated to understand the effectiveness of coarse sand in lieu of more open-graded materials such as #57 stone, if that option is considered. The trench should be lined with a non-woven fabric to minimize the loss of soil fines into the trench. The purpose of the underdrain system is to minimize groundwater intrusion into the subbase section of the roadway thereby reducing the strength of the roadway soils. Therefore, the drain should be positioned above the normal water level of adjacent drainage features to avoid inundating the subbase soils with water on a regular basis.

5. Suitability of Pond Soils for Reuse as Structural Fill

Based on the visual classification of the soils, as well as the laboratory test results, we have included on the test pit logs in **Appendix B** color codes that provide a visual depiction of the general suitability of the soils for use as structural fill (assuming they are placed at or near the optimum moisture content). A summary of the suitability designations is provided below:

- a) All-purpose fill – Soils designated for use as all-purpose fill consist of predominantly sandy soils with less than 20 percent by weight finer than the #200 sieve (i.e. silt/clay content). Soils in this grouping can be utilized as roadway subgrade/subbase, building pad fill, and utility backfill, are less sensitive to moisture fluctuations, and can be dried relatively quickly when excess moisture is present. Soils in this grouping are considered 'select fill'.
- b) Building Pad Fill/Utility Backfill – Soils designated for this use consist of predominantly sandy soils, classified as silty sands or clayey sands, with 20 to 30 percent by weight finer than the #200 sieve (i.e. silt/clay content). Soils in this grouping can be utilized for any application other than the top 24 inches below the aggregate base course within roadways and are moderately sensitive to moisture fluctuations.
- c) Marginal Fill – Soils designated for this use consist of predominantly sandy soils, classified as very silty sands or very clayey sands, with 30 to 50 percent by weight finer than the #200 sieve (i.e. silt/clay content). Soils in this grouping are sensitive to moisture fluctuations, which increases with fines content. These soils contain more than the typically recommended 30 percent maximum fines content for fill or backfill within building pad areas. The basis for the maximum fines content lies in the moisture sensitivity of these materials which makes them difficult to moisture adjust and adequately densify to meet project specifications during construction. Successful use of these soils is highly dependent on dry weather, and they will require significant additional effort to attain passing compaction.
- d) Unsuitable – Soils designated for this use consist of silts / clays (soils having greater than 50 percent by weight finer than the #200 sieve. Soils in this grouping in this geographic areas are typically significantly wet of optimum moisture content and thus are deemed unsuitable for use as structural fill, and they should be placed in non-structural areas only.

We have summarized the results of our test pit explorations in terms of potential reuse in **Table 3**. Note that the soils considered suitable must be at least 2 feet in thickness to be considered retrievable without significant contamination by the overlying topsoil, and thus, they should not be included in reuse quantities.

Table 3 Summary of Potential Soil Reuse as Structural Fill

Test Pit	Depths Encountering All-Purpose Structural Fill (Sands having $\leq 20\%$ Silt/Clay)	Depths Encountering Building Pad Fill and Utility Backfill ^a (Sands having ≤ 30 Silt/Clay)	Depths Encountering Marginal Fill / Utility Backfill ^a (Sands with 30 to 50% Silt/Clay)	Depths Encountering Soils Unsuitable for Reuse (Silt/Clay)
TP-1	8" – 3'	8" – 3'	3' – 9'	9' – 14'
TP-2	-	8" – 3'	3' - 10'	-
TP-3	11' – 14'	8" – 2' ^c / 5' – 14'	2' – 5'	14' – 15'
TP-4	-	10" – 2' ^c	2' – 9'	9' – 15'
TP-5	5' – 9'	6" – 3' / 9' – 14'	3' – 5'	-
TP-6	5' – 13'	6" – 3' / 5' – 17'	3' – 5'	-
TP-7	7' – 12'	10" – 4' / 7' – 14'	4' – 7'	-
TP-8	-	3" – 3' / 6' – 10'	3' – 6' / 10' – 14'	-

^a Where silty, clayey and/or very clayey fine sands are to be reused as structural fill or as backfill in utility trench excavations, strict moisture control will need to be maintained during site preparation. It should be realized that much of these soils will be excavated in a wet condition, will retain moisture and will require additional effort to achieve the prescribed dry density and a stable condition. Failure to control moisture in these soils may result in undercutting of otherwise stable soils after placement.

6. Limitations

This report: has been prepared by GHD for City of Port Wentworth and may only be used and relied on by City of Port Wentworth and the selected project consultants for the purpose agreed between GHD and City of Port Wentworth as set out in this report.

GHD otherwise disclaims responsibility to any person other than City of Port Wentworth arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD's scope of work for this project has not included investigation, detection, or evaluation related to the presence of any biological pollutants. The term 'biological pollutants' includes, but is not limited to, mold, fungi, spores, bacteria, and viruses, and the by products of any such biological organisms. Further, evaluation or review to determine compliance with State and/or Federal regulatory requirements, assessment of potential contamination migration from or onto the subject site, and/or any similar environmental analyses were beyond the scope of this study.

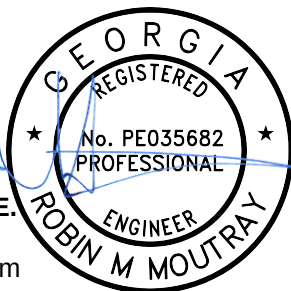
This report has been prepared with the intent that it not be separated. Information from this report should not be distributed or made available to designers or contractors in partial form. This report should be made available to prospective contractors for information only, and not as a warranty of subsurface conditions.

7. Closure

We appreciate the opportunity to work with you on this project. We trust that the information provided in the report is clear and understandable. Should it require any clarification or amplification, however, please contact us at (912) 235-3021.

Regards


Robin M. Moutray, P.E.
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6-6-2023


Sean M. McCubbins, LEED® AP
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Enclosures

cc: Mr. Kevin Smith, P.E.; Thomas & Hutton

Appendix A

Hand-Auger Logs

Key to Soil Classification

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	Coarse - 3/4 to 3 inches diameter Fine - 4.76 mm to 3/4 inch diameter
Sand:	Coarse - 2.0 mm to 4.76 mm diameter Medium - 0.42 mm to 2.0 mm diameter Fine - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

Modifiers

The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

Approximate Content	Modifiers	Field Moisture Description
≤ 5%:	Trace	Saturated: Usually liquid; very wet, usually from below the groundwater table
5% to 12%:	Slightly silty, slightly clayey, slightly sandy	Wet: Semisolid; requires drying to attain optimum moisture
12% to 30%:	Silty, clayey, sandy	Moist: Solid; at or near optimum moisture
30% to 50%:	Very silty, very clayey, very sandy	Dry: Requires additional water to attain optimum moisture

A-1 Log of Hand-Auger Borings

Project: Port Wentworth Recreation Complex

Date: May 22, 2023

Personnel: W. Marshall

Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Suitability as Subbase
HA-1	0 – 5"	Topsoil / Pine straw cover	
	5" – 17"	Gray silty fine SAND (SM)	
	17" – 28"	Tan silty fine SAND (SM)	
	28" – 36"	Gray and orange fine very sandy CLAY (CL) <MC=8.9; -200=56.7> <Liquid Limit=38; Plasticity Index=23>	
	36" – 48"	Orange and gray fine sandy CLAY (CL)	
HA-2	0 – 6"	Topsoil / Pine straw cover	
	6" – 12"	Dark brown silty fine SAND (SM)	
	12" – 30"	Tan silty fine SAND (SM) <MC=0.9; -200=24.4>	
	30" – 36"	Orange and gray clayey fine SAND (SC)	
	36" – 48"	Red and gray very clayey fine SAND (SC)	
HA-3	0 – 3"	Topsoil / Pine straw cover	
	3" – 12"	Gray silty fine SAND (SM)	
	12" – 18"	Tan silty fine SAND (SM)	
	18" – 30"	Orange very clayey fine SAND (SC)	
	30" – 48"	Tan very silty fine SAND (SM) with clay nodules <MC=4.8; -200=37.2>	
HA-4	0 – 5"	Topsoil / Pine straw cover	
	5" – 12"	Gray silty fine SAND (SM)	
	12" – 24"	Tan silty fine SAND (SM)	
	24" – 48"	Red and gray very clayey fine SAND (SC) <MC=9.0; -200=44.3> <Liquid Limit=41; Plasticity Index=22>	

Comments: MC = Moisture Content; -200 = Percent Silt / Clay; Yellow = Suitable as Subbase; Red = Not Suitable as Subbase

A-1 Log of Hand-Auger Borings

Project: Port Wentworth Recreation Complex

Date: May 22, 2023

Personnel: W. Marshall

Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Suitability as Subbase
HA-5	0 – 6"	Topsoil / Pine straw cover	
	6" – 12"	Gray silty fine SAND (SM) <MC=2.3; -200=23.9>	
	12" – 24"	Tan silty fine SAND (SM)	
	24" – 36"	Red and orange clayey fine SAND (SC)	
	36" – 48"	Red and gray clayey fine SAND (SC)	
HA-6	0 – 4"	Topsoil / Leave cover	
	4" – 14"	Dark brown silty fine SAND (SM)	
	14" – 36"	Tan and gray silty fine SAND (SM)	
	36" – 48"	Orange and gray very clayey fine SAND (SC) <MC=6.8; -200=39.2>	

Comments: MC = Moisture Content; -200 = Percent Silt / Clay; Yellow = Suitable as Subbase;
Red = Not Suitable as Subbase

Appendix B

Log of Test Pits

B-1 Log of Test Pits

Project: Port Wentworth Recreation Complex

Date: May 19, 2023

Personnel: W. Marshall / W. Walston

Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Natural Moisture Content (%)	Percent Finer than #200 Sieve	Suitability
TP-1	0 – 8"	Topsoil			
	8" – 3'	Tan fine SAND (SP)			
	3' – 9'	Gray and orange very clayey fine SAND (SC)	18.5	36.9	
	9' – 14'	Dark gray and blue fine very sandy CLAY (CL) with sand seams	27.4	52.4	
Test pit terminated at 14'					

Suitability Key:

	All-Purpose Fill; Silt/Clay Content = 0 to 20% (SP, SP-SM, SP-SC, SM, SC)
	Building Pad Fill/Utility Backfill; Silt/Clay Content = 20 to 30% (SM, SC)
	Marginal Structural Use; Silt/Clay Content = 30 to 50% (SM, SC)
	Typically Unsuitable; Silt/Clay Content = >50% (CL, CH)

B-1 Log of Test Pits

Project: Port Wentworth Recreation Complex

Date: May 19, 2023

Personnel: W. Marshall / W. Walston

Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Natural Moisture Content (%)	Percent Finer than #200 Sieve	Suitability
TP-2	0 – 8"	Topsoil			
	8" – 3'	Tan silty fine SAND (SM)	8.0	20.2	
	3' – 10'	Orange and gray very clayey fine SAND (SC)	17.5	38.0	
	10' – 15'	Dark gray and blue very clayey fine SAND (SC) with sand seams and fine gravel	23.0	33.7	
		<Groundwater infiltration encountered at 15'>			
Test pit terminated at 15'					

Suitability Key:

	All-Purpose Fill; Silt/Clay Content = 0 to 20% (SP, SP-SM, SP-SC, SM, SC)
	Building Pad Fill/Utility Backfill; Silt/Clay Content = 20 to 30% (SM, SC)
	Marginal Structural Use; Silt/Clay Content = 30 to 50% (SM, SC)
	Typically Unsuitable; Silt/Clay Content = >50% (CL, CH)

B-1 Log of Test Pits

Project: Port Wentworth Recreation Complex

Date: May 19, 2023

Personnel: W. Marshall / W. Walston

Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Natural Moisture Content (%)	Percent Finer than #200 Sieve	Suitability
TP-3	0 – 8"	Topsoil / Pine straw cover			
	8" – 2'	Tan silty fine SAND (SM)			
	2' – 5'	Red and brown very clayey fine SAND (SC)	18.8	44.3	
	5' – 11'	Red and gray clayey fine SAND (SC)	13.5	25.1	
		<Groundwater infiltration encountered at 11'>			
	11' – 14'	Gray slightly silty fine SAND (SP-SM)	25.6	7.9	
	14' – 15'	Gray fine sandy CLAY (CL) with sand seams	44.4	81.7	
Test pit terminated at 15'					

Suitability Key:

	All-Purpose Fill; Silt/Clay Content = 0 to 20% (SP, SP-SM, SP-SC, SM, SC)
	Building Pad Fill/Utility Backfill; Silt/Clay Content = 20 to 30% (SM, SC)
	Marginal Structural Use; Silt/Clay Content = 30 to 50% (SM, SC)
	Typically Unsuitable; Silt/Clay Content = >50% (CL, CH)

B-1 Log of Test Pits

Project: Port Wentworth Recreation Complex

Date: May 19, 2023

Personnel: W. Marshall / W. Walston

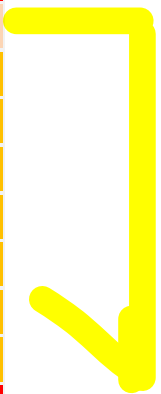
Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Natural Moisture Content (%)	Percent Finer than #200 Sieve	Suitability
TP-4	0 – 10"	Topsoil			
	10" – 2'	Tan silty fine SAND (SM)			
	2' – 5'	Gray and orange very clayey fine SAND (SC)	23.6	48.4	
	5' – 9'	Brown and gray very clayey fine SAND (SC)	19.1	32.3	
	9' – 15'	Gray and orange fine sandy CLAY (CL) with sand seams	47.4	85.3	
Test pit terminated at 15'					

Suitability Key:

	All-Purpose Fill; Silt/Clay Content = 0 to 20% (SP, SP-SM, SP-SC, SM, SC)
	Building Pad Fill/Utility Backfill; Silt/Clay Content = 20 to 30% (SM, SC)
	Marginal Structural Use; Silt/Clay Content = 30 to 50% (SM, SC)
	Typically Unsuitable; Silt/Clay Content = >50% (CL, CH)



B-1 Log of Test Pits

Project: Port Wentworth Recreation Complex

Date: May 19, 2023

Personnel: W. Marshall / W. Walston

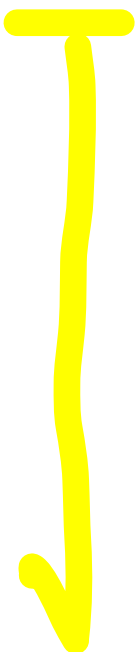
Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Natural Moisture Content (%)	Percent Finer than #200 Sieve	Suitability
TP-5	0 – 6"	Pine straw cover / Topsoil			
	6" – 3'	Tan silty fine SAND (SM)			
	3' – 5'	Red and gray very clayey fine SAND (SC)	15.2	36.9	
	5' – 9'	Orange and gray clayey fine SAND (SC)	8.5	14.3	
	9' – 14'	Tan and orange clayey fine SAND (SC) <i><Groundwater infiltration encountered at 11'></i>	26.8	25.2	
Test pit terminated at 14'					

Suitability Key:

	All-Purpose Fill; Silt/Clay Content = 0 to 20% (SP, SP-SM, SP-SC, SM, SC)
	Building Pad Fill/Utility Backfill; Silt/Clay Content = 20 to 30% (SM, SC)
	Marginal Structural Use; Silt/Clay Content = 30 to 50% (SM, SC)
	Typically Unsuitable; Silt/Clay Content = >50% (CL, CH)



B-1 Log of Test Pits

Project: Port Wentworth Recreation Complex

Date: May 19, 2023

Personnel: W. Marshall / W. Walston

Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Natural Moisture Content (%)	Percent Finer than #200 Sieve	Suitability
TP-6	0 – 6"	Topsoil / Pine straw cover			
	6" – 3'	Tan silty fine SAND (SM)			
	3' – 5'	Orange and gray very clayey fine SAND (SC)	20.0	39.1	
	5' – 13'	Orange and gray clayey fine SAND (SC)	14.1	17.9	
		<Groundwater infiltration encountered at 13'>			
	13' – 17'	Dark gray and blue silty fine SAND (SM)	33.3	28.7	
Test pit terminated at 17'					

Suitability Key:

	All-Purpose Fill; Silt/Clay Content = 0 to 20% (SP, SP-SM, SP-SC, SM, SC)
	Building Pad Fill/Utility Backfill; Silt/Clay Content = 20 to 30% (SM, SC)
	Marginal Structural Use; Silt/Clay Content = 30 to 50% (SM, SC)
	Typically Unsuitable; Silt/Clay Content = >50% (CL, CH)

B-1 Log of Test Pits

Project: Port Wentworth Recreation Complex

Date: May 19, 2023

Personnel: W. Marshall / W. Walston

Reference No: 12613101-00

Location: See Figure 1

Location	Depth Below Ground Surface	Soil Description	Natural Moisture Content (%)	Percent Finer than #200 Sieve	Suitability
TP-7	0 – 10"	Topsoil			
	10" – 4'	Tan silty fine SAND (SM)			
	4' – 7'	Gray and orange very clayey fine SAND (SC)	16.4	30.7	
	7' – 12'	Gray and orange clayey fine SAND (SC)			
			13.1	19.1	
	12' – 14'	Gray silty fine SAND (SM) <Groundwater infiltration encountered at 13'>	29.7	29.0	
Test pit terminated at 14'					

Suitability Key:

	All-Purpose Fill; Silt/Clay Content = 0 to 20% (SP, SP-SM, SP-SC, SM, SC)
	Building Pad Fill/Utility Backfill; Silt/Clay Content = 20 to 30% (SM, SC)
	Marginal Structural Use; Silt/Clay Content = 30 to 50% (SM, SC)
	Typically Unsuitable; Silt/Clay Content = >50% (CL, CH)

B-1 Log of Test Pits

Project: Port Wentworth Recreation Complex

Date: May 19, 2023

Personnel: W. Marshall / W. Walston

Reference No: 12613101-00

Location: See Figure 1

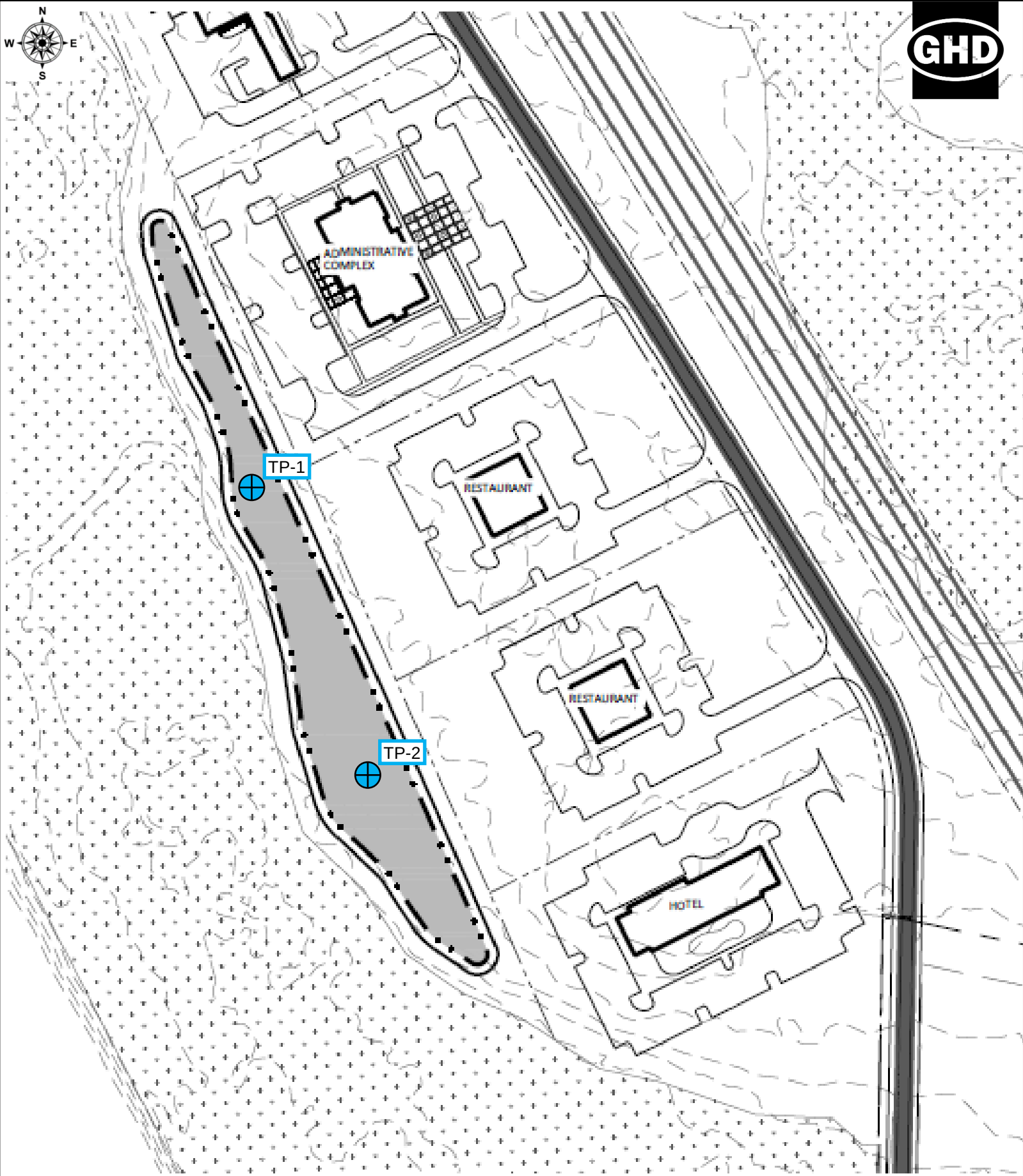
Location	Depth Below Ground Surface	Soil Description	Natural Moisture Content (%)	Percent Finer than #200 Sieve	Suitability
TP-8	0 – 3"	Topsoil / Grass cover			
	3" – 3'	Tan and dark brown silty fine SAND (SM)			
	3' – 6'	Orange and gray very clayey fine SAND (SC)	17.4	32.1	
	6' – 10'	Red and orange clayey fine SAND (SC)	23.8	22.7	
		<Rapid groundwater infiltration encountered at 10'>			
	10' – 14'	Gray and orange very clayey fine SAND (SC)	25.8	41.1	
Test pit terminated at 14'					

Suitability Key:

	All-Purpose Fill; Silt/Clay Content = 0 to 20% (SP, SP-SM, SP-SC, SM, SC)
	Building Pad Fill/Utility Backfill; Silt/Clay Content = 20 to 30% (SM, SC)
	Marginal Structural Use; Silt/Clay Content = 30 to 50% (SM, SC)
	Typically Unsuitable; Silt/Clay Content = >50% (CL, CH)

Appendix C

Figure



TP-# Designation / approximate location of Test Pits

Figure 1: Exploration Location Plan – Northern Area
Port Wentworth Recreation Complex

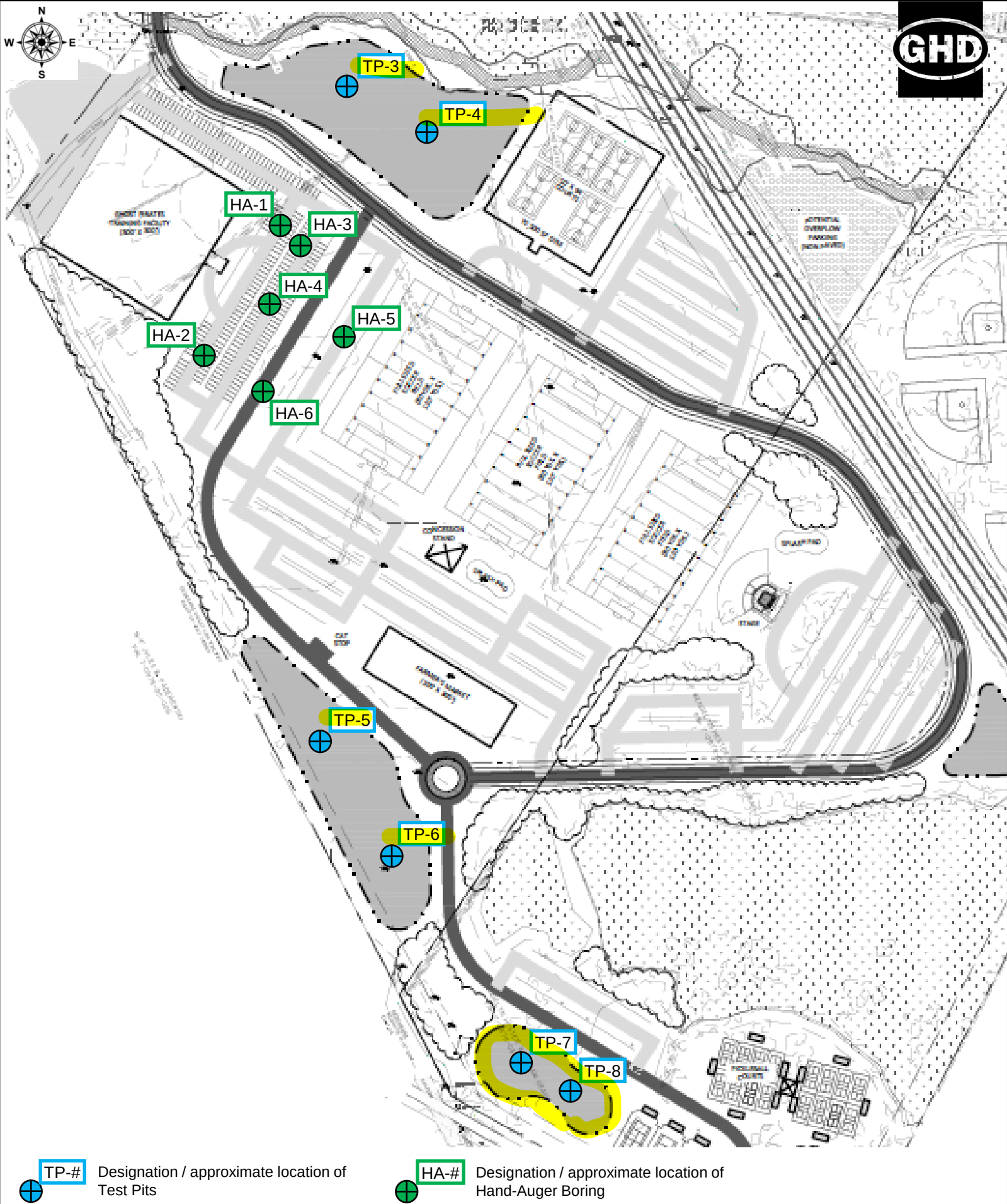


Figure 2: Exploration Location Plan – Southern Area

Port Wentworth Recreation Complex

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SECTION 02 41 13**SELECTIVE SITE DEMOLITION****PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of selective demolition work is indicated on drawings.

1.3 SUBMITTALS

- A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection. Include schedule and location for return of items identified on plans to be delivered to Owner of property.

1.4 JOB CONDITIONS

- A. Condition of Structures: Owner assumes no responsibility for actual condition of items to be demolished.
- B. Partial Demolition and Removal: Items indicated to be removed but of value to Contractor may be removed as work progresses. Transport salvaged items from site as they are removed.

Storage or sale of removed items on site will not be permitted.

- C. Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

Protect from damage existing finish work to remain in place and becomes exposed during demolition operations. Remove protections at completion of work.

1.5 DAMAGES

- A. Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

1.6 TRAFFIC

- A. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

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

1.7 EXPLOSIVES

- A. Use of explosives will not be permitted.

1.8 UTILITY SERVICES

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

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

1.9 ENVIRONMENTAL CONTROLS

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

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

1.10 MEASUREMENT AND PAYMENT

- A. There will be no measurement for selective demolition. Payment will be made at the contract lump sum price. Payment will include equipment, labor, materials, protection, clean-up, disposal, and all work necessary to complete the selective demolition shown on the construction drawings.

PART 2 – PRODUCTS

None in this section

PART 3 – EXECUTION

3.1 PREPARATION

- A. Prior to commencement of selective demolition work, check areas in which work will be performed. Photograph or video existing conditions of surfaces, equipment, or surrounding properties that could be misconstrued as damage resulting from selective demolition work. File with Owner's representative prior to starting work.
- B. Cover and protect equipment and fixtures to remain from soiling or damage when demolition work is performed in areas from which such items have not been removed.

3.2 DEMOLITION

- A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations.

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

Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel and sand, free of trash and debris, stones over 2" diameter, roots or other organic matter.

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

3.3 SALVAGE MATERIALS

- A. All equipment and materials desired by Owner shall be delivered to a designated location, not further than 2 miles from the job site.

Any articles of historic significance will remain the property of the Owner. Notify Owner's representative if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish and other materials resulting from demolition operations from site. Transport and legally dispose of materials off site.

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

Burning of removed materials is not permitted on project site.

3.5 CLEAN-UP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave site clean.

Repair demolition performed in excess of required work. Return structures and surfaces to remain to the condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

Fill in all voids created by selective demolition and grade site to drain. Grass all disturbed areas for erosion control.

END OF SECTION

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SECTION 03 00 00**CONCRETE****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Concrete sidewalks, curbs, gutters, parking areas, and roads.

1.2 RELATED SECTIONS

- A. Section 31 00 00 – Earthwork.
- B. Section 32 11 23 – Aggregate Base Courses.
- C. Section 32 12 16GA – Asphaltic Surface Paving.

1.3 MEASUREMENT AND PAYMENT

- A. Concrete pavement and sidewalk, regardless of thickness, will be measured by the square yard of finished surface complete in place and accepted. Payment for concrete pavement and sidewalk sections shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.
- B. Curb and Gutter – Payment for concrete curb and gutter sections shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Measurement will be along the centerline of completed and accepted curb and gutter.
- C. Payment shall constitute full compensation for furnishing all materials, plant, equipment, tools, forms, inserts, and for all labor and incidentals necessary to complete the work required by these specifications. No payment will be made for any material wasted, used for convenience of the Contractor, unused or rejected.

1.4 REFERENCES (LATEST REVISION)

- A. ACI 211.1 – Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- B. ACI 211.2 – Selecting Proportions for Structural Lightweight Concrete.
- C. ACI 301 – Specifications for Structural Concrete.
- D. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
- E. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.
- F. ACI 305R – Hot Weather Concreting.

- G. ACI 306R – Cold Weather Concreting.
- H. ACI 308R – Guide to Curing Concrete.
- I. ACI 318 – Building Code Requirements for Structural Concrete.
- J. ACI 347 – Guide to Formwork for Concrete.
- K. ASTM A185 – Steel Welded Wire Reinforcement, Plain, for Concrete.
- L. ASTM A615 – Deformed and Plain Carbon – Steel Bars for Concrete Reinforcement.
- M. ASTM A 775/A 775M – Epoxy Coated Steel Reinforcing Bars.
- N. ASTM B 221 – Aluminum and Aluminum–Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- O. ASTM C 33 – Concrete Aggregates.
- P. ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens.
- Q. ASTM C 42 – Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- R. ASTM C 94 – Ready–Mixed Concrete.
- S. ASTM C 150 – Portland Cement.
- T. ASTM C 172 – Practice for Sampling Freshly Mixed Concrete.
- U. ASTM C 231 – Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- V. ASTM C 260 – Air–Entraining Admixtures for Concrete.
- W. ASTM C 309 – Liquid Membrane–Forming Compounds for Curing Concrete.
- X. ASTM C 330 – Light Weight Aggregates for Structural Concrete.
- Y. ASTM C 494 – Chemical Admixtures for Concrete.
- Z. ASTM C 618 – Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- AA. ASTM C 920 – Elastomeric Joint Sealants.
- BB. ASTM C 1116 – Fiber – Reinforced Concrete.
- CC. ASTM D 994 – Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- DD. ASTM D 1751 – Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non–extruding and Resilient Bituminous Types).

- EE. ASTM D 2103 – Polyethylene Film and Sheeting.
- FF. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- GG. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.5 SUBMITTALS FOR REVIEW

- A. Section 01 33 00 – Procedures for Submittals.
- B. Product Data: Provide data on joint filler, admixtures, and curing compounds.
- C. Concrete Design Mix.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301, ACI 318, and ACI 330R.
- B. Obtain cementitious materials from same source throughout.
- C. Conform to ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.
- D. Contractor to measure for accessible route with a 24" digital smart-level will be used to measure points along the accessible route. Line of measurement shall be parallel to the long edge of ramp or accessible route, whether straight or curved. Longitudinal measurement lines shall be spaced 3 feet apart, but in no case, shall fewer than two lines be used. The horizontal measurement cross-slope will be measured every 6 feet. Engineer may request additional measurements if further investigation is necessary. The 24" Smart-level slope readings greater than specified tolerance within contract documents will be identified as non-compliant and not accepted.
- E. Engineer reserves the right to mark and reject portions of concrete not within tolerance as specified.
- F. Accessible Route Tolerance by measuring Floor Flatness and Levelness. Traffic floors All Accessible Routes shall conform to the following surface profile tolerances:
 - a. Floor Designation: All floor areas not specified to be part of the "defined traffic floor" Accessible Routes shall be part of a "random traffic floor" Non-accessible Route. Any floor slab comprising part of the traffic floor shall be designated a "traffic slab" Accessible Route.
 - b. Flatness and Levelness Tolerances: A traffic floor shall conform to the following surface profile tolerances:

Floor Flatness Number: F_F
 Specified Overall Value = 38
 Minimum Local Value = 25

Floor Levelness Number: F_L
 Specified Overall Value = 25
 Minimum Local Value = 17

- c. Floor Tolerance Measurements: F_F and F_L tolerances shall be tested in accordance with ASTM E 1155. Actual overall F-numbers shall be calculated using the inferior / superior area method.
 - d. Timeliness of Floor Profile Tests & Reports: All floor tolerance measurements shall be made within 48 hours after slab installation. In all cases, tolerance measurements shall precede the removal of shores and forms. Results of all floor profile tests (including a running tabulation of overall F_F and F_L values for all traffic slabs installed to date) shall be provided to the Contractor within 72 hours after each slab installation.
 - e. Remedy for Out-of-Tolerance Work: For purposes of flatness and levelness control, minimum floor section boundaries shall coincide with the control joints. Profile test compliance requirements apply to the time period specified above only. Contractor shall remedy any floor section measuring below either the minimum local F_F , or F_L number. Any floor section measuring at or above both the minimum local F_F and F_L number shall be accepted. If actual overall F_F or F_L number for entire random-traffic floor installation measures less than its specified value, then Contractor shall undertake remedial measures acceptable to the Engineer.
- G. Defined random traffic floors Non-accessible Routes shall conform to the following surface profile tolerances:
- a. Floor Designation: All floor areas specified as "defined random traffic floor" include only the Non-accessible route.
 - b. Flatness and Levelness Tolerances: The defined traffic floor shall conform to the following surface profile tolerances: $F_{min} = 25$
 - c. Floor Tolerance Measurements: F_{min} tolerances shall be tested in accordance with ASTM E 1486.
 - d. Timeliness of Floor Profile Tests & Reports: All floor tolerance measurements shall be made by the Contractor within 24 hours after slab installation and before saw cutting of control joints. In all cases, tolerance measurements shall precede the removal of shores and forms. Results of all floor profile tests including a running tabulation of overall F_{min} values for all of defined-traffic slabs installed to date shall be provided to the Contractor within 48 hours after each slab installation.
- H. Remedy for Out-of-Tolerance Work: For purposes of flatness and levelness control, minimum floor section boundaries shall coincide with the construction joints. Profile test compliance requirements apply to time period specified above only. Contractor shall remedy any floor section measuring below the F_{min} number, in accordance with recommendations of the Engineer. Any floor section measuring at or above the F_{min} number shall be accepted. If actual overall F_{min} number entire

defined-traffic floor installation measures less than its specified value, then Contractor shall undertake remedial measures acceptable to the Engineer.

If a portion of a floor does not meet specified F-number, the following remedies are recommended:

- a. Local value is out of spec – grind or replace floor.
- b. Overall value is out of spec – Contractor shall pay the Owner per square foot for portion of floor not meeting F-number spec. This can be obtained by specifying a figure in project specifications in conjunction with square footage obtained from reading taken in the field.

1.7 REGULATORY REQUIREMENTS

- A. Conform to City of Port Wentworth, Chatham County and the Georgia Department of Transportation, State of Georgia standards for paving work on public property.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

1.9 GUARANTEE

- A. Contractor shall guarantee the quality of materials and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

1.10 TESTING

- A. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- B. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.
- C. Testing shall be the Contractor's responsibility and shall be performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph A above.
- D. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

- A. Wood or steel form material profiled to suit conditions.
- B. Joint Filler: ASTM D1751 type; 1/2 inch thick.

2.2 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615, Grade 60 billet steel deformed bars; uncoated finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A 185; uncoated finish.
- C. Fiber reinforcement: Shall conform to ASTM C 1116 as manufactured by Fibermesh Company or equivalent. Concrete mix design shall utilize between 0.5% and 1.0% fiber content.

2.3 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type I – Normal.
- B. Fine and Coarse Mix Aggregates: ASTM C 33. Coarse aggregate shall consist of granite stone.
- C. Water: Potable, not detrimental to concrete.
- D. Air Entrainment: ASTM C 260.
- E. Chemical Admixture: ASTM C 494, Type A – Water Reducing.

2.4 ACCESSORIES

- A. Curing Compound: ASTM C309, clear with fugitive dye.
- B. Sealant: Joints shall be sealed per detail on project drawings, conforming to ASTM C 920, Type S or M, Grade P or NS, Class 25.

2.5 CONCRETE MIX – BY PERFORMANCE CRITERIA

- A. Provide concrete to the following criteria:
 - 1. Flexible Strength: 700 psi.
 - 2. Compressive Strength: 3,000 psi @ 28 days.
 - 3. Slump: 4 to 5 inches.
 - 4. Or, as shown on plan details.
- B. Use accelerating admixtures in cold weather only when acceptable to Engineer. Use of admixtures will not relax cold weather placement requirements.
- C. Use calcium chloride only when accepted by Engineer.
- D. Use set retarding admixtures during hot weather only when accepted by Engineer.

2.6 SOURCE QUALITY CONTROL AND TESTS

- A. All sampling and testing services shall be performed, at Contractor's expense, by a testing agency operating in accordance to ASTM D 3740 and E 329 latest edition and acceptable to the Engineer.
- B. Contractor shall submit to the Engineer a design mix on each class of concrete proposed for use. The mix shall be prepared by an acceptable testing laboratory. Compressive strength of at least four specimens of the design mix shall indicate 15% higher than 28 days strengths specified. During the work, Contractor shall make three test cylinders for each 50 cubic yards, or fraction thereof, of concrete placed each day. One cylinder shall be tested at 7 days and the other two at 28 days in accordance with ASTM C 39. Copies of all test reports shall be furnished to the Engineer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify subgrade conditions under provisions of Section 31 00 00 – Earthwork.
- B. Verify compacted subgrade is acceptable and ready to support concrete and imposed loads.
- C. Verify slopes and elevations of subgrade are correct.

3.2 CONSTRUCTION OBSERVATION

- A. Engineer or Project Representative will have the right to require any portion of work be completed in their presence and if work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if Contractor notifies the Engineer such work is scheduled, and Engineer fails to appear within 48 hours, Contractor may proceed. All work completed, and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

3.3 SUBGRADE

- A. Prepare subgrade in accordance with Section 31 00 00 – Earthwork.

3.4 PREPARATION FOR PLACING

- A. Water shall be removed from excavations before concrete is deposited. Hardened concrete debris and other foreign materials shall be removed from the interior of forms and inside of mixing and conveying equipment. The reinforcement shall be made secure in position and shall be subject to examination and acceptance.
- B. Moisten subgrade to minimize absorption of water from fresh concrete.

- C. Coat surfaces of manhole, inlet, and catch basin frames with oil to prevent bond with concrete pavement.
- D. Notify Engineer minimum 48 hours prior to commencement of concreting operations.

3.5 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler in position, in straight lines. Secure to formwork during concrete placement.
- D. Forms shall be constructed to the shape, line, and grade required and shall be maintained sufficiently rigid to prevent deformation under load. Form work and details of construction joints shall conform to ACI-318, Chapter 6.

3.6 REINFORCEMENT

- A. Place reinforcement as indicated.
- B. Interrupt reinforcement at expansion joints.

3.7 PLACING CONCRETE

- A. Placing of concrete shall conform to Chapter 5 of the American Concrete Institute Standard A.C.I. 318. Concrete having attained initial set or having contained water for more than 45 minutes shall not be used in the work. Concrete shall not be dropped freely more than 5 feet. Concrete shall be mixed and placed only when the temperature is at least 40 degrees F and rising. Concrete shall be placed only upon surfaces free from frost, ice, mud and other detrimental substances or conditions. When placed on dry soil or pervious material, water proof paper or polyethylene sheeting shall be laid over surfaces to receive the concrete.
- B. Ensure reinforcement, inserts, embedded parts, formed joints and forms are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of panel and between predetermined construction joints. Do not break or interrupt successive pours so cold joints will not occur.
- D. Place concrete to elevations indicated on the contract drawings.

3.8 JOINTS

- A. Place expansion joints at 50-foot intervals and radius points.
- B. Place contraction joints at 10-foot intervals. Align curb, gutter, and sidewalk joints.

- C. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1/8 inch.
- D. Saw cut contraction joints 3/16-inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.9 FINISHING

- A. Area Paving: Light broom.
- B. Sidewalk Paving: Light broom, radius to 1/4 inch radius, and trowel joint edges.
- C. Curbs and Gutters: Light broom parallel to gutter.
- D. Inclined Vehicular Ramps: Broomed perpendicular to slope.
- E. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.
- F. Accessible Routes: Surfaces shall be stable, firm, and slip resistant. Slab Finish Tolerances – Unless otherwise called out in the contract documents, finishes shall be true planes within 3/16 inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction. Maximum variation in elevation for a level slab shall not exceed quarter of an inch (1/4") over the entire slab or accessible route tolerances.
- G. ADA compliant detectable warning devices shall be installed by the contractor in accordance with manufacturer recommendations and Contractor shall ensure complete compliance with ADA standards, codes, and guidance.

3.10 JOINT SEALING

- A. Separate pavement from vertical surfaces with 1/2-inch thick joint filler.
- B. Place joint filler in pavement pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- C. Extend joint filler from bottom of pavement to within 1/8 inch of finished surface.

3.11 TOLERANCES

- A. Section 01 45 00 – Quality Control: Tolerances.
- B. General Site Concrete:
 - 1. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.
 - 2. Maximum Variation from True Position: 1/4 inch.
- C. Accessible Routes: Variation from design elevation shall not exceed 1/4 inch; however, accessible routes shall not exceed maximum ADA allowable slopes.

Contractor shall remove and replace any and all portions of the accessible route exceeding maximum ADA allowable slopes.

3.12 CURB AND GUTTER SECTIONS

- A. Shall be constructed as shown on the drawings and in accordance with applicable details. Subgrade below the curb and gutter sections shall be compacted to 98% density. Curb and gutter sections shall be constructed in sections of uniform length and shall not exceed 10 feet or be less than 5 feet in length. Straight edging along the edge of gutter and top of curb shall conform to those requirements for adjacent pavement but with no irregularities to exceed 1/4 inch in 10 feet.
- B. If slip-form or extruded construction is used, contraction joints shall be located at intervals no greater than 10 feet by sawing hardened concrete at the proper time. Joints shall be sawed between 4 to 8 hours after placing of concrete. Depth of saw-cut shall be one-fourth thickness of the curb and gutter section. The maximum width of cut shall be 1/4 inch. All joints shall be sawed in succession.
- C. Half inch thick premolded expansion joints shall be installed completely through the joints at spaces not to exceed 50 feet and at all structures and walks.
- D. When curb forms are removed, backfill shall be immediately placed, tamped, and graded behind the new curb to help protect line and grade. Machine methods of placing and forming may be used provided finished product is satisfactory to the Engineer.
- E. Contractor shall place a concrete depressed curb at all driveways shown on the drawings or where a driveway is in use.
- F. Cracked curb and gutter will not be accepted.

3.13 CONCRETE CURING

- A. Immediately after placement and finishing, concrete shall be protected from moisture loss for not less than 7 days. For surfaces not in contact with forms, curing compound shall be uniformly applied after water sheen disappears from the concrete. Formed surfaces shall receive an application of curing compound if forms are removed during the 7-day curing period. Curing compound shall not be applied during rainfall.
- B. Curing compound shall be applied under pressure at the rate of 1 gallon per 150 square feet by mechanical sprayers. The spraying equipment shall be of the fully atomizing type. At time of use, curing compound shall be thoroughly mixed with a fugitive dye uniformly dispersed throughout the sprayer. Care shall be taken to prevent application to joints where concrete bond is required, to reinforcement steel and to joints where joint sealer is to be placed. The compound shall form a uniform continuous coherent film which will not crack or peel and shall be free from pinholes and other imperfections. Concrete surfaces subjected to heavy rainfall within 3 hours after curing compound has been applied shall be resprayed by above method and at above coverage at no additional expense to the Owner.

- C. No pedestrian or vehicular traffic shall be allowed over the surface for seven days unless surface is protected by planks, plywood, or sand. Protection shall not be placed until at least 12 hours after application of the curing compound.
- D. Protect concrete by suitable methods to prevent damage by mechanical injury or excessively hot or cold temperatures.

3.14 FIELD QUALITY CONTROL

- A. Field quality control tests specified herein will be conducted by the Owner's Independent Testing Laboratory at no cost to Contractor in accordance with Section 01 45 23. Contractor shall perform additional testing as considered necessary by the Contractor for assurance of quality control. Retesting required as a result of failed initial tests shall be at the Contractor's expense.
- B. Field testing, frequency, and methods may vary as determined by and between the Owner and Owner's Testing Laboratory.
- C. Review the Contractor's proposal materials and mix design for conformance with specifications.
- D. Perform testing in accordance with ACI 301 and testing standards listed herein.
- E. Strength Tests
 - 1. Secure composite samples in accordance with ASTM C 172. Sample at regularly spaced intervals from middle portion of the batch. Sampling time shall not exceed 15 minutes.
 - 2. Mold and cure specimens in accordance with ASTM C31.
 - a. A minimum of four concrete test cylinders shall be taken for every 50 cubic yards or less of each class of concrete placed each day and not less than once for each 5,000 square feet of paved area.
 - b. During initial 24 hours (plus or minus 8 hours) after molding, the temperature immediately adjacent to specimens shall be maintained in a range of 60 to 80 degrees F. Control loss of moisture from specimens by shielding from direct rays of the sun and from radiant heating devices.
 - c. Specimens transported prior to 48 hours after molding shall not be demolded but shall continue initial curing at 60 – 80 degrees F until time for testing.
 - d. Specimens transported after 48 hours age shall be demolded in 24 hours (plus or minus 8 hours). Curing shall then be continued but in saturated limewater at 73.4 degrees (plus or minus 3 degrees F) until the time of testing.
 - e. Wet cure cylinders under controlled temperature until testing.

3. Test cylinders in accordance with ASTM C 39.
 - a. Date test cylinders and number consecutively. Give each cylinder of each set an identifying letter (i.e. A, B, C, and D). Prepare a sketch of the building plan for each test set identifying location of placed concrete.
 - b. Test on cylinder (A) at 7 days for information. If compressive strength of concrete sample is equal to or above the 28-day specified strength, test another cylinder (B) at 7 days. The average of breaks shall constitute compressive strength of concrete sample.
 - c. Test two cylinders (B and C) at 28 days and the average of breaks shall constitute compressive strength of concrete sample.
 - d. Retain fourth cylinder (D) for further testing if needed, but do not retain cylinder more than 60 days.
4. Evaluation and Acceptance
 - a. Strength level of concrete will be considered satisfactory if the average of all sets of three consecutive strength tests equal or exceed specified strength and no individual strength test (average of two cylinders) results are below specified compressive strength test by more than 500 psi.
 - b. Completed concrete work will not be accepted unless requirements of ACI 301, have been met, including dimensional tolerances, appearance, and strength of structure.

3.15 PROTECTION

- A. Immediately after placement, protect pavement from premature moisture loss, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit vehicular traffic over pavement or curb for seven days minimum after finishing. Do not permit pedestrian traffic over concrete for three days.

END OF SECTION

INDEX TO
SECTION 10 14 53 – TRAFFIC SIGNAGE

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SECTION 10 14 53 – TRAFFIC SIGNAGE

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Signs.
- B. Posts.
- C. Fabricating and installing traffic signs in accordance with details shown on construction plans and the Manual on Uniform Traffic Control Devices.

1.2 REFERENCES (LATEST REVISION)

- A. ASTM A 123 – Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. ASTM A 153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A 193 – Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
- D. ASTM A 307 – Carbon Steel Bolts, Studs, and Threaded Rod, 60,000 PSI Tensile Strength.
- E. ASTM A 615 – Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- F. ASTM B 209 – Aluminum and Aluminum-Alloy Sheet and Plate.
- G. ASTM B 211 – Aluminum and Aluminum-Alloy Rolled or Cold Finish Bar, Rod, and Wire.

1.3 SUBMITTALS

- A. A sample of all signs and posts to be placed shall be submitted to the Engineer for review prior to ordering.

1.4 QUALITY ASSURANCE

- A. Material and equipment shall be the standard product of a manufacturer who has manufactured them for a minimum of 2 years and provides published data on quality and performance.

1.5 GUARANTEE

- A. Contractor shall guarantee the quality of materials and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

1.6 MEASUREMENT AND PAYMENT

- A. Payment for signs will include all necessary equipment, labor, materials, and all other incidentals to fabricate and install the sign. Payment for signs shall be included in the contract lump sum price. Any changes in quantities and costs necessitated

through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.

PART 2 – PRODUCTS

2.1 UNIFORMITY

- A. All signs shall be uniform in shape, color, dimensions, legends, and illumination or reflectorization.

2.2 MATERIALS AND WORKMANSHIP

- A. Signs: Shall be aluminum 0.08 inch minimum thickness and shall conform to ASTM B 209, Alloy 6061-T6 or 5053-H38. Finished sign shall be clear cut, the lines of all letters and details true, regular and free from waviness, unevenness, furry edges, or lines and shall be free from all scaling, cracking, blistering, pitting, dents, or blemishes of any kind.
- B. Sign Posts: Shall be galvanized steel flanged "U" channel section with a minimum (before punching or drilling) of two (2) pounds per foot and shall conform to the minimum yield point and tensile strength specified in ASTM A 615 Grade 60. Galvanizing shall be in accordance with ASTM A 123. Length as specified on the plans. Holes may be punched or drilled 3/8 inch in diameter and spaced one (1) inch center to center beginning one (1) inch from the top and extending the full length of post.
- C. Hardware: Bolts shall be 5/16 inch diameter with hexagonal heads and of sufficient length to extend at least 1/4 inch beyond the nut when installed. Nuts shall be hex nuts of the self-locking plastic insert type. The thread fit for nuts shall be ANSI, Class 2B. The washers shall be flat and 25/64 inch ID by 3/4 inch OD by 0.091 inch thick. These washers are to be placed between head of bolt and sign face. Bolts, nuts, washers and spacers may be aluminum, stainless steel or galvanized steel. Galvanized steel bolts and washers shall conform to ASTM A 307, galvanized in accordance with ASTM A 153. Aluminum shall conform to ASTM B 211, Alloy 2024-T4 for bolts, Alloy 2017-T4 for nuts, and ASTM B 209, Alloy 2024-T4 for washers. Stainless steel shall conform to ASTM A 193, Type B8.

2.3 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered.

PART 3 – EXECUTION

3.1 GENERAL

- A. Sign posts and their foundations and sign mountings shall be constructed to hold signs in a proper and permanent position, to resist swaying in the wind or displacement by vandalism.

3.2 LOCATION

- A. Signs are to be placed as shown on the plans. Signs shall conform to height and lateral locations as shown in the Manual on Uniform Traffic Control Devices.

3.3 ERECTION

- A. Drive type posts may either be driven in place or placed in prepared holes. Driven posts will be limited to locations where the surrounding soil is firm and stable. When sandy or unstable soils are present, each drive post shall be placed in a prepared dry hole minimum six (6) inches in diameter. Whenever posts are placed in prepared holes, the holes shall be backfilled with a mixture of Portland Cement and sand. The resultant mixture shall be mixed with water to a moist consistency and placed around posts. All posts shall be erected in a vertical and plumb position to a depth of three (3) feet and at an angle to the roadway as shown on plans or directed by Engineer.

END OF SECTION

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SECTION 31 00 00 – EARTHWORK

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SECTION 31 00 00**EARTHWORK****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Grading
- B. Excavation
- C. Backfilling
- D. Compaction
- E. Remove and Replace Topsoil
- F. Dressing of Shoulders and Banks
- G. Stone Drainage Filter
- H. Water Control
- I. Testing

1.2 RELATED SECTIONS

- A. Section 01 45 00 – Quality Control
- B. Section 01 45 23 – Testing and Inspecting Services
- C. Section 02 30 00 – Subsurface Investigation
- D. Section 31 10 00 – Site Clearing

1.3 MEASUREMENT AND PAYMENT

- A. Grading to subgrades, construction of ditches, dressing of disturbed areas, removing and replacing topsoil, excavating, backfilling and compacting to required elevations, testing, staking, and construction supervision shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity and will include the cost of all equipment, labor, materials, and all other incidentals.
- B. Unsuitable Material – Payment for unsuitable material shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include excavation and disposal of unsuitable material.

- C. Borrow – Payment for borrow material shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity for each cubic yard in place and will include the cost of all equipment, labor, materials, and all other incidentals. Payment will include furnishing materials required in excess of suitable materials available on site.
- D. Earthwork – All earthwork associated with the installation of bulkheads, headwalls, wingwalls, weir structures, drainage filters, rip-rap, etc. shall not be measured for direct payment. Payment for the earthwork shall be included in the item to which it pertains.
- E. Dewatering – No direct payment shall be made for dewatering. Dewatering shall be included in the item to which it pertains.
- F. Proof Rolling – Payment for proof rolling shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include furnishing a loaded truck, truck driver, fuel and rolling the designated areas.

1.4 REFERENCES (LATEST REVISION)

- A. ASTM D 448 – Sizes of Aggregate for Road and Bridge Construction.
- B. ASTM D 1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
- C. ASTM D 2487 – Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- D. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- E. ASTM D 6938 – In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- F. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.5 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Procedures for submittals.
- B. Materials Source: Submit gradation analysis, proctor results, and soil classification for all borrow material.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with Federal, State of Georgia, County of Chatham and City of Port Wentworth standards.

1.7 TESTING

- A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).
- B. In place density tests in accordance with ASTM D 6938.
- C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- D. The testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any of the tests.
- E. Testing shall be Contractor's responsibility and performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.
- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Borrow shall consist of sand or sand-clay soils capable of being readily shaped and compacted to the required densities, and shall be reasonably free of roots, trash, rock larger than 2 inches, and other deleterious material.
- B. All soils used for structural fills shall have a PI (plastic index) of less than 10, and a LL (liquid limit) of less than 30. Fill soils shall be dried or wetted to appropriate moisture contents prior to compaction. Additionally, fill soils used for the top 2 feet of fill beneath roads and parking lots shall have no more than 15% passing the # 200 sieve. Fill soils used for house lots shall have no more than 25% passing the # 200 sieve.
- C. Contractor shall furnish all borrow material.
- D. Contractor shall be responsible for and bear all expenses in developing borrow sources including securing necessary permits, drying the material, haul roads, clearing, grubbing, excavating the pits, placing, compaction and restoration of pits and haul roads to a condition satisfactory to property owners and in compliance with applicable federal, state, and local laws and regulations.

2.2 SOURCE QUALITY CONTROL

- A. If tests indicate materials do not meet specified requirements, change material and retest.
- B. Provide materials of each type from same source throughout the Work.

PART 3 – EXECUTION

3.1 TOPSOIL

- A. Contractor shall strip topsoil and stockpile on site at a location determined by the Owner at the Contractor's expense.
- B. Topsoil shall be placed to a depth of 4 inches over all disturbed or proposed landscaped areas.
- C. Topsoil shall be provided at Contractor's expense if it is not available from site.
- D. Any remaining topsoil determined by the Owner or Engineer to be useful will be stored on site at a location determined by the Owner at the Contractor's expense.
- D. Do not excavate wet topsoil.

3.2 EXCAVATION

- A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials or obstructions encountered.
- B. Suitable excavation material shall be transported to and placed in fill areas within limits of the work.
- C. Unsuitable material encountered in areas to be paved and under building pads, shall be excavated 2 feet below final grade and replaced with suitable material from site or borrow excavations. Contractor shall notify Engineer if more than 2 feet of excavation is needed to replace unsuitable material.
- D. Unsuitable and surplus excavation material not required for fill shall be disposed of off site.
- E. Proper drainage, including sediment and erosion control, shall be maintained at all times. Methods shall be in accordance with the National Pollutant Discharge Elimination System standards and other local, state, and federal regulations.
- F. Unsuitable materials as stated herein are defined as highly plastic clay soils, of the CH and MH designation, border line soils of the SC-CH description, and organic soils of the OL and OH description based on the Unified Soils Classification System. Further, any soils for the top two feet of pavement subbase shall have no more than 15% passing the # 200 sieve.

3.3 GROUND SURFACE PREPARATION FOR FILL

- A. All vegetation, roots, brush, heavy sods, heavy growth of grass, decayed vegetable matter, rubbish, and other unsuitable material within the areas to be filled shall be stripped and removed prior to beginning the fill operation.

- B. Sloped ground surfaces steeper than 1 vertical to 4 horizontal, on which fill is to be placed shall be plowed, stepped, or benched, or broken up as directed, in such a manner where fill material will bond with the existing surface.
- C. Surfaces on which fill is to be placed and compacted shall be wetted or dried as may be required to obtain the specified compaction.

3.4 FILL

- A. Shall be placed in successive horizontal layers 8 inches to 12 inches in loose depth for the full width of the cross-section and compacted as required.

3.5 FINISHED GRADING

- A. All areas covered by the project including excavated and filled sections and adjacent transition areas shall be smooth graded and free from irregular surface changes.
- B. Degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations, supplemented with hand raking and finishing, except as otherwise specified.
- C. Unpaved areas to within 0.1 feet of elevations shown on the drawings provided such deviation does not create low spots that do not drain.
- D. Paved Areas – Subgrade to within 0.05 feet of the drawing elevations less the compacted thickness of the base and paving.
- E. Building Pads – Subgrade to within 0.05 feet of the drawing elevations less the thickness of the concrete slab.
- F. Ditches and lagoon banks shall be finished graded, dressed, and seeded within 14 calendar days of work to reduce erosion and permit adequate drainage.

3.6 DISPOSAL OF WASTE MATERIAL

- A. All vegetation, roots, brush, sod, broken pavements, curb and gutter, rubbish, and other unsuitable or surplus material stripped or removed from limits of construction shall be disposed of by the Contractor.

3.7 PROTECTION

- A. Graded areas shall be protected from traffic, erosion, settlement, or any washing away occurring from any cause prior to acceptance.
- B. Contractor shall be responsible for protection of below grade utilities shown on the drawings or indicated by the Owner at all times during earthwork operations.
- C. Repair or re-establishment of graded areas prior to final acceptance shall be at the Contractors expense.

- D. Site drainage shall be provided and maintained by Contractor during construction until final acceptance of the project. Drainage may be by supplemental ditching, or pumping if necessary, prior to completion of permanent site drainage.

3.8 DRAINAGE

- A. Contractor shall be responsible for providing surface drainage away from all construction areas. This shall include maintenance of any existing ditches or those constructed in the immediate vicinity of the work. Contractor shall provide proper and effective measures to prevent siltation of wetlands, streams, and ditches on both the Owner's property, and those properties downstream.

3.9 FIELD QUALITY CONTROL

- A. Compaction testing shall be performed in accordance with ASTM D 6938. Where tests indicate the backfill does not meet specified requirements, the backfill shall be reworked or removed and replaced, and then retested at the Contractor's expense.
- B. Unpaved areas – at least 90% of maximum laboratory density within 2% optimum moisture content unless otherwise approved by the Engineer.
- C. Paved Areas and Under Structures – top 6 inch layer of subbase to at least 98% of maximum laboratory density within 2% optimum moisture content. Layers below top 6 inches shall be compacted to 95% of maximum laboratory density within 2% optimum moisture content.
- D. Rolling and compaction equipment and methods shall be subject to acceptance by the Engineer. Acceptance in no way relieves Contractor of the responsibility to perform in correct and timely means.
- E. Number of Tests – Under paved areas, no less than one density test per horizontal layer per 5,000 square feet of subbase shall be made. In unpaved areas, no less than one density test per horizontal layer per 10,000 square feet of fill area shall be made. Under curb and gutter, no less than one density test per every 300 linear feet. On building pads, no less than one density test per horizontal layer per 1,500 square feet of fill area shall be made.

3.10 PROOF ROLLING

- A. Shall be required on the subbase of all curb and gutter and paved areas and on the base of all paved areas where designated by the Engineer. Proof rolling shall take place after all underground utilities are installed and backfilled. The operation shall consist of rolling the subbase or base with a fully loaded 10-wheeled dump truck. A full load shall consist of 10 to 12 cubic yards of soil or rock. The dump truck shall be capable of traveling at a speed of two to five miles per hour and be in sound mechanical shape with no exhaust leaks or smoking from burning oil. The Engineer shall determine number of passes and areas rolled.

END OF SECTION

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SECTION 31 10 00**SITE CLEARING****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Removal of surface debris.
- B. Removal of trees, shrubs, and other plant life.
- C. Topsoil excavation.

1.2 RELATED SECTIONS

- A. Section 31 00 00 – Earthwork.

1.3 MEASUREMENT AND PAYMENT

- A. Site Clearing: Clearing, grubbing and other items to be removed will be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity and will include the cost of all equipment, labor, materials, and all other incidentals.
- B. Includes clearing site, removing stumps, loading and removing waste materials from site.

1.4 REGULATORY REQUIREMENTS

- A. Conform to Federal, State and local codes for environmental requirements, disposal of debris, and burning of debris.
- B. Coordinate clearing Work with utility companies.

PART 2 – PRODUCTS**2.1 MATERIALS**

- A. Provide tree protection materials as detailed on the construction drawings.

PART 3 – EXECUTION**3.1 PREPARATION**

- A. Verify existing plant life designated to remain is tagged or identified.
- B. Identify a waste area for placing removed materials.

3.2 PROTECTION

- A. All trees on site will be saved except those marked specifically by the Owner's representative for removal during construction. No trees, including those marked for removal on site or any other tree, may be removed prior to the preconstruction conference. All trees not to be removed will be protected from injury to their roots and to their top to a distance three feet beyond the drip-line and no grading, trenching, pruning, or storage of materials may go in this area except as provided by an Owner's representative stakeout. Contractor will pay a penalty for any tree removed from the site that has not been marked specifically for removal. Contractor also will pay for any tree that dies due to damage during construction. This applies to all trees on site whether or not they are shown on the plans.
- B. Contractor shall not be held accountable for damages to trees resulting from placement of fill or removal of soils where such action is required by the contract documents. Any tree, the trunk of which is within 10 feet of any footing or trench, shall be exempt from these penalties except Contractor shall exercise all reasonable precautions to preserve even these trees. Contractor agrees to pay fines as established below in the event he or any of his subcontractors causes loss or removal of trees designated to be saved under provisions of this contract.

The fines are as follows:

<u>Caliper</u>	<u>Fine</u>
1" – 2"	\$ 150.00
2" – 3"	200.00
3" – 4"	250.00
4" – 5"	400.00
5" – 6"	500.00
6" – 7"	600.00
7" – 8"	750.00
8" – 11"	1,500.00
12" – 20"	2,000.00
21" & larger	\$ 2,500.00

- C. Trees shall be graded by Owner's representative as to variety, condition, and site importance, with above figures acting as a maximum fine. Lowest assessment amount shall be no less than one-half of the above fine figures.
- D. Protect benchmarks, survey control points, and existing structures from damage or displacement.
- E. Protect all remaining utilities.
- F. Clearing operations shall be conducted to prevent damage by falling trees to trees left standing, to existing structures and installations, and to those under construction, and to provide for the safety of employees and others.

3.3 CLEARING

- A. Clear areas required for access to site and execution of work. Clearing shall consist of felling and cutting trees into sections, and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within area to be cleared. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be burned or removed completely from the site, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within cleared areas shall be trimmed of dead branches 1-1/2 inch or more in diameter. Limbs and branches to be trimmed shall be neatly cut close to the trunk of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an accepted treewound paint. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations, by the erection of timber barriers or by such other means as circumstances require. Such barriers must be placed and be checked by the OWNER before construction observations can proceed (See 3.2). Clearing shall also include removal and disposal of structures obtruding, encroaching upon, or otherwise obstructing the work.

3.4 REMOVAL

- A. Where indicated or directed, trees and stumps shall be removed from areas outside those areas designated for clearing and grubbing. Work shall include felling of such trees and removal of their stumps and roots. Trees shall be disposed of as hereinafter specified.
- B. Remove debris, rock, and other extracted plant life from site.
- C. Partially remove paving, curbs, and other as shown on plans. Neatly saw cut edges at right angle to surface.

3.5 DISPOSAL

- A. Disposal of trees, branches, snags, brush, stumps, etc., resulting from clearing and grubbing shall be the Contractor's responsibility and shall be disposed of by burning, removal from site, or a combination of both. All costs in connection with disposing of materials will be at the Contractor's expense. Material disposed of by burning shall be burned in a manner avoiding all hazards, such as damage to existing structures, construction in progress, trees, and vegetation. Contractor shall be responsible for compliance with all local and State laws and regulations relative to the building of fires. Disposal by burning shall be kept under constant attendance until fires have burned out or extinguished. All liability of any nature resulting from disposal of cleared and grubbed material shall become the Contractor's responsibility. Disposal of all materials cleared and grubbed will be in accordance with rules and regulations of the State of Georgia. No material will be burned unless directed to do so by the OWNER. Contractor shall obtain a permit to burn on site from local fire department, before beginning the work.

3.6 GRUBBING

- A. Grubbing shall consist of removal and disposal of stumps, roots larger than one inch in diameter, and matted roots from designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for building of pavement

subgrade or building pads, shall be excavated and removed to a depth of not less than 18 inches below original surface level of the ground in embankment areas and not less than 2 feet below finished earth surface in excavated areas. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform to original adjacent ground.

END OF SECTION

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SECTION 31 25 00GA – EROSION AND SEDIMENTATION CONTROLS (GA)

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SECTION 31 25 00GA**EROSION AND SEDIMENTATION CONTROLS (GA)****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Soil erosion, sediment, and pollution control measures shall include all temporary and permanent means of soil protection, trapping soils and containment of pollutants on the construction site during land disturbing activities. Activities covered in this section are regulated by the Manual for Erosion and Sediment Control in Georgia (latest revision) and Georgia's National Pollutant Discharge Elimination System Permit (NPDES), General Permit No. GAR100001.
- B. Reporting
- C. Sampling

1.2 RELATED SECTIONS

- A. Section 31 00 00 – Earthwork
- B. Section 31 10 00 – Site Clearing
- C. Section 33 10 00 – Water Utilities
- D. Section 33 30 00 – Sanitary Sewerage Utilities
- E. Section 33 40 00 – Storm Drainage Utilities

1.3 PURPOSES

- A. The purpose of this section is to achieve the following goals:
 - 1. Minimize soil exposure by proper timing of clearing grading and construction.
 - 2. Retain existing vegetation whenever feasible.
 - 3. Vegetate and mulch disturbed areas as soon as possible.
 - 4. Divert runoff away from disturbed areas.
 - 5. Minimize length and steepness of slopes when it is practical.
 - 6. Reduce runoff velocities with check dams or surface roughing.
 - 7. Trap sediment on site.
 - 8. Inspect and maintain erosion, sedimentation, and pollution control measures.

9. Report on condition of Best Management Practices (BMPs).
10. Sample site run off per Georgia's NPDES Permit.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of soil erosion, sedimentation and pollution control systems products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards: Comply with all applicable Local, State, and Federal Standards pertaining to soil erosion, sedimentation, and pollution control.
- C. The 24-hour contact for erosion and sedimentation control measures is noted on the construction plans.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instruction for soil erosion, sedimentation and pollution control materials and products.

1.6 MEASUREMENT AND PAYMENT

- A. No unit measurements will be made for soil erosion control. Payment for erosion and sedimentation control shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. The cost of soil erosion control shall include all equipment, labor, maintenance, monitoring, sampling, reporting, and materials necessary to comply with the State of Georgia NPDES Permit.

PART 2 – PRODUCTS

2.1 VEGETATIVE MATERIALS

- A. Mulch
 1. Dry straw or hay.
 2. Wood chips, sawdust or bark.
 3. Cutback asphalt.
- B. Temporary Seeding
 1. Annual Ryegrass
 2. Browntop Millet

- C. Permanent Seeding
 - 1. Common Bermuda
 - 2. Centipede
- D. Sod
 - 1. Common Bermuda
 - 2. Centipede
 - 3. St. Augustine
- E. Fertilizer
 - 1. Commercial 6-12-12

2.2 STRUCTURAL MATERIALS

- A. Check Dam
 - 1. Stone (2" – 10")
 - 2. Bales of densely baled hay or straw wrapped with synthetic or wire bands (two minimum per bale).
- B. Construction Exit
 - 1. Minimum 20' x 50' x 0.5' layer of 1.5" to 3.5" stone with a geotextile underliner.
- C. Filter Ring
 - 1. Minimum 2' high stone ring. Stone shall be no smaller than 3" to 5" when utilized at storm drain inlets and pond outlets with pipe diameters less than 12".
 - 2. Minimum 2' high stone ring. Stone shall be no smaller than 10" to 15" when utilized at storm drain inlets and pond outlets with pipe diameters greater than 12".
- D. Sediment Barrier
 - 1. Bales of densely baled hay or straw wrapped with synthetic or wire bands (two minimum per bale).
 - 2. Silt Fence – Shall be a woven geotextile fabric sheet of plastic yarn composed of a long chain synthetic polymer with at least 85% by weight propylene, ethylene, amide, ester or vinylidene chloride, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultra-violet and/or heat

exposure. The fabric shall be finished so the filaments will retain their relative position with respect to each other. The fabric shall be free of defects, rips, holes, or flaws. The manufacturer shall have either an approved color mark yarn in the fabric or label the fabricated silt fence with both the manufacturer and fabric name every 100'.

The fabric shall meet the following requirements:

Grab Strength	90 lbs.
Mullen Burst Strength	150 lbs.
UV Resistance	80 %

E. Inlet Sediment Trap

1. Silt fence (Type C) supported by steel posts.
2. Baffle Box – Constructed of 2" x 4" boards spaced a maximum of 1" apart or plywood with weep holes 2" in diameter (See detail).
3. Sod Inlet Protection – Four – 1 foot wide strips of sod on each side of the inlet (See detail).
4. Curb Inlet Protection – Eight inch concrete blocks wrapped in filter fabric, placed in front of a curb inlet.

F. Storm Drain Outlet Protection

1. Geotextile fabric equivalent to Mirafi FW700.
2. Rip-rap (See detail for size).

2.3 CHEMICAL MATERIALS

- A. Dust Control – Calcium Chloride, Anionic Asphalt Emulsion, Latex Emulsion, or Resin-in-Water Emulsion.
- B. Anionic Polyacrylamide (PAM) – Consult state and local laws concerning the regulations of this chemical.

PART 3 – EXECUTION

3.1 GENERAL

- A. All disturbed soil areas except those to support paving shall be graded and protected from erosion with vegetative materials. Sedimentation discharge from the construction site into natural drainage ways and storm drainage systems shall be prevented by means of vegetative measures and temporary structural practices. These vegetative measures and structural practices are known as Best Management Practices (BMPs). Rainfall, pollution control measures, and construction exit condition shall be monitored and reported on each day when construction activities take place. Erosion and sedimentation control measures

shall be monitored and reported on every seven days and within 24 hours of a qualifying rainfall event of 0.5 inches or more. Sampling of construction site discharging water shall be sampled within 45 minutes of a qualifying rainfall event and analyzed immediately or no later than 48 hours after collection. The above reports shall be submitted to the Georgia EPD by the fifteenth day of the month following the reporting period.

- B. The Contractor (Operator) is considered a "Primary Permittee" and shall submit a Notice of Intent (NOI) in accordance with General Permit No. GAR100001 at least 14 days prior to the commencement of construction activities. Contractor shall retain a copy of the Erosion, Sedimentation, and Pollution Control Plan and Comprehensive Monitoring Program required by above permit at construction site or be readily available at a designated alternate location from date of project initiation to date of final stabilization. Copies of all Notice of Intent, Notice of Termination, plans, monitoring reports and all other records required by above permit shall be retained by Contractor for a period of at least three years from date the site is finally stabilized. Copies of Notice of Intent (NOI), Notice of Termination (NOT) and General Permit Number GAR100001 are found at the end of this section.

3.2 ON-SITE OBSERVATION

- A. Engineer is required by General Permit No. GAR100001 to check the installation of Erosion, Sedimentation and Pollution Control measures within one week after initial construction activities commence. The Contractor shall notify Engineer within 24 hours of control measures installation for the above site visit. Engineer, within the above parameters, shall check subsequent installation of control measures.

3.3 VEGETATIVE PRACTICES

- A. Mulch
 - 1. Dry straw or hay shall be applied at a depth of 2 to 4 inches by hand or mechanical equipment providing complete soil coverage. Straw or hay shall be anchored immediately after application. Straw or hay can be anchored with a disk harrow, packer disk or emulsified asphalt.
 - 2. Wood chips, sawdust, or bark shall be applied at a depth of 2 to 3 inches by hand or mechanical equipment providing complete soil coverage. Netting of the appropriate size shall be used to anchor the above materials.
 - 3. Cutback asphalt shall be applied at 1,200 gallons per acre or 1/4 gallon per square yard.
- B. Seeding
 - 1. Seed shall be applied uniformly by hand, cyclone seeder, drill, cultipacker seeder, or hydraulic seeder. Drill or cultipacker seeders shall place seed 1/4" to 1/2" deep. Soil shall be raked lightly to cover seed with soil if seeded by hand.

2. During times of drought, water shall be applied at a rate not causing runoff and erosion. The soil shall be thoroughly wetted to depth insuring germination of the seed. Subsequent applications of water shall be made when needed.
3. Refer to Section 32 92 00 – Turf and Grasses for additional seeding requirements.

C. Sodding

1. Bring soil surface to final grade. Clear surface of trash, woody debris stones, and dirt clods larger than 1". Mix fertilizer into soil surface. Apply sod to soil when surface is not muddy or frozen. Lay sod with tight joints and in straight lines. Do not overlap joints. Stagger joints and do not stretch sod. On slopes steeper than 3:1, sod shall be anchored with pins or other approved methods. Installed sod shall be rolled or tamped to provide good contact between sod and soil. Irrigate sod and soil to a depth of 4" immediately after installation. Irrigation shall be used to supplement rainfall for a minimum of 2–3 weeks.
2. Refer to Section 32 92 00 – Turf and Grasses for additional sodding requirements.

3.4 STRUCTURAL MEASURES

A. Check Dam

1. Stone – Shall be constructed of graded size 2–10 inch stone underlaid with a geotextile fabric. Mechanical or hand placement shall be required to insure complete coverage of entire width of ditch or swale and center of dam is lower than edges. Sediment shall be removed when it reaches a depth of one-half the original dam height or before.
2. Haybale – Shall be staked and embedded a minimum of 4" and may be used as temporary check dams in concentrated flow areas while vegetation is becoming established. They should not be used where the drainage area exceeds one acre. Sediment shall be removed when it reaches a depth of one-half the original dam height or before.

B. Construction Exit

1. A stone stabilized pad shall be located at any point where traffic will be leaving the construction site to a public right-of-way, street, alley, sidewalk, parking area or any other area where there is a transition from bare soil to a paved area. The pad shall be constructed of 1.5" to 3.5" stone, having a minimum thickness of 6" and not less than 20' wide and 50' long. The pad shall be underlaid with a geotextile fabric. The pad shall be maintained in a condition, which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with 1.5" to 3.5" stone. All materials spilled, dropped, washed, or tracked

from vehicles or site onto roadways or into storm drains must be removed immediately.

C. Filter Ring

1. Shall surround all sides of the structure receiving runoff from disturbed areas. It shall be placed a minimum of 4' from the structure. It may also be used below storm drains discharging into detention ponds, creating a centralized area for sediment accumulation. When utilized below a storm drain outlet, it shall be placed such that it does not create a condition causing water to back-up into the storm drain and inhibit the function of the storm drain system. The larger stone can be faced with smaller filter stone on the upstream side for added sediment filtering capabilities. Mechanical or hand placement of stone shall be required to uniformly surround the structure.
2. Filter ring must be kept clear of trash and debris. This requires continuous monitoring and maintenance, which includes sediment removal when one-half full. Filter rings are temporary and should be removed when the site has been stabilized.

D. Sediment Barrier

1. Hay or straw bales may be used in areas of low sheet flow rates. They shall not be use if the project duration is expected to exceed three months. Bales shall be placed in a single row, lengthwise, and embedded in the soil to a depth of 4". Bales must be securely anchored in place by stakes or bars driven through the bales or by other acceptable means to prevent displacement. Bales shall be placed so the binding wire or twine around the bale will not touch the soil. Sediment shall be removed once it has accumulated to one-half the original height of the barrier. Barriers shall remain in place until disturbed areas have been permanently stabilized. All sediment accumulated at the barrier shall be removed and properly disposed of before the barrier is removed. The slope lengths contributing runoff to a bale barrier cannot exceed those listed below.

<u>Land Slope</u> (Percent)	<u>Maximum Slope Length</u> <u>Above Bale</u> (Feet)
< 2	75
2 to 5	50
5 to 10	35
10 to 20	20
> 20	10

2. Silt fence may be used in areas of higher sheet flow rates. The drainage area shall not exceed ¼ acre for every 100' of silt fence. **Silt fence shall not be installed across streams, ditches, waterways or other concentrated flow areas.** Silt fence shall be installed according to this specification, as shown on the construction drawings or as directed by the Engineer. See details on the construction drawings for installation requirements.

- a. Type A – A 36" wide filter fabric silt fence shall be used on construction sites where the life of the project is greater than or equal to six months.
 - b. Type B – A 22" wide filter fabric silt fence shall be limited to use on minor projects, such as residential home sites or small commercial developments where permanent stabilization will be achieved in less than six months.
 - c. Type C – A 36" wide filter fabric silt fence with wire reinforcement shall be used where runoff flows or velocities are particularly high or where slopes exceed a vertical height of 10'. Along stream buffers and other sensitive areas, two rows of Type C silt fence or one row of Type C silt fence backed by hay bales shall be used.
3. Where all runoff is to be stored behind the silt fence (where no stormwater disposal system is present), the slope lengths contributing runoff to a silt fence barrier cannot exceed those listed below.

<u>Land Slope</u> (Percent)	<u>Maximum Slope Length</u> <u>Above Fence</u> (Feet)
< 2	100
2 to 5	75
5 to 10	50
10 to 20	25
> 20*	15

*In areas where the slope is greater than 20%, a flat area length of 10' between the toe of the slope and the fence shall be provided.

4. Sediment shall be removed once it has accumulated to one-half the original height of the barrier. Filter fabric shall be replaced whenever it has deteriorated to such an extent that the effectiveness of the fabric is reduced (approximately six months). Barriers shall remain in place until disturbed areas have been permanently stabilized. All sediment accumulated at the barrier shall be removed and properly disposed of before the barrier is removed.

E. Inlet Sediment Trap

1. Shall be installed at or around all storm drain inlets receiving runoff from disturbed areas. Sediment traps must be self draining unless they are otherwise protected in an approved manner that will not present a safety hazard. The drainage area entering the inlet sediment trap shall be no greater than one acre. Sediment traps may be constructed on natural ground surface, on an excavated surface or on machine compacted fill provided they have a non-erodible outlet.

2. Type C silt fence supported by steel posts may be used where the inlet drains a relatively flat area (slope no greater than 5%) and shall not apply to inlets receiving concentrated flows, such as in street or highway medians. The stakes shall be spaced evenly around the perimeter of the inlet a maximum of 3' apart and securely driven into the ground, approximately 18" deep. The fabric shall be entrenched 12" and backfilled with crushed stone or compacted soil. Fabric and wire shall be securely fastened to the posts and fabric ends must be overlapped a minimum of 18" or wrapped together around a post to provide a continuous fabric barrier around the inlet. The trap shall be inspected daily and after each rain. Repairs are to be made as needed. Sediment shall be removed once it has accumulated to one-half the height of the trap. **Sediment shall not be washed into the inlet.** It shall be removed from the sediment trap and disposed of and stabilized so it will not enter the inlet again. When the contributing drainage area has been permanently stabilized, all materials and any sediment shall be removed and either salvaged or disposed of properly. The disturbed area shall be brought to proper grade, smoothed and compacted. Appropriately stabilize all disturbed areas around the inlet.

3. A baffle box shall be used for inlets receiving runoff with a higher volume or velocity. The box shall be constructed of 2" x 4" boards spaced a maximum of 1" apart or of plywood with weep holes 2" in diameter. The weep holes shall be placed approximately 6" on center vertically and horizontally. The entire box shall be wrapped in Type C filter fabric that is entrenched 12" and backfilled. Gravel shall be placed around the box to a depth of 2" to 4". The trap shall be inspected daily and after each rain. Repairs are to be made as needed. Sediment shall be removed once it has accumulated to one-half the height of the trap. **Sediment shall not be washed into the inlet.** It shall be removed from the sediment trap and disposed of and stabilized so it will not enter the inlet again. When the contributing drainage area has been permanently stabilized, all materials and any sediment shall be removed and either salvaged or disposed of properly. The disturbed area shall be brought to proper grade, smoothed and compacted. Appropriately stabilize all disturbed areas around the inlet.

4. Sod Inlet Protection shall be used only at the time of permanent seeding, to protect the inlet from sediment and mulch material until permanent vegetation has become established. The sod shall be place to form a turf mat covering the soil for a distance of 4' from each side of the inlet structure. Sod strips shall be staggered so adjacent strip ends are not aligned. Re-sod areas where an adequate stand of sod is not obtained. New sod should be mowed sparingly. Grass height should not be less than 2" to 3".

5. Curb Inlet Protection shall be used on curb inlets receiving runoff from disturbed areas once pavement has been installed. Place 8" concrete blocks wrapped in filter fabric in front of the curb inlet opening. A gap of approximately 4" shall be left between the inlet filter and the inlet to allow for overflow and prevention of hazardous ponding in the roadway. **This**

method of inlet protection shall be removed if a safety hazard is created.
Sediment shall be removed from curb inlet protection immediately.

F. Storm Drain Outlet Protection

1. Outlet protection aprons shall be constructed at all storm drain outlets, road culverts, paved channel outlets discharging into natural or constructed channels. Apron will extend from end of the conduit, channel, or structure to the point of entry into an existing stream or publicly maintained drainage system. Apron length, width, and stone size shall conform to details on the construction drawings. Apron shall be constructed with no slope along its length. Invert elevation of the downstream end of apron shall be equal to the elevation of the receiving channel invert. There shall be no overfall at the end of apron. Apron shall be located so there are no bends in the horizontal alignment.
2. Subgrade for geotextile fabric and rip-rap shall follow required lines and grades shown on the construction drawings. Compact any subgrade fill required to the density of surrounding undisturbed material. Low areas in subgrade on undisturbed soil may also be filled by increasing rip-rap thickness. Geotextile fabric shall be protected from punching or tearing during installation. Repair any damage by removing rip-rap and placing another piece of fabric over the damaged area. All connecting joints shall overlap a minimum of 1'. If damage is extensive, replace entire geotextile fabric. Rip-rap shall be placed by equipment or hand. Minimum thickness of rip-rap shall be 1.5 times the maximum stone diameter. Immediately after construction, stabilize all disturbed areas around apron with vegetation.
3. Check outlet apron after heavy rains to see if any erosion around or below the rip-rap has taken or if stones have been dislodged. Immediately make all needed repairs to prevent further damage.

3.5 CHEMICAL MEASURES

A. Dust Control

1. Dust raised from vehicular traffic shall be controlled by wetting down roads with water or by the use of chemicals. Chemicals shall be applied in accordance with the manufacturer's recommendations.

B. Soil Binding

1. This temporary practice is intended for direct soil surface application to sites where the timely establishment of vegetation may not be feasible or where vegetative cover is absent or inadequate. **This temporary practice is not intended for application to surface waters of the state.** It is intended for application within construction storm water ditches and storm drains that feed into previously constructed sediment ponds or basins.
2. Anionic Polyacrylamide (PAM) is available in emulsions, powders, gel bars, and logs. It is required that other Best Management Practices be used in

combination with anionic PAM. The use of seed and mulch for additional erosion protection beyond the life of anionic PAM is recommended. Use 50' setbacks when applying anionic PAM near natural water bodies. Never add water to PAM, add PAM slowly to water. If water is added to PAM, globs can form which can clog dispensers. This signifies incomplete dissolving of PAM and therefore increases the risk of under application. Application rates shall conform to manufacturer's guidelines. **The maximum application rate of PAM, in pure form, shall not exceed 200pounds/acre/year.** Contractors using anionic PAM shall obtain and follow all Material Safety Data Sheet requirements and manufacturer's recommendations. Gel bars and logs of anionic PAM mixtures may be used in ditch systems. This application shall meet the same testing requirements as anionic PAM emulsions and powders. Maintenance will consist of reapplying anionic PAM to disturbed areas, including high traffic areas, which interfere in the performance of this practice.

3.6 MONITORING AND REPORTING

- A. Each day, when any type of construction activity takes place on the construction site, Contractor's qualified personnel shall monitor and record rainfall, inspect all areas where petroleum products are stored, used or handled for spills and leaks from vehicles and equipment and check all locations where vehicles enter or exit the site for evidence of off site sediment tracking. These inspections shall be conducted until a Notice of Termination (NOT) is submitted. For linear construction where a phased activity is conducted, this paragraph applies to the active phase(s) of work.
- B. Once every seven calendar days and within 24 hours of the end of a storm 0.5 inches or greater, Contractor's qualified personnel shall inspect disturbed areas of the construction site that have not undergone final stabilization, areas used for storage of materials that are exposed to precipitation that have not undergone final stabilization and structural control measures (BMPs). Erosion and sediment control measures identified in the Erosion, Sedimentation, and Pollution Control Plan shall be observed to ensure they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving water(s). These inspections must be conducted until a Notice of Termination is submitted. For linear construction where a phase activity is conducted, this paragraph applies to the active phase(s) of work.
- C. Contractor's qualified personnel shall inspect a least once per month during the term of the General Permit, areas of the construction site having undergone final stabilization. These areas shall be inspected for evidence of, or the potential for, pollutants entering the drainage system and receiving water(s). Erosion and sediment control measure shall be observed to ensure they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measure are effective in preventing significant impacts to receiving water(s). For linear construction, monthly inspections in accordance with this paragraph shall be made for those phases on which final stabilization has been completed.

- D. Contractor shall prepare a report summarizing the scope of inspections, name(s) of qualified personnel making the inspections, date(s) of inspections, major observations relating to the implementation of the Erosion, Sedimentation and Pollution Control Plan and any actions taken. This report shall be retained on the construction site or be readily available at a designated alternate location until the entire site or portion of a construction project that was phased, has undergone final stabilization and a Notice of Termination (NOT) is submitted to EPD. Such reports shall identify any incidents of non-compliance. Where the report does not identify any incidents of non-compliance, the re report shall contain a certification that the facility is in compliance with the Erosion, Sedimentation and Pollution Control Plan and the General Permit. The report shall be signed in accordance with the General Permit.

3.7 SAMPLING AND ANALYSIS

- A. Contractor must manually or automatically sample in accordance with the Comprehensive Monitoring Plan (CMP) at least once for each rainfall event described below. For a qualifying event, samples must be taken within forty-five (45) minutes of:
1. The accumulation of the minimum amount of rainfall, if the storm water discharge to a monitored receiving water or from a monitored outfall has begun at or prior to the accumulation.
 2. The beginning of any storm water discharge to a monitored receiving water or from a monitored outfall, if the discharge begins after the accumulation of the minimum amount of rainfall.

However, where manual and automatic sampling are impossible (as defined in the permit), or are beyond the Contractor's control, the Contractor shall take samples as soon as possible, but in no case more than 12 hours after the beginning of the storm water discharge.

- B. Sampling shall occur for the following events:
1. For each area of the site discharging to a receiving stream, the first rain event reaching or exceeding 0.5 inch and allows for monitoring during normal business hours* (Monday thru Friday, 8:00 a.m. to 5:00 p.m. and Saturday 8:00 a.m. to 5:00 p.m. when construction activity is being conducted by the Primary permittee) occurring after all clearing and grubbing operations are completed in the drainage area of the location selected as the sampling location;
 2. In addition to (1) above, for each area of the site discharging to a receiving stream, the first rain event reaching or exceeding 0.5 inch and allows for monitoring during normal business hours* occurring either 90 days after the first sampling event or after all mass grading operations are completed in the drainage area of the location selected as the sampling location, whichever comes first.
 3. At the time of the sampling performed pursuant to (1) and (2) above, if BMPs are found to be properly designed, installed, and maintained, no

further action is required. If BMPs in any area of the site discharging to a receiving stream are not properly designed, installed, and maintained, corrective action shall be defined and implemented within two business days, and turbidity samples shall be taken from discharges of the same area for each subsequent rain event reaching or exceeding 0.5 inch during normal business hours* until the selected turbidity standard is attained, or until post-storm event inspections determine BMPs are properly designed, installed, and maintained;

4. Existing construction activities, i.e., those occurring on or before the effective date of this permit, having met the sampling required by (1) above shall sample in accordance with (2). Those existing construction activities having met the sampling required by (2) above shall not be required to conduct additional sampling other than as required by (3) above.

* Note the Permittee may choose to meet the requirements of (1) and (2) above by collecting turbidity samples from any rain event reaching or exceeding 0.5 inch and allows for monitoring at any time of the day or week.

5. For linear construction, if at any time during the life of the project, BMPs have not been properly designed, installed or maintained for the construction activities that discharge into a receiving water which is not being sampled, the Contractor shall sample that receiving water for the first rainfall event greater than or equal to 0.5 inches thereafter and for every rainfall event greater than or equal to 0.5 inches until BMPs are properly designed, installed and maintained.

- C. Sampling shall be collected by "grab samples" and the analysis of these samples must be conducted in accordance with methodology and test procedures established in the General Permit. Sample containers shall be labeled prior to collecting the samples. Samples shall be well mixed before transferring to a secondary container. Large mouth, well cleaned and rinsed glass or plastic jars shall be used for collecting samples. The jars shall be cleaned thoroughly to avoid contamination. Manual or automatic sampling shall be utilized. Samples required by the General Permit shall be analyzed immediately, but in no case later than 48 hours after collection. However, samples from automatic samplers must be collected no later than the next business day after their accumulation, unless flow through automated analysis is utilized. Samples are not required to be cooled. Samples taken for the purpose of compliance with the General Permit shall be representative of the monitored activity and representative of the water quality of the receiving water(s) and/or the storm water outfalls using the following minimum guidelines:

1. The upstream sample for each receiving water(s) must be taken immediately upstream of the confluence of the first storm water discharge from the permitted construction site but downstream of any other storm water discharges not associated with the site. Where appropriate, several upstream samples from across the receiving water(s) may need to be taken and the average turbidity of these samples used for an upstream turbidity value.

2. The downstream sample for each receiving water(s) must be taken downstream of the confluence of the last storm water discharge from the construction site but upstream of any other storm water discharge not associated with the site. Where appropriate, several downstream samples from across the receiving water(s) may need to be taken and the average turbidity of these samples used for a downstream turbidity value.
 3. Samples shall be taken from the horizontal and vertical center of the receiving water(s) or the storm water outfall channel(s).
 4. Care shall be taken to avoid stirring the bottom sediments in the receiving water(s) or in the outfall storm water channel(s).
 5. Sampling container shall be held so the opening faces upstream.
 6. Samples shall be kept from floating debris.
- D. For all construction sites and common developments other than linear construction projects, the Contractor shall sample all receiving water(s), or all outfall(s) or a combination of receiving water(s) and outfall(s). For linear construction projects, the Contractor must sample all perennial and intermittent streams and other water bodies shown on an USGS topographic map and all other field verified perennial and intermittent streams and other water bodies, or all outfalls into such streams and other water bodies, or a combination thereof.
- E. Contractor shall provide and implement all safety equipment and procedures necessary for sampling during hazardous weather conditions and in the event of biological, chemical or physical hazards
- F. Contractor shall submit a summary of the monitoring results to the EPD at the address shown in the General Permit by the fifteenth day of the month following the reporting period. For a monitoring period during which no qualifying rainfall events occur, a monitoring report must be submitted stating such. Monitoring periods are calendar months beginning with the first month after the effective date of the General Permit. Monitoring reports shall be signed in accordance with the General Permit and submitted to EPD until such time as a NOT is submitted.
- G. Contractor must retain copies of all monitoring results and monitoring information reported. In addition to other record keeping requirements, the monitoring information shall include:
1. Date, exact place, and time of sampling or measurements.
 2. Name(s) of the individual(s) who performed the sampling and measurements.
 3. Date(s) analyses were performed.
 4. Time(s) analyses were initiated.

5. Name(s) of the individual(s) who performed the analyses.
 6. References and written procedures, when available, for the analytical techniques or methods used. A quality control/quality assurance program must be included in the written procedures.
 7. The results of such analyses, including the bench sheets, instrument readouts, computer disks or tapes, used to determine these results.
 8. Results exceeding 1,000 NTU shall be reported as "Exceeds 1,000 NTU."
- H. Suggested monitoring and report forms are found at the end of this section.

End of Section



**Authorization To Discharge Under The
National Pollutant Discharge Elimination System
Stormwater Discharges Associated With Construction Activity
For Stand Alone Construction Projects**

In compliance with the provisions of the Georgia Water Quality Control Act (Georgia Laws 1964, p.416, as amended), hereinafter called the "State Act," the Federal Clean Water Act, as amended (33 U.S.C. 1251 et seq.), hereinafter called the "Clean Water Act," and the Rules and Regulations promulgated pursuant to each of these Acts, new and existing stormwater point sources within the State of Georgia that are required to have a permit, upon submittal of a Notice of Intent, are authorized to discharge stormwater associated with construction activity to the waters of the State of Georgia in accordance with the limitations, monitoring requirements and other conditions set forth in Parts I through VI hereof.

This permit shall become effective on August 1, 2023.

This permit and the authorization to discharge shall expire at midnight, July 31, 2028.

Signed this 06/20/2023



A handwritten signature in dark ink, appearing to read 'R. Dunn'.

Richard E. Dunn, Director
Environmental Protection Division

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Part I. COVERAGE UNDER THIS PERMIT

A. Permit Area.

This permit regulates point source discharges of stormwater to the waters of the State of Georgia from construction activities, as defined in this permit.

B. Definitions. All terms used in this permit shall be interpreted in accordance with the definitions as set forth in the Georgia Water Quality Control Act (Act) and the Georgia Rules and Regulations for Water Quality Control Chapter 391-3-6 (Rules), unless otherwise defined in this permit:

1. “Best Management Practices” (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent and minimize erosion and resultant sedimentation, which are consistent with, and no less stringent than, those practices contained in the “Manual for Erosion and Sediment Control in Georgia” (Manual) published by the Georgia Soil and Water Conservation Commission as of January 1 of the year in which the land-disturbing activity was permitted to prevent or reduce the pollution of waters of Georgia. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
2. “Buffer” means the area of land immediately adjacent to the banks of State waters in its natural state of vegetation, which facilitates the protection of water quality and aquatic habitat.
3. “Certified Personnel” means a person who has successfully completed the appropriate certification course approved by the Georgia Soil and Water Conservation Commission.
4. “Commencement of Construction” means the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.
5. “Common Development” means a contiguous area where multiple, separate, and distinct construction activities will be taking place at different times on different schedules under one plan of development.
6. “Construction Activity” means the disturbance of soils associated with clearing, grading, excavating, filling of land, or other similar activities which may result in soil erosion. Construction activity does not include agricultural and silvicultural practices, but does include agricultural buildings.
7. “CPESC” means Certified Professional in Erosion and Sediment Control with current certification by EnviroCert International, Inc.
8. “CWA” means Federal Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972).

9. “Design Professional” means a professional licensed by the State of Georgia in the field of: engineering, architecture, landscape architecture, forestry, geology, or land surveying; or a person that is a Certified Professional in Erosion and Sediment Control (CPESC) with a current certification by EnviroCert International, Inc. and that has completed the appropriate certification course approved by the Georgia Soil and Water Conservation Commission in accordance with O.C.G.A 12-7-9. Design Professionals shall practice in a manner that complies with applicable Georgia law governing professional licensure.

10. “Director” means the Director of the Environmental Protection Division or an authorized representative.

11. “Division” or “EPD” means the Environmental Protection Division of the Department of Natural Resources.

12. “Drainage Structure” means a device composed of virtually nonerodible material such as concrete, steel, plastic, or other such material that conveys water from one place to another by intercepting the flow and carrying it to a release point for storm water management, drainage control, or flood control purposes.

13. “Erosion” means the process by which land surface is worn away by the action of wind, water, ice or gravity.

14. “Erosion, Sedimentation and Pollution Control Plan” or “Plan” means a plan for the control of soil erosion, sediment and pollution resulting from a construction activity.

15. “Filling” means the placement of any soil or solid material either organic or inorganic on a natural ground surface or an excavation.

16. “Final Stabilization” means that all soil disturbing activities at the site have been completed, and that for unpaved areas and areas not covered by permanent structures and areas located outside the waste disposal limits of a landfill cell that has been certified by EPD for waste disposal, 100% of the soil surface is uniformly covered in permanent vegetation with a density of 70% or greater, or landscaped according to the Plan (uniformly covered with landscaping materials in planned landscaped areas), or equivalent permanent stabilization measures as defined in the Manual (excluding a crop of annual vegetation and a seeding of target crop perennials appropriate for the region).

17. “General Contractor” means the operator of the stand alone construction or site.

18. “Impossible” means the monitoring location(s) are either physically or legally inaccessible, or access would cause danger to life or limb.

19. “Infeasible” means not technologically possible, or not economically practicable and achievable in light of best industry practices.

20. "Landfill" means an area of land or an excavation in which waste materials are placed for permanent disposal, and which is not a land application unit, surface impoundment, injection well or waste pile as defined by Georgia NPDES General Permit GAR050000, and which area of land or excavation must be certified by EPD before it can begin waste disposal operations.
21. "Landfill Cell(s)" means a defined area within a landfill where waste materials are permanently disposed and that must be certified by EPD for use before such cell(s) can begin receiving waste materials after which those activities associated with waste receipt and disposal in the landfill cell(s) shall not be considered construction activity as defined by this permit.
22. "Local Issuing Authority" means the governing authority of any county or municipality which is certified pursuant to Official Code of Georgia Section 12-7-8(a).
23. "Mass Grading" means the movement of earth by mechanical means to alter the gross topographic features (elevations, slopes, etc.) to prepare a site for final grading and the construction of facilities (buildings, roads, parking, etc.).
24. "Nephelometric Turbidity Unit (NTU)" means a numerical unit of measure based upon photometric analytical techniques for measuring the light scattered by fine particles of a substance in suspension.
25. "NOI" means Notice of Intent to be covered by this permit (see Part II).
26. "NOT" means Notice of Termination (see Part VI).
27. "Operator" means the entity that has the primary day-to-day operational control of those activities at the construction site necessary to ensure compliance with Erosion, Sedimentation and Pollution Control Plan requirements and permit conditions.
28. "Other Water Bodies" means ponds, lakes, marshes and swamps which are waters of the State.
29. "Outfall" means the location where stormwater, in a discernible, confined and discrete conveyance, leaves a facility or construction site or, if there is a receiving water on site, becomes a point source discharging into that receiving water.
30. "Owner" means the legal title holder to the real property on which is located the facility or site where construction activity takes place.
31. "Permittee" means any entity that has submitted a Notice of Intent and obtained permit coverage.
32. "Phase" or "Phased" means sub-parts or segments of construction sites where the sub-part or segment is constructed and stabilized prior to completing the entire construction site.

33. "Point Source" means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure or container from which pollutants are or may be discharged. This term also means sheet flow which is later conveyed via a point source to waters of the State. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

34. "Primary Permittee" means the Owner and/or the Operator of a tract of land for a construction site subject to this permit.

35. "Proper Design" and "Properly Designed" means designed in accordance with the design requirements and specifications contained in the "Manual for Erosion and Sediment Control in Georgia" (Manual) published by the Georgia Soil and Water Conservation Commission (GSWCC) as of January 1 of the year in which the land-disturbing activity was permitted and amendments to the Manual as approved by the GSWCC up until the date of NOI submittal.

36. "Receiving Water(s)" means all perennial and intermittent waters of the State into which the runoff of stormwater from a construction activity will actually discharge, either directly or indirectly.

37. "Roadway Drainage Structure" means a device, such as a bridge, culvert, or ditch, composed of a virtually nonerodible material such as concrete, steel, plastic, or other such material that conveys water under a roadway by intercepting the flow on one side of a traveled way consisting of one or more defined lanes, with or without shoulder areas, and carrying water to a release point on the other side.

38. "Roadway Project(s)" means traveled ways including but not limited to roads, sidewalks, multi-use paths and trails, and airport runways and taxiways. This term also includes the accessory components to a roadway project that are necessary for the structural integrity of the roadway and the applicable safety requirements. These accessory components include but are not limited to slopes, shoulders, stormwater drainage ditches and structures, guardrails, lighting, signage, cameras and fences and exclude subsequent landscaping and beautification projects.

39. "Sediment" means solid material, both organic and inorganic, that is in suspension, is being transported, or has been moved from its site of origin by, wind, water, ice, or gravity as a product of erosion.

40. "Sedimentation" means the action or process of forming or depositing sediment.

41. "Sheet Flow" means runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

42. "Site" or "Construction Site" means a facility of any type on which construction activities are occurring or are to occur which may result in the discharge of pollutants from a point source into the waters of the State.

43. “Stand Alone Construction” or “Stand Alone Construction Project” means construction activities that are not part of a common development where the Primary Permittee chooses not to use Secondary Permittees.

44. “Stormwater” means stormwater runoff, snow melt runoff, and surface runoff and drainage.

45. “Structural Erosion and Sediment Control Practices” means measures for the stabilization of erosive or sediment producing areas by utilizing the mechanical properties of matter for the purpose of either changing the surface of the land or storing, regulating or disposing of runoff to prevent excessive sediment loss.

46. “Sub-contractor” means an entity employed or retained by the permittee to conduct any type of construction activity (as defined in this permit) at a stand alone construction site. Sub-contractors must complete the appropriate certification course approved by the Georgia Soil and Water Conservation Commission in accordance with the provisions of O.C.G.A. 12-7-19. Sub-contractors are not permittees unless they meet the definition of either a Primary, Secondary or Tertiary Permittee.

47. “Surface Water Drainage Area” means the hydrologic area starting from the lowest downstream point where the stormwater from the construction activity enters the receiving water(s) and following the receiving water(s) upstream to the highest elevation of land that divides the direction of water flow. This boundary will connect back with the stormwater entrance point. Boundary lines follow the middle of the highest ground elevation or halfway between contour lines of equal elevation.

48. “Trout Streams” means waters of the State classified as either primary trout waters or secondary trout waters, as designated in the Rules and Regulations for Water Quality Control, Chapter 391-3-6.

49. “Utility Company or Utility Contractor” means, for purposes of this Permit, an entity or sub-contractor that is responsible, either directly or indirectly, for the construction, installation, and maintenance of conduits, pipes, pipelines, cables, wires, trenches, vaults, manholes, and similar structures or devices for the conveyance of natural gas (or other types of gas), liquid petroleum products, electricity, telecommunications (telephone, data, television, etc.), water, stormwater or sewage.

50. “USGS Topographic Map” means a current quadrangle, 7½ minute series map prepared by the United States Department of the Interior, Geological Survey.

51. “Vegetative Erosion and Sediment Control Practices” means measures for the stabilization of erosive or sediment producing areas by covering the soil with: (1) permanent seeding, sprigging or planting, producing long-term vegetative cover; (2) temporary seeding, producing short-term vegetative cover; or (3) sodding, covering areas with a turf of perennial sod forming grass.

52. “Waters Supporting Warm Water Fisheries” means all waters of the State that sustain, or have the potential to sustain, aquatic life but excluding trout streams.

53. “Waters of Georgia” or “Waters of the State” means any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, wetlands, and all other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the State which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation.

C. Eligibility.

1. Construction Activities. This permit authorizes, subject to the conditions of this permit:

- a. all discharges of stormwater associated with stand alone construction projects that will result in land disturbance equal to or greater than one (1) acre occurring on or before, and continuing after, the effective date of this permit, (henceforth referred to as existing stormwater discharges from construction activities) except for discharges identified under Part I.C.3.;
- b. all discharges of stormwater associated with stand alone construction projects that will result in land disturbance equal to or greater than one (1) acre occurring after the effective date of this permit, (henceforth referred to as stormwater discharges from construction activities); and
- c. coverage under this permit is not required for discharges of stormwater associated with minor land disturbing activities (such as home gardens and individual home landscaping, repairs, maintenance work, fences and other related activities which result in minor soil erosion) conducted outside of the 25 foot buffer along the banks of all State waters requiring a buffer and outside of the 50 foot buffer along the banks of all State waters classified as 'trout streams' requiring a buffer on individual residential lots sold to homeowners where all planned construction activities on that lot have been completed and have undergone final stabilization.

2. Mixed Stormwater Discharges. This permit may only authorize a stormwater discharge from a construction site or construction activities mixed with a stormwater discharge from an industrial source or activity other than construction where:

- a. the industrial source or activity other than construction is located on the same site as the construction activity and is an integral part of the construction activity;
- b. the stormwater discharges associated with industrial activity from the areas of the site where construction activities are occurring are in compliance with the terms of this permit; and
- c. stormwater discharges associated with industrial activity from the areas of the site where industrial activity other than construction are occurring are covered by a different NPDES general permit or individual permit authorizing such discharges and the discharges are in compliance with a different NPDES permit.

3. Limitations on Coverage. The following stormwater discharges from construction sites are not authorized by this permit:

- a. stormwater discharges associated with an industrial activity that originate from the site after construction activities have been completed and the site has undergone final stabilization;
- b. discharges that are mixed with sources of non-stormwater other than discharges which are identified in Part III.A.2. of this permit and which are in compliance with Part IV.D.7. (non-stormwater discharges) of this permit;
- c. stormwater discharges associated with industrial activity that are subject to an existing NPDES individual or general permit. Such discharges may be authorized under this permit after an existing permit expires provided the existing permit did not establish numeric limitations for such discharges; and
- d. stormwater discharges from construction sites that the Director (EPD) has determined to be or may reasonably be expected to be contributing to a violation of a water quality standard.

4. Compliance with Water Quality Standards. No discharges authorized by this permit shall cause violations of Georgia's in-stream water quality standards as provided by the Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03.

D. Authorization.

- 1. Any person desiring coverage under this permit must submit a Notice of Intent (NOI) to the EPD and the NOI must be received by the EPD in accordance with the requirements of Part II, using the electronic submittal service provided by the EPD, in order for stormwater discharges from construction sites to be authorized.
- 2. Unless notified by the Director to the contrary, a permittee who submits an NOI in accordance with the requirements of this permit is authorized to discharge stormwater from construction sites under the terms and conditions of this permit fourteen (14) days after the date that the NOI is submitted and confirmation of submittal is received. The Director may deny coverage under this permit and require submittal of an application for an individual NPDES permit or alternative general NPDES permit based on a review of the NOI or other information. Should the Director deny coverage under this permit, coverage under this permit is authorized until the date specified in the notice of denial by the Director.
- 3. Where a new permittee is to begin work on-site after an NOI for the facility/construction site has been submitted, that new permittee must submit a new NOI in accordance with Part II.

E. Continuing Obligations of Permittees. Unless and until responsibility for a site covered under this permit is properly terminated or ownership changes, according to the terms of the permit, the current permittee remains responsible for compliance with all applicable terms of the permit and for any violations of said terms.

Part II. NOTICE OF INTENT REQUIREMENTS

A. Deadlines for Notification.

1. Except as provided in Part II.A.2., II.A.3. and II.A.5., Owners or Operators or both who intend to obtain coverage under this general permit for stormwater discharges from a construction site (where construction activities begin after issuance of this permit), shall submit a Notice of Intent (NOI) in accordance with the requirements of Part II at least fourteen (14) days prior to the commencement of construction activities.

2. For sites where construction activities, subject to this permit, are occurring on the effective date of this permit, the Owner or Operator or both shall submit a re-issuance NOI for an existing construction site in accordance with the requirements of this part no later than ninety (90) days after the effective date of this permit. Failure to comply with this requirement shall constitute a violation of the Georgia Water Quality Control Act for each day until the Owner or Operator or both submit an initial NOI for a new construction site in accordance with Part II.A.1., comply with the special conditions in Part III., prepare and submit a new Erosion, Sedimentation and Pollution Control Plan in accordance with Part IV., and pay all applicable fees in accordance with Part II.D.

3. A discharger is not precluded from submitting an NOI in accordance with the requirements of this part after the dates provided in Parts II.A.1. or II.A.2. of this permit. In such instances, EPD may bring an enforcement action for failure to submit an NOI in a timely manner or for any unauthorized discharges of stormwater associated with construction activity that have occurred on or after the dates specified in Part II.A.1. and II.A.2.

4. Where an Owner or an Operator or both changes after an NOI has been filed, the subsequent Owner or Operator or both must submit a modification NOI in accordance with this Part by the earlier to occur of (a) seven (7) days before beginning work at the facility/construction site or (b) thirty (30) days from acquiring legal title to the facility/construction site. In the event a lender or other secured creditor acquires legal title to the facility/construction site, such party must submit a modification NOI in accordance with this Part by the earlier to occur of (a) seven (7) days before beginning work at the facility/construction site; or (b) thirty (30) days from acquiring legal title to the facility/construction site. Stabilization and BMP installation and/or maintenance measures of a disturbed site, by the subsequent Owner or Operator, may occur in advance of filing a new NOI, without violation of this permit. Failure to comply with this requirement shall constitute a violation of the Georgia Water Quality Control Act for each day until the Owner or Operator or both submit an initial NOI for a new construction site in accordance with Part II.A.1., comply with the special conditions in Part III., prepare and submit a new Erosion, Sedimentation and Pollution Control Plan in accordance with Part IV., and pay all applicable fees in accordance with Part II.D.

5. For sites where construction activities will result in land disturbance equal to or greater than one (1) acre that are required as a result of storm- or emergency-related repair work, the Owner or Operator or both shall notify the appropriate EPD District Office within three (3) days of commencement of said construction activities. The Owner or Operator or both shall submit the NOI to the appropriate EPD district office as soon as possible after the storm- or emergency-related

event but no later than fourteen (14) days after the commencement of construction activities and shall submit the Plan in accordance with Part IV.A.6.

B. Notice of Intent Contents.

1. Primary Permittee. A single Notice of Intent for the Primary Permittee (i.e., one NOI signed by the Owner or the Operator or both) shall be signed in accordance with Part V.G.1. of this permit and shall include the following information:

a. The project construction site name, GPS location (decimal degrees) of construction exit, construction site location (e.g., street address), city (if applicable) and county of the construction site for which the notification is submitted. The construction site location information must be sufficient to accurately locate the construction site;

b. The Owner's legal name, address, telephone number and email address; and if available, the Operator's legal name, address, telephone number and email address; and if applicable, the Duly Authorized Representative's legal name and/or position name, telephone number and email address;

c. The name, telephone number and email address of the individual to whom the permittee has assigned the responsibility for the daily operational control (i.e., construction superintendent, etc.) of the construction site;

d. The name of the initial receiving water(s) or if unnamed the first named blue line stream indicated on the appropriate USGS Topographic map, and when the discharge is through a municipal separate storm sewer system (MS4), the name of the local government operating the municipal separate storm sewer system and the name of the receiving water(s) which receives the discharge from the MS4, and the permittee's determination of whether the receiving water(s) supports warm water fisheries or is a trout stream as indicated in the Rules and Regulations for Water Quality Control, Chapter 391-3-6;

e. The name of the receiving water(s) located within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment identified as "not supporting" its designated use(s) shown on Georgia's most current "305(b)/303(d) List Documents (Approved)" for the criteria violated/cause, "Bio F" (Impaired Fish Community) and/or "Bio M" (Impaired Macroinvertebrate Community), within Category 4a, 4b or 5, and the potential cause is either "NP" (nonpoint source) or "UR" (urban runoff);

f. An estimate of project start date and completion date, a schedule for the timing of the various construction activities, the number of acres of the site on which soil will be disturbed, and the surface water drainage area (if applicable). For projects that began on or before the effective date of this permit, the start date must be the actual start date of construction;

g. The following certification shall be signed in accordance with Part V.G.1. of this permit:

“I certify that to the best of my knowledge and belief, that the Erosion, Sedimentation and Pollution Control Plan (Plan) was prepared by a design professional, as defined by this permit, that has completed the appropriate certification course approved by the Georgia Soil and Water Conservation Commission in accordance with the provisions of O.C.G.A. 12-7-19 and that I will adhere to the Plan and comply with all requirements of this permit.”

- h. The type of construction activity category (from those listed on the NOI) conducted at the site;
- i. The location of the receiving water(s) or outfall(s) or a combination of receiving water(s) and outfall(s) to be sampled on a map or drawing of appropriate scale. When it is determined by the Primary Permittee that some or all of the outfall(s) will be sampled, the applicable nephelometric turbidity unit (NTU) selected from Appendix B (i.e., based upon the size of the construction site and the surface water drainage area) must be shown for each outfall to be sampled.
- j. NOIs may be submitted for separate phases of projects with a total planned disturbance greater than 5.0 acres, provided that each phase shall not be less than 1.0 acre. Phased NOIs shall include all documentation required by this permit for each phase, including fees; and
- k. Any other information specified on the NOI in effect at the time of submittal.

C. Notice of Intent Submittal. NOIs are to be submitted to EPD using the electronic submittal service provided by EPD and a copy to the Local Issuing Authority in jurisdictions authorized to issue a Land Disturbance Activity permit for the permittee's construction site pursuant to O.C.G.A. 12-7-1, et seq. The permittee shall retain a copy of the proof of submittal at the construction site or the proof of submittal shall be readily available at a designated alternative location from commencement of construction until such time as a Notice of Termination (NOT) is submitted in accordance with Part VI.

D. Fees. Any applicable fees shall be submitted by the **Primary Permittee** in accordance with Rules and Regulations for Water Quality Control (Rules) promulgated by the Board of Natural Resources. By submitting an NOI for coverage under this permit the Primary Permittee agrees to pay any fees required, now or in the future, by such Rules authorized under O.C.G.A. Section 12-5-23(a)(5)(A), which allows the Board of Natural Resources to establish a fee system. Fees may be assessed on land disturbing activity proposed to occur on or after the effective date of this permit and shall be paid in accordance with such Rules.

E. Renotification. Upon issuance of a new or different general permit for some or all of the stormwater discharges covered by this permit, the permittee is required to notify the EPD of their intent to be covered by the new or different general permit. The permittee must submit a renewal Notice of Intent in accordance with the notification requirements of the new or different general permit.

PART III. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, PERMIT VIOLATIONS AND OTHER LIMITATIONS

A. Prohibition on Non-Stormwater Discharges.

1. Except as provided in Part I.C.2. and III.A.2., all discharges covered by this permit shall be composed entirely of stormwater.
2. The following non-stormwater discharges may be authorized by this permit provided the non-stormwater component of the discharge is explicitly listed in the Erosion, Sedimentation and Pollution Control Plan and is in compliance with Part IV.D.7.; discharges from firefighting activities; fire hydrant flushing; potable water sources including water line flushing; irrigation drainage; air conditioning condensate; springs; uncontaminated ground water; and foundation or footing drains where flows are not contaminated with process materials or pollutants.
3. This permit does not authorize the discharge of soaps or solvents used in vehicle and equipment washing.
4. This permit does not authorize the discharge of wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials.

B. Releases in Excess of Reportable Quantities.

1. The discharge of hazardous substances or oil in the stormwater discharge(s) from a site shall be prevented. This permit does not relieve the permittee of the reporting requirements of Georgia's Oil or Hazardous Material Spills or Releases Act (O.C.G.A. §§12-14-2, et seq.), 40 CFR Part 117 and 40 CFR Part 302. Where a release containing a hazardous substance in an amount equal to or in excess of a reporting quantity established under either Georgia's Oil or Hazardous Material Spills or Releases Act (O.C.G.A. §§12-14-2, et seq.), 40 CFR 117 or 40 CFR 302 occurs during a 24 hour period, the permittee is required to notify EPD at (404) 656-4863 or (800) 241-4113 and the National Response Center (NRC) at (800) 424-8802 in accordance with the requirements of Georgia's Oil or Hazardous Material Spills or Releases Act (O.C.G.A. §§12-14-2, et seq.), 40 CFR 117 and 40 CFR 302 as soon as he/she has knowledge of the discharge.
2. This permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill.

C. Discharges into, or within One Mile Upstream of and within the Same Watershed as, Any Portion of a Biota Impaired Stream Segment.

Any permittee who intends to obtain coverage under this permit for stormwater discharges associated with construction activity into an Impaired Stream Segment, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment identified as "not supporting" its designated use(s), as shown on Georgia's most current

“305(b)/303(d) List Documents (Approved)” at the time of NOI submittal, must satisfy the requirements of Part III.C. of this permit if the Impaired Stream Segment has been listed for criteria violated/cause, “Bio F” (Impaired Fish Community) and/or “Bio M” (Impaired Macroinvertebrate Community), within Category 4a, 4b or 5, and the potential cause is either “NP” (nonpoint source) or “UR” (urban runoff). Those discharges that are located within one (1) linear mile of an Impaired Stream Segment, but are not located within the watershed of any portion of that stream segment, are excluded from this requirement. Georgia’s “305(b)/303(d) List Documents (Approved)” can be viewed on the EPD website.

1. If a Total Maximum Daily Load (TMDL) Implementation Plan for sediment has been finalized at least six (6) months prior to the permittee’s submittal of the NOI, the Erosion, Sedimentation and Pollution Control Plan (Plan) must address any site-specific conditions or requirements included in the TMDL Implementation Plan that are applicable to the permittee’s discharge(s) to the Impaired Stream Segment within the timeframe specified in the TMDL Implementation Plan. If the TMDL Implementation Plan establishes a specific numeric wasteload allocation that applies to a permittee’s discharge(s) to the Impaired Stream Segment, then the permittee must incorporate that allocation into the Erosion, Sedimentation and Pollution Control Plan and implement all necessary measures to meet that allocation. A list of TMDL Implementation Plans can be viewed on the EPD website.

2. In order to ensure that the permittee’s discharge(s) do not cause or contribute to a violation of State water quality standards, the Plan must include at least four (4) of the following best management practices (BMPs) for those areas of the site which discharge into or within one (1) linear mile upstream and within the same watershed as the Impaired Stream Segment:

a. During all construction activities as defined in this permit, double the width of the 25 foot undisturbed vegetated buffer along all State waters requiring a buffer and the 50 foot undisturbed vegetated buffer along all State waters classified as “trout streams” requiring a buffer. During construction activities, EPD will not grant variances to any such buffers that are increased in width pursuant to this section.

b. Increase all temporary sediment basins and retrofitted stormwater management basins to provide sediment storage of at least 3600 cubic feet (134 cubic yards) per acre drained.

c. Use baffles in all temporary sediment basins and retrofitted stormwater management basins to at least double the conventional flow path length to the outlet structure.

d. A large sign (minimum 4 feet x 8 feet) must be posted on site by the actual start date of construction. The sign must be visible from a public roadway. The sign must identify the following: (1) the construction site, (2) the permittee(s), (3) the contact person(s) along with their telephone number(s), and (4) the permittee-hosted website where the Plan can be viewed. The permittee-hosted website where the Plan can be viewed must be provided on the submitted NOI. The sign must remain on site and the Plan must be available on the provided website until a NOT has been submitted.

- e. Use tackifiers and/or mulch to stabilize all areas left disturbed for more than seven (7) calendar days in accordance with Part III.D.1. of this permit.
- f. Conduct turbidity sampling after every rain event of 0.5 inch or greater within any 24 hour period, recognizing the exceptions specified in Part IV.D.6.d. of this permit.
- g. Comply with the applicable end-of-pipe turbidity effluent limit, without the “BMP defense” as provided for in O.C.G.A. 12-7-6(a)(1).
- h. Reduce the total planned site disturbance to less than 50% impervious surfaces (excluding any State-mandated buffer areas from such calculations). All calculations must be included on the Plan.
- i. Limit the amount of area disturbed at any one time to no greater than 25 acres or 50% of the total planned site, whichever is less. All calculations must be included on the Plan.
- j. Use “Dirt II” techniques available on the EPD website, to model and manage all construction stormwater runoff (including sheet flow). All calculations must be included on the Plan.
- k. Conduct soil tests representative of conditions at the time of planting to identify and to implement site-specific fertilizer needs and/or add appropriate organic soil amendments (e.g., compost) and conduct pre- and post-construction soil sampling to a depth of six (6) inches to document improved levels of soil carbon after final stabilization of the construction site.
- l. Use mulch filter berms, in addition to a silt fence, on the site perimeter wherever construction stormwater (including sheet flow) may be discharged. Mulch filter berms cannot be placed in waterways or areas of concentrated flow.
- m. Use appropriate erosion control slope stabilization instead of concrete in all construction stormwater ditches and storm drainages designed for a 25 year, 24 hour rainfall event.
- n. Use flocculants or coagulants under a passive dosing method (e.g., flocculant blocks) within all construction stormwater ditches and storm drainages that feed into temporary sediment basins and retrofitted management basins.
- o. Install sod for a minimum 20 foot width (in lieu of seeding) after final grade has been achieved, along the site perimeter wherever construction stormwater (including sheet flow) may be discharged.
- p. Certified personnel shall conduct inspections at least twice every seven (7) calendar days and within 24 hours of the end of the storm that is 0.5 inches rainfall or greater in accordance with Part IV.D.4.a.(3)(a)–(c) of this permit.

- q. Apply the appropriate compost blankets (minimum depth 1.5 inches) to protect soil surfaces until vegetation is established during the final stabilization phase of the construction activity.
- r. Use alternative BMPs whose performance has been documented to be superior to conventional BMPs as certified by a Design Professional (unless disapproved by EPD or the Georgia Soil and Water Conservation Commission).
- s. Limit the total planned site disturbance to less than 15% impervious surfaces (excluding any State-mandated buffer areas from such calculations). All calculations must be included in the Plan.
- t. Conduct inspections during the intermediate grading and drainage BMP phase and during the final BMP phase of the project by the design professional who prepared the Plan in accordance with Part IV.A.5. of the permit.
- u. Install Post Construction BMPs (e.g., runoff reduction BMPs) which remove 80% TSS as outlined in the Georgia Stormwater Management Manual known as the Blue Book or an equivalent or more stringent design manual.

D. Management Practices and Permit Violations.

1. Best management practices, as set forth in this permit, are required for all construction activities, and must be implemented in accordance with the design specifications contained in the "Manual for Erosion and Sediment Control in Georgia" (Manual) published by the Georgia Soil and Water Conservation Commission as of January 1 of the year in which the land-disturbing activity was permitted to prevent or reduce the pollution of waters of Georgia. Proper design, installation, and maintenance of best management practices shall constitute a complete defense to any action by the Director or to any other allegation of noncompliance with Part III.D.4. and Part III.D.5.
2. Except as required to install the initial sediment storage requirements and perimeter control BMPs as described in Part IV.D.3., the initial sediment storage requirements and perimeter control BMPs must be installed and implemented prior to conducting any other construction activities (e.g., clearing, grubbing and grading) within the construction site or when applicable, within phased sub-parts or segments of the construction site. Failure to comply shall constitute a violation of this permit for each day on which construction activities occur. The design professional who prepared the Plan must inspect the initial sediment storage requirements and perimeter control BMPs in accordance with Part IV.A.5. within seven (7) days after installation.
3. Failure to properly design, install, or maintain best management practices shall constitute a violation of this permit for each day on which such failure occurs. BMP maintenance as a result of the permittee's routine inspections shall not be considered a violation for the purposes of this paragraph. If during the course of the permittees routine inspection BMP failures are observed which have resulted in sediment deposition into Waters of the State, the permittee shall correct the

BMP failures and shall submit a summary of the violations to EPD in accordance with Part V.A.2. of this permit.

4. A discharge of stormwater runoff from disturbed areas where best management practices have not been properly designed, installed, and maintained shall constitute a separate violation for each day on which such discharge results in the turbidity of receiving water(s) being increased by more than ten (10) nephelometric turbidity units for waters classified as trout streams or more than twenty-five (25) nephelometric turbidity units for waters supporting warm water fisheries, regardless of a permittee's certification under Part II.B.1.i. This paragraph shall not apply to any land disturbance associated with the construction of single-family homes which are not part of a subdivision or planned common development unless five (5) acres or more will be disturbed.

5. When the permittee has elected to sample outfall(s), the discharge of stormwater runoff from disturbed areas where best management practices have not been properly designed, installed, and maintained shall constitute a separate violation for each day on which such condition results in the turbidity of the discharge exceeding the value selected from Appendix B applicable to the construction site. As set forth therein, the nephelometric turbidity unit (NTU) value shall be selected from Appendix B based upon the size of the construction site, the surface water drainage area and whether the receiving water(s) supports warm water fisheries or is a trout stream as indicated in the Rules and Regulations for Water Quality Control, Chapter 391-3-6.

6. Whenever a permittee finds that a BMP has failed or is deficient (beyond routine maintenance) and has resulted in sediment deposition into waters of the State, the permittee shall immediately take all reasonable steps to address the condition, including cleaning up any impacted areas so the material will not discharge in subsequent rain events. The permittee shall submit a summary of the violations to EPD in accordance with Part V.A.2. of this permit and shall correct such BMP as follows:

a. When the repair does not require a new or replacement BMP or significant repair, the BMP failure or deficiency must be repaired within two (2) business days from the time of discovery;

b. When the repair requires a new or replacement BMP or significant repair, the installation of the new or modified BMP must be completed and the BMP must be operational by no later than seven (7) days from the time of discovery. If it is infeasible to complete the installation or repair within seven (7) days, the permittee must document why it is infeasible to complete the installation or repair within the seven (7) day timeframe and document the schedule for installing or repairing the BMPs and making the BMPs operational as soon as feasible after the seven (7) day timeframe.

Part IV. EROSION, SEDIMENTATION AND POLLUTION CONTROL PLAN

A site-specific Erosion, Sedimentation and Pollution Control Plan (Plan) shall be designed, installed and maintained for the entire construction activity covered by this permit. The Erosion, Sedimentation and Pollution Control Plan must be prepared by a design professional as defined by

this permit. All persons involved in Plan preparation shall have completed the appropriate certification course, pursuant to O.C.G.A. 12-7-19(b), approved by the Georgia Soil and Water Conservation Commission. The design professional preparing the Plan must include and sign the following certification in the Plan:

“I certify that the permittee’s Erosion, Sedimentation and Pollution Control Plan provides for an appropriate and comprehensive system of best management practices required by the Georgia Water Quality Control Act and the document “Manual for Erosion and Sediment Control in Georgia” (Manual) published by the Georgia Soil and Water Conservation Commission as of January 1 of the year in which the land-disturbing activity was permitted, provides for the sampling of the receiving water(s) or the sampling of the stormwater outfalls and that the designed system of best management practices and sampling methods is expected to meet the requirements contained in the General NPDES Permit No. GAR100001.”

The Plan shall include any additional certifications regarding the design professional's site visit in accordance with the Rules for Erosion and Sedimentation Control promulgated by the Board of Natural Resources:

“I certify under penalty of law that this Plan was prepared after a site visit to the locations described herein by myself or my authorized agent, under my supervision.”

The Plan shall include, as a minimum, best management practices, including sound conservation and engineering practices to prevent and minimize erosion and resultant sedimentation, which are consistent with, and no less stringent than, those practices contained in the “Manual for Erosion and Sediment Control in Georgia” (Manual) published by the Georgia Soil and Water Conservation Commission as of January 1 of the year in which the land-disturbing activity was permitted and O.C.G.A. 12-7-6, as well as the following:

(i). Except as provided in Part IV.(iii). below, no construction activities shall be conducted within a 25 foot buffer along the banks of all State waters, as measured horizontally from the point where vegetation has been wrested by normal stream flow or wave action, except where the Director has determined to allow a variance that is at least as protective of natural resources and the environment in accordance with the provisions of O.C.G.A. 12-7-6, or where a drainage structure or a roadway drainage structure must be constructed, provided that adequate erosion control measures are incorporated in the project plans and specifications and are implemented, or along any ephemeral stream, or where bulkheads and seawalls must be constructed to prevent the erosion of the shoreline on Lake Oconee and Lake Sinclair. The buffer shall not apply to the following activities provided that adequate erosion control measures are incorporated into the project plans and specifications and are implemented:

- (1) public drinking water system reservoirs;
- (2) stream crossings for water lines and sewer lines, provided that the stream crossings occur at an angle, as measured from the point of crossing, within 25 degrees of perpendicular to the

- stream and cause a width of disturbance of not more than 50 feet within the buffer, and native riparian vegetation is re-established in any bare or disturbed areas within the buffer;
- (3) stream crossings for any utility lines of any electric membership corporation or municipal electrical system or any public utility under the regulatory jurisdiction of the Public Service Commission, any utility under the regulatory jurisdiction of the Federal Energy Regulatory Commission, any cable television system as defined in Code Section 36-18-1, or any agency or instrumentality of the United States engaged in the generation, transmission or distribution of power, provided that: (a) the stream crossings occur at an angle, as measured from the point of crossing, within 25 degrees of perpendicular to the stream and cause a width of disturbance of not more than 50 feet within the buffer, (b) native riparian vegetation is re-established in any bare or disturbed areas within the buffer and (c) the entity is not a Secondary Permittee for a project located within a common development or sale under this permit;
 - (4) buffer crossing for fences, provided that the crossings occur at an angle, as measured from the point of crossing, within 25 degrees of perpendicular to the stream and cause a width of disturbance of not more than 50 feet within the buffer, and native riparian vegetation is re-established in any bare or disturbed areas within the buffer;
 - (5) stream crossings for aerial utility lines, provided that: (a) the new utility line right-of-way width does not exceed 100 linear feet, (b) utility lines are routed and constructed so as to minimize the number of stream crossings and disturbances to the buffer, (c) only trees and tree debris are removed from within the buffer resulting in only minor soil erosion (i.e., disturbance to underlying vegetation is minimized), and (d) native riparian vegetation is re-established in any bare or disturbed areas within the buffer. The Plan shall include a description of the stream crossings with details of the buffer disturbance including area and length of buffer disturbance, estimated length of time of buffer disturbance, and justification;
 - (6) right-of-way posts, guy-wires, anchors, survey markers and the replacement or maintenance of existing utility structures within the current right-of-way undertaken or financed in whole or in part by the Department of Transportation, the Georgia Highway Authority or the State Road and Tollway Authority or undertaken by any county or municipality, provided that: (a) the area of land disturbance does not exceed 100 square feet per structure, (b) the area of buffer vegetation to be cut (not grubbed) does not exceed 1,000 square feet per structure, (c) native riparian vegetation is re-established in any bare or disturbed areas within the buffer and (d) the entity is not a Secondary Permittee for a project located within a common development or sale under this permit;
 - (7) right-of-way posts, guy-wires, anchors, survey markers and the replacement or maintenance of existing utility structures within the current right-of-way by any electric membership corporation or municipal electrical system or any public utility under the regulatory jurisdiction of the Public Service Commission, any utility under the regulatory jurisdiction of the Federal Energy Regulatory Commission, any cable television system as defined in Code Section 36-18-1, or any agency or instrumentality of the United States engaged in the generation, transmission or distribution of power, provided that: (a) the area of land disturbance does not exceed 100 square feet per structure, (b) the area of buffer vegetation to be cut (not grubbed) does not exceed 1,000 square feet per structure, (c) native riparian vegetation is re-established in any bare or disturbed areas within the buffer and (d) the entity

is not a Secondary Permittee for a project located within a common development or sale under this permit; and

- (8) maintenance (excluding dredging), repair and/or upgrade of Soil and Water Conservation District watershed dams when under the technical supervision of the USDA Natural Resources Conservation Service.

(ii). No construction activities shall be conducted within a 50 foot buffer, as measured horizontally from the point where vegetation has been wrested by normal stream flow or wave action, along the banks of any State waters classified as "trout streams" except when approval is granted by the Director for alternate buffer requirements in accordance with the provisions of O.C.G.A. 12-7-6, or where a roadway drainage structure must be constructed; provided, however, that small springs and streams classified as "trout streams" which discharge an average annual flow of 25 gallons per minute or less shall have a 25 foot buffer or they may be piped, at the discretion of the permittee, pursuant to the terms of a rule providing for a general variance promulgated by the Board of Natural Resources including notification of such to EPD and the Local Issuing Authority of the location and extent of the piping and prescribed methodology for minimizing the impact of such piping and for measuring the volume of water discharged by the stream. Any such pipe must stop short of the downstream permittee's property, and the permittee must comply with the buffer requirement for any adjacent trout streams. The buffer shall not apply to the following activities provided that adequate erosion control measures are incorporated into the project plans and specifications and are implemented:

- (1) public drinking water system reservoirs;
- (2) stream crossings for water lines and sewer lines, provided that the stream crossings occur at an angle, as measured from the point of crossing, within 25 degrees of perpendicular to the stream and cause a width of disturbance of not more than 50 feet within the buffer, and native riparian vegetation is re-established in any bare or disturbed areas within the buffer;
- (3) stream crossings for any utility lines of any electric membership corporation or municipal electrical system or any public utility under the regulatory jurisdiction of the Public Service Commission, any utility under the regulatory jurisdiction of the Federal Energy Regulatory Commission, any cable television system as defined in Code Section 36-18-1, or any agency or instrumentality of the United States engaged in the generation, transmission or distribution of power, provided that: (a) the stream crossings occur at an angle, as measured from the point of crossing, within 25 degrees of perpendicular to the stream and cause a width of disturbance of not more than 50 feet within the buffer, (b) native riparian vegetation is re-established in any bare or disturbed areas within the buffer and (c) the entity is not a Secondary Permittee for a project located within a common development or sale under this permit;
- (4) buffer crossing for fences, provided that the crossings occur at an angle, as measured from the point of crossing, within 25 degrees of perpendicular to the stream and cause a width of disturbance of not more than 50 feet within the buffer, and native riparian vegetation is re-established in any bare or disturbed areas within the buffer;
- (5) stream crossings for aerial utility lines, provided that: (a) the new utility line right-of-way width does not exceed 100 linear feet, (b) utility lines are routed and constructed so as to minimize the number of stream crossings and disturbances to the buffer, (c) only trees and

tree debris are removed from within the buffer resulting in only minor soil erosion (i.e., disturbance to underlying vegetation is minimized), and (d) native riparian vegetation is re-established in any bare or disturbed areas within the buffer. The Plan shall include a description of the stream crossings with details of the buffer disturbance including area and length of buffer disturbance, estimated length of time of buffer disturbance, and justification;

- (6) right-of-way posts, guy-wires, anchors, survey markers and the replacement or maintenance of existing utility structures within the current right-of-way undertaken or financed in whole or in part by the Department of Transportation, the Georgia Highway Authority or the State Road and Tollway Authority or undertaken by any county or municipality, provided that: (a) the area of land disturbance does not exceed 100 square feet per structure, (b) the area of buffer vegetation to be cut (not grubbed) does not exceed 1,000 square feet per structure, (c) native riparian vegetation is re-established in any bare or disturbed areas within the buffer and (d) the entity is not a Secondary Permittee for a project located within a common development or sale under this permit;
- (7) right-of-way posts, guy-wires, anchors, survey markers and the replacement or maintenance of existing utility structures within the current right-of-way undertaken by any electric membership corporation or municipal electrical system or any public utility under the, provided that: (a) the area of land disturbance does not exceed 100 square feet per structure, (b) the area of buffer vegetation to be cut (not grubbed) does not exceed 1,000 square feet per structure, (c) native riparian vegetation is re-established in any bare or disturbed areas within the buffer and (d) the entity is not a Secondary Permittee for a project located within a common development or sale under this permit; and
- (8) maintenance (excluding dredging), repair and/or upgrade of Soil and Water Conservation District watershed dams when under the technical supervision of the USDA Natural Resources Conservation Service.

(iii). Except as provided in Part IV(iv) below, no construction activities shall be conducted within a 25 foot buffer along coastal marshlands, as measured horizontally from the coastal marshland-upland interface, as determined in accordance with Part 4 of Article 4 of Chapter 5 of Title 12, the Coastal Marshlands Protection Act of 1970, and the rules and regulations promulgated thereunder, except where the Director determines to allow a variance that is at least as protective of natural resources and the environment in accordance with the provisions of O.C.G.A. 12-7-6, or where otherwise allowed by the Director pursuant to Code Section 12-2-8, or where an alteration within the buffer area has been authorized pursuant to Code Section 12-5-286, or for maintenance of any currently serviceable structure, landscaping, or hardscaping, including bridges, roads, parking lots, golf courses, golf cart paths, retaining walls, bulkheads, and patios, provided that adequate erosion control measures are incorporated into the project plans and specifications and such measures are fully implemented, or where a drainage structure or roadway drainage structure is constructed or maintained, provided that adequate erosion control measures are incorporated into the project plans and specifications and such measures are fully implemented, or on the landward side of any currently serviceable shoreline stabilization structure, or for the maintenance of any manmade stormwater detention basin, golf course pond, or impoundment that is located entirely within the property of a single individual, partnership, or corporation, provided that adequate erosion control measures are incorporated into the project plans and specifications and such measures are fully

implemented. The buffer shall not apply to the following activities provided that adequate erosion control measures are incorporated into the project plans and specifications and such measures are fully implemented:

- (1) Public drinking water system reservoirs;
- (2) Crossings for utility lines that cause a width of disturbance of not more than 50 feet within the buffer;
- (3) Any land-disturbing activity conducted pursuant to and in compliance with a valid and effective land-disturbing permit issued subsequent to April 22, 2014, and prior to December 31, 2015;
- (4) Any lot for which the preliminary plat has been approved prior to December 31, 2015 if roadways, bridges, or water and sewer lines have been extended to such lot prior to the effective date of this Act and if the requirement to maintain a 25 foot buffer would consume at least 18 percent of the high ground of the platted lot otherwise available for development;
- (5) Buffer crossings for fences, provided that the crossings occur at an angle, as measured from the point of crossing, within 25 degrees of perpendicular to the Jurisdictional Line and cause a width of disturbance of not more than 50 feet within the buffer, and vegetation is re-established in any bare or disturbed areas within the buffer;
- (6) Crossings for aerial utility lines, provided that: (a) the new utility line right-of-way width does not exceed 100 linear feet, (b) utility lines are routed and constructed so as to minimize the number of crossings and disturbances to the buffer, (c) only trees and tree debris are removed from within the buffer resulting in only minor soil erosion (i.e., disturbance to underlying vegetation is minimized), and (d) vegetation is re-established in any bare or disturbed areas within the buffer. The Plan shall include a description of the crossings with details of the buffer disturbance including area and length of buffer disturbance, estimated length of time of buffer disturbance, and justification;
- (7) Right-of-way posts, guy wires, anchors, survey markers and the replacement or maintenance of existing utility structures within the current right-of-way undertaken or financed in whole or in part by the Department of Transportation, the Georgia Highway Authority or the State Road and Tollway Authority or undertaken by any county or municipality, provided that: (a) the area of land disturbance does not exceed 100 square feet per structure, (b) the area of buffer vegetation to be cut (not grubbed) does not exceed 1,000 square feet per structure, (c) vegetation is re-established in any bare or disturbed areas within the buffer and (d) the entity is not a Secondary Permittee for a project located within a common development or sale under this permit;
- (8) Right-of-way posts, guy wires, anchors, survey markers and the replacement or maintenance of existing utility structures within the current right-of-way by any electric membership corporation or municipal electrical system or any public utility under the regulator jurisdiction of the Public Service Commission, any utility under the regulatory jurisdiction of the Federal Energy Regulatory Commission, any cable television system as defined in Code Section 36-18-1, or any agency or instrumentality of the United States engaged in the generation, transmission or distribution of power, provided that (a) the area of land disturbance does not exceed 100 square feet per structure, (b) the area of buffer vegetation to be cut (not grubbed) does not exceed 1,000 square feet per structure, (c) vegetation is re-established in any bare or disturbed areas within the buffer and (d) the

entity is not a Secondary Permittee for a project located within a common development or sale under this permit; and

- (9) maintenance (excluding dredging), repair and/or upgrade of Soil and Water Conservation District watershed dams when under the technical supervision of the USDA Natural Resources Conservation Service.

(iv). Except as provided above, for buffers required pursuant to Part IV.(i). and (ii) and (iii), no construction activities shall be conducted within a buffer and a buffer shall remain in its natural, undisturbed, state of vegetation until all land-disturbing activities on the construction site are completed. During coverage under this permit, a buffer cannot be thinned or trimmed of vegetation and a protective vegetative cover must remain to protect water quality and aquatic habitat and a natural canopy must be left in sufficient quantity to keep shade on the stream bed or marsh.

The Erosion, Sedimentation and Pollution Control Plan shall identify all potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges from the construction site. In addition, the Plan shall describe, and the applicable permittee shall ensure, the implementation of practices which will be used to reduce the pollutants in stormwater discharges associated with construction activity at the site and to assure compliance with the terms and conditions of this permit. The applicable permittee must implement and maintain the provisions of the Plan required under this part as a condition of this permit.

Except as provided in Part IV.A.2., a single Erosion, Sedimentation and Pollution Control Plan must be prepared by the Primary Permittee for the stand alone construction project.

A. Deadlines for Plan Preparation and Compliance.

1. Except as provided in Part IV.A.2. and Part IV.A.6., the Erosion, Sedimentation and Pollution Control Plan shall be completed prior to submitting the NOI and prior to conducting any construction activity by any permittee.

2. For construction activities that began on or before the effective date of this permit and were subject to the regulations under the previous permit, the permittee(s) shall continue to operate under the existing Plan.

3. For construction activities that begin after the effective date of this permit, the Primary Permittee shall be required to prepare the Plan for that phase of the stand alone development that corresponds with the NOI being submitted and the Primary Permittee(s) shall implement the Plan on or before the day construction activities begin.

4. Additional Plan Submittals.

a. For all projects identified under Part I.C.1.b., which begin after the effective date of this permit, in a jurisdiction where there is no certified Local Issuing Authority regulating that project, a single copy of the Plan must be submitted to the EPD Watershed Protection Branch to the address provided in Appendix A or through the electronic submittal method

provided by EPD and a second copy of the Plan must be submitted to the appropriate EPD District Office prior to or concurrent with the NOI submittal. The second copy of the Plan must be submitted electronically as a Portable Document Format (PDF) file through the electronic submittal method provided by EPD, or by return receipt certified mail or similar service to the appropriate EPD District Office. The permittee shall retain a copy of the proof of the submittal at the construction site or the proof of submittal shall be readily available at a designated alternative location from commencement of construction until such a time as a Notice of Termination (NOT) is submitted in accordance with Part VI. The EPD Watershed Protection Branch will review Plans for deficiencies using the applicable Erosion, Sedimentation and Pollution Control Plan Checklist established by the Georgia Soil and Water Conservation Commission as of January 1 of the year in which the land-disturbing activity was permitted.

b. For all projects where the construction activity as indicated on the existing NOI has changed, the amended Plans must be submitted in accordance with Part IV.A.4.a. In addition, the permittee must submit a modification NOI in accordance with Part II.

5. For stand alone projects that begin construction activity after the effective date of this permit, the Primary Permittee must retain the design professional who prepared the Erosion, Sedimentation and Pollution Control Plan, or an alternative design professional approved by EPD in writing, to inspect and certify the installation of the initial sediment storage requirements and perimeter control BMPs which the design professional designed within seven (7) days after installation. The design professional shall determine if these BMPs have been installed and are being maintained as designed. The design professional shall report the results of the inspection to the Primary Permittee within seven (7) days and the permittee must correct all deficiencies within two (2) business days of receipt of the inspection report from the design professional prior to commencing with construction activities as required by Part III.D.2 of this Permit unless weather related site conditions are such that additional time is required.

6. For storm- or emergency-related repair work, the permittee shall implement appropriate BMPs and certified personnel (provided by the Primary Permittee) shall inspect at least once every seven (7) calendar days and within 24 hours of the end of a storm that is 0.5 inches rainfall or greater. If the storm- or emergency-related repair work will not be completed within sixty (60) days of commencement of construction activity, a single copy of the Plan shall be submitted to EPD and the permittee shall comply with all requirements of this permit on the sixty-first (61st) day.

B. Signature and Plan Review.

1. The Erosion, Sedimentation and Pollution Control Plan shall be signed in accordance with Part IV., and be retained on the site (or, if not possible, at a readily accessible location) which generates the stormwater discharge in accordance with Part IV.F. of this permit.

2. The Primary Permittee shall make Plans available upon request to the EPD; to designated officials of the local government reviewing soil Erosion, Sedimentation and Pollution Control Plans, grading plans, or stormwater management plans; or in the case of a stormwater discharge

associated with construction activity which discharges through a municipal separate storm sewer system with an NPDES permit, to the local government operating the municipal separate storm sewer system.

3. EPD may notify the Primary Permittee at any time that the Plan does not meet one or more of the minimum requirements of this Part. Within seven (7) days of such notification (or as otherwise provided by EPD), the Primary Permittee shall make the required changes to the Plan and shall submit to EPD either the amended Plan or a written certification that the requested changes have been made.

C. Keeping Plans Current. The Primary Permittee(s) shall amend their Plan whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on BMPs with a hydraulic component (i.e., those BMPs where the design is based upon rainfall intensity, duration and return frequency of storms) or if the Plan proves to be ineffective in eliminating or significantly minimizing pollutants from sources identified under Part IV.D.3. Amendments to the Plan must be certified by a design professional as provided in this permit.

D. Contents of Plan. The Erosion, Sedimentation and Pollution Control Plan shall include, as a minimum, best management practices, including sound conservation and engineering practices to prevent and minimize erosion and resultant sedimentation, which are consistent with, and no less stringent than, those practices contained in the “Manual for Erosion and Sediment Control in Georgia” (Manual) published by the Georgia Soil and Water Conservation Commission as of January 1 of the year in which the land-disturbing activity was permitted, as well as the following:

1. Checklist. Each plan shall include a completed Erosion, Sedimentation and Pollution Control Plan Checklist established by the Georgia Soil and Water Conservation Commission (GSWCC) as of January 1 of the year in which the land-disturbing activity was permitted and amendments to the applicable Checklist as approved by the GSWCC up until the date of the NOI submittal. The applicable checklists are available on the GSWCC website.

2. Site description. Each site-specific Plan shall provide a description of pollutant sources and other information as indicated:

- a. A description of the nature of the construction activity;
- b. A description of normal business hours as established by the Permittee;
- c. A detailed description and chart or timeline of the intended sequence of major activities which disturb soils for major portions of the site (i.e., initial sediment storage requirements and perimeter BMPs, clearing and grubbing activities, excavation activities, grading activities, infrastructure activities, immediate and final stabilization activities);
- d. Estimates of the total area of the site and the total area of the site that is expected to be disturbed by excavation, grading, or other activities;

e. An estimate of the runoff coefficient or peak discharge flow of the site prior to the construction activities and after construction activities are completed and existing data describing the soil or the quality of any discharge from the site¹;

f. A site-specific map indicating drainage patterns and approximate slopes anticipated after major grading activities, areas of soil disturbance, an outline of areas which are not to be disturbed, the location of major structural and nonstructural controls identified in the Plan, the location of areas where stabilization practices are expected to occur, surface waters (including wetlands), and locations where stormwater is discharged to a surface water; and

g. Identify the receiving water(s) and areal extent of wetland acreage at the site;

3. Controls. Each Plan shall include a description of appropriate controls and measures that will be implemented at the construction site including: (1) initial sediment storage requirements and perimeter control BMPs, (2) intermediate grading and drainage BMPs, and (3) final BMPs. For construction sites where there will be no mass grading and the initial sediment storage requirements and perimeter control BMPs, intermediate grading and drainage BMPs, and final BMPs are the same, the Plan may combine all of the BMPs into a single-phase Plan. The Plan will include appropriate staging and access requirements for construction equipment. Plans submitted after the effective date of this permit shall limit the amount of disturbed area to less than 50 acres at any one time without prior written authorization from the appropriate EPD District Office according to the schedule in Appendix A of this permit. EPD will approve or disapprove such requests within 35 days of receipt. Failure of EPD to act within 35 days shall be considered an approval of such requests. If the EPD District Office approves a request to disturb 50 acres or more at any one time, the Plan must include at least four (4) of the best management practices listed in Part III.C.2. of this permit.

The Plan will clearly describe for each major activity identified in Part IV.D.2.b. appropriate control measures and the timing during the construction process that the measures will be implemented. The Primary Permittee is encouraged to utilize the document, Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites, EPA 833-R-060-04, May 2007, when preparing the Plan. The description and implementation of controls shall address the following minimum components:

a. Erosion and sediment controls.

(1). Stabilization measures. A description of interim and permanent stabilization measures, including site-specific scheduling of the implementation of the measures. Site plans should ensure that existing vegetation is preserved and that disturbed portions of the site are stabilized. Stabilization measures may include: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other

¹ For solar farm projects, solar panels are to be considered impervious areas when determining the calculations and the post-construction impervious area shall be calculated as 70% of the square footage of the solar panels.

appropriate measures. A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be included in the Plan. Except as provided in paragraphs IV.D.3(a)(1)(a). below, stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

(a). Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently cease is precluded by snow cover or other adverse weather conditions, stabilization measures shall be initiated as soon as practicable.

(2). Structural practices. A description of structural practices to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Such practices may include silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. Structural practices should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA.

(3). Sediment basins. For common drainage locations a temporary (or permanent) sediment basin providing at least 1800 cubic feet (67 cubic yards) of storage per acre drained, or equivalent control measures, shall be provided until final stabilization of the site. The 1800 cubic feet (67 cubic yards) of storage area per acre drained does not apply to flows from off-site areas and flows from on-site areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. For drainage locations where a temporary sediment basin providing at least 1800 cubic feet (67 cubic yards) of storage per acre drained, or equivalent controls is not attainable, sediment traps, silt fences, wood mulch berms or equivalent sediment controls are required for all side slope and down slope boundaries of the construction area. When the sediment fills to a volume at most of 22 cubic yards per acre for each acre of drainage area, the sediment shall be removed to restore the original design volume. This sediment must be properly disposed. Sediment basins may not be feasible at some construction sites. Careful consideration must be used to determine when a sediment basin cannot be used and/or when 67 cubic yards of storage per acre drained is not attainable and a written justification explaining the decision(s) must be included in the Plan. Perennial and intermittent waters of the State shall not be used for temporary or permanent sediment detention.

When discharging from sediment basins and impoundments, permittees are required to utilize outlet structures that withdraw water from the surface, unless infeasible. If outlet structures that withdraw water from the surface are not feasible, a written justification explaining this decision must be included in the Plan. Outlet structures that withdraw water from the surface are temporary BMPs and must be removed prior to submitting a Notice of Termination. For construction activities where the NOI was submitted prior to January 1, 2014, this requirement of the permit is not applicable.

(4). Alternative BMPs. The use of alternative BMPs whose performance has been documented to be equivalent or superior to conventional BMPs as certified by a Design Professional may be allowed (unless disapproved by EPD or the Georgia Soil and Water Conservation Commission).

(5). High performance BMPs. The use of infiltration trenches, seep berms, sand filters, dry wells, flocculants or coagulants, etc. for minimizing point source discharges except for large rainfall events is encouraged.

b. Stormwater management. A description of measures that will be installed during the construction process to control pollutants in stormwater discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA. This permit only addresses the installation of stormwater management measures, and not the ultimate operation and maintenance of such structures after the construction activities have been completed and the site has undergone final stabilization. Operators are only responsible for the installation and maintenance of stormwater management measures prior to final stabilization of the site and are not responsible for maintenance after stormwater discharges associated with construction activity have been eliminated from the site.

(1). Such practices may include: stormwater detention structures (including wet ponds); stormwater retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff on-site; and sequential systems (which combine several practices). The Plan shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed pre-development levels.

(2). Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel for the purpose of providing a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g., no significant changes in the hydrological regime of the receiving water(s)).

(3). Installation and use of green infrastructure approaches and practices that mimic natural processes and direct stormwater where it can be infiltrated,

evapotranspired or re-used with significant utilization of soils and vegetation rather than traditional hardscape collection, conveyance and storage structures are encouraged to the maximum extent practicable. Green Infrastructure practices or approaches include permeable or porous paving, vegetated swales instead of curbs and gutters, green roofs, tree boxes, rain gardens, constructed wetlands, infiltration planters, vegetated median strips, protection and enhancement of riparian buffers and floodplains, and the overall reduction in site disturbance and impervious area. Design information on Green Infrastructure practices and other ways to manage stormwater can be found in the Georgia Stormwater Management Manual and Coastal Stormwater Supplement. Additional information on Green Infrastructure can be found at the USEPA website.

c. Other controls.

(1). Waste disposal. Locate waste collection areas away from streets, gutters, watercourses and storm drains. Waste collection areas, such as dumpsters, are often best located near construction site entrances to minimize traffic on disturbed soils. The Plan should include secondary containment around liquid waste collection areas to further minimize the likelihood of contaminated discharges. Solid materials, including building materials, shall not be discharged to waters of the State, except as authorized by a Section 404 permit.

(2). For building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site, provide cover (e.g., plastic sheeting, temporary roofs) to minimize the exposure of these products to precipitation and to stormwater, or a similarly effective means designed to minimize the discharge of pollutants from these areas. Minimization of exposure is not required in cases where exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk to stormwater contamination (such as final products and materials intended for outdoor use).

(3). Off-site vehicle tracking of dirt, soils, and sediments and the generation of dust shall be minimized or eliminated to the maximum extent practical. The Plan shall include the best management practice to be implemented at the site or construction activity.

(4). Nothing in this permit relieves a permittee from any obligation to comply with all applicable State and local regulations of waste disposal, sanitary sewer, septic and petroleum storage systems.

(5). The Plan shall include best management practices for the remediation of all petroleum spills and leaks as appropriate.

(6). The Plan shall include best management practices for concrete washdown of tools, concrete mixer chutes, hoppers and the rear of vehicles. Washout of the drum at the construction site is prohibited. Additional information about best management practices for concrete washout is available at the USEPA website.

(7). All permittees are required to minimize the discharge of pollutants from dewatering trenches and excavations. Discharges are prohibited unless managed by appropriate controls.

4. Inspections.

a. Permittee requirements.

(1). Each day when any type of construction activity has taken place at a Primary Permittee's site, certified personnel provided by the Primary Permittee shall inspect: (a) all areas at the Primary Permittee's site where petroleum products are stored, used, or handled for spills and leaks from vehicles and equipment and (b) all locations at the Primary Permittee's site where vehicles enter or exit the site for evidence of off-site sediment tracking. These inspections must be conducted until a Notice of Termination is submitted.

(2). Measure and record rainfall within disturbed areas of the site that have not met final stabilization once every 24 hours except any non-working Saturday, non-working Sunday and non-working Federal holiday. The data collected for the purpose of compliance with this permit shall be representative of the monitored activity. Measurement of rainfall may be suspended if all areas of the site have undergone final stabilization or established a crop of annual vegetation and a seeding of target perennials appropriate for the region.

(3). Certified personnel (provided by the Primary Permittee) shall inspect the following at least once every seven (7) calendar days: (a) disturbed areas of the Primary Permittee's construction site; (b) areas used by the Primary Permittee for storage of materials that are exposed to precipitation; and (c) structural control measures. Erosion and sediment control measures identified in the Plan applicable to the Primary Permittee's site shall be observed to ensure that they are operating correctly. Certified personnel shall also conduct inspections within 24 hours of the end of a storm that is 0.5 inches rainfall or greater (unless such storm ends after 5:00 PM on any Friday or on any non-working Saturday, non-working Sunday or any non-working Federal holiday in which case the inspection shall be completed by the end of the next business day and/or working day, whichever occurs first). Post-rain inspections will reset the 7-day inspection frequency requirement. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving water(s). For areas of a site that have undergone final stabilization or established a crop of annual vegetation and a seeding of target perennials

appropriate for the region, the permittee must comply with Part IV.D.4.a.(4). These inspections must be conducted until a Notice of Termination is submitted.

(4). Certified personnel (provided by the Primary Permittee) shall inspect at least once per month during the term of this permit (i.e., until a Notice of Termination has been submitted) the areas of the site that have undergone final stabilization or established a crop of annual vegetation and a seeding of target perennials appropriate for the region. These areas shall be inspected for evidence of, or the potential for, pollutants entering the drainage system and the receiving water(s). Erosion and sediment control measures identified in the Plan shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving water(s).

(5). Based on the results of each inspection, the site description and the pollution prevention and control measures identified in the Erosion, Sedimentation and Pollution Control Plan, the Plan shall be revised as appropriate not later than seven (7) calendar days following each inspection. Implementation of such changes shall be made as soon as practical but in no case later than seven (7) calendar days following each inspection.

(6). A report of each inspection that includes the name(s) of certified personnel making each inspection, the date(s) of each inspection, construction phase (i.e., initial, intermediate or final), major observations relating to the implementation of the Erosion, Sedimentation and Pollution Control Plan, and actions taken in accordance with Part IV.D.4.a.(5). of the permit shall be made and retained at the site or be readily available at a designated alternate location until the entire site or that portion of a construction site that has been phased has undergone final stabilization and a Notice of Termination is submitted to EPD. Such reports shall be readily available by end of the second business day and/or working day and shall identify all incidents of best management practices that have not been properly installed and/or maintained as described in the Plan. Where the report does not identify any incidents, the inspection report shall contain a certification that the best management practices are in compliance with the Erosion, Sedimentation and Pollution Control Plan. The report shall be signed in accordance with Part V.G.2. of this permit.

5. Maintenance. The Plan shall include a description of procedures to ensure the timely maintenance of vegetation, erosion and sediment control measures and other protective measures identified in the site plan.

6. Sampling Requirements. This permit requires the monitoring of nephelometric turbidity in receiving water(s) or outfalls in accordance with this permit. This paragraph shall not apply to any land disturbance associated with the construction of single-family homes which are not part of a

subdivision or planned common development unless five (5) acres or more will be disturbed. The following procedures constitute EPD's guidelines for sampling turbidity.

a. *Sampling Requirements* shall include the following:

- (1). A USGS topographic map, a topographic map or a drawing (referred to as a topographic map) that is a scale equal to or more detailed than a 1:24000 map showing the location of the site or the stand alone construction; (a) the location of all perennial and intermittent streams and other water bodies as shown on a USGS topographic map, and all other perennial and intermittent streams and other water bodies located during mandatory field verification, into which the stormwater is discharged and (b) the receiving water and/or outfall sampling locations. When the permittee has chosen to use a USGS topographic map and the receiving water(s) is not shown on the USGS topographic map, the location of the receiving water(s) must be hand-drawn on the USGS topographic map from where the stormwater(s) enters the receiving water(s) to the point where the receiving water(s) combines with the first blue line stream shown on the USGS topographic map;
- (2). A written narrative of site specific analytical methods used to collect, handle and analyze the samples including quality control/quality assurance procedures. This narrative must include precise sampling methodology for each sampling location;
- (3). When the permittee has determined that some or all outfalls will be sampled, a rationale must be included on the Plan for the NTU limit(s) selected from Appendix B. This rationale must include the size of the construction site, the calculation of the size of the surface water drainage area, and the type of receiving water(s) (i.e., trout stream or supporting warm water fisheries); and
- (4). Any additional information EPD determines necessary to be part of the Plan. EPD will provide written notice to the permittee of the information necessary and the timeline for submittal.

b. *Sample Type*. All sampling shall be collected by "grab samples" and the analysis of these samples must be conducted in accordance with methodology and test procedures established by 40 CFR Part 136 (unless other test procedures have been approved); the guidance document titled "NPDES Storm Water Sampling Guidance Document, EPA 833-B-92-001" and guidance documents that may be prepared by the EPD.

- (1). Sample containers should be labeled prior to collecting the samples.
- (2). Samples should be well mixed before transferring to a secondary container.
- (3). Large mouth, well cleaned and rinsed glass or plastic jars should be used for collecting samples. The jars should be cleaned thoroughly to avoid contamination.

(4). Manual, automatic or rising stage sampling may be utilized. Samples required by this permit should be analyzed immediately, but in no case later than 48 hours after collection. However, samples from automatic samplers must be collected no later than the next business day after their accumulation, unless flow through automated analysis is utilized. If automatic sampling is utilized and the automatic sampler is not activated during the qualifying event, the permittee must utilize manual sampling or rising stage sampling during the next qualifying event. Dilution of samples is not required. Samples may be analyzed directly with a properly calibrated turbidimeter. Samples are not required to be cooled.

(5). Sampling and analysis of the receiving water(s) or outfalls beyond the minimum frequency stated in this permit must be reported to EPD as specified in Part IV.E.

c. Sampling Points.

(1). For construction activities the Primary Permittee must sample all receiving water(s), or all outfall(s), or a combination of receiving water(s) and outfall(s). Sampling points shall be located on applicable pages of the Initial, Intermediate, and Final phase of the Erosion, Sedimentation and Pollution Control Plans. Samples taken for the purpose of compliance with this permit shall be representative of the monitored activity and representative of the water quality of the receiving water(s) and/or the stormwater outfalls using the following minimum guidelines:

(a). The upstream sample for each receiving water(s) must be taken immediately upstream of the confluence of the first stormwater discharge from the permitted activity (i.e., the discharge farthest upstream at the site) but downstream of any other stormwater discharges not associated with the permitted activity. Where appropriate, several upstream samples from across the receiving water(s) may need to be taken and the arithmetic average of the turbidity of these samples used for the upstream turbidity value.

(b). The downstream sample for each receiving water(s) must be taken downstream of the confluence of the last stormwater discharge from the permitted activity (i.e., the discharge farthest downstream at the site) but upstream of any other stormwater discharge not associated with the permitted activity. Where appropriate, several downstream samples from across the receiving water(s) may need to be taken and the arithmetic average of the turbidity of these samples used for the downstream turbidity value.

- (c). Ideally the samples should be taken from the horizontal and vertical center of the receiving water(s) or the stormwater outfall channel(s).
- (d). Care should be taken to avoid stirring the bottom sediments in the receiving water(s) or in the outfall stormwater channel.
- (e). The sampling container should be held so that the opening faces upstream.
- (f). The samples should be kept free from floating debris.
- (g). Permittees do not have to sample sheet flow that flows onto undisturbed natural areas or areas stabilized by the project. For purposes of this section, stabilized shall mean, for unpaved areas and areas not covered by permanent structures and areas located outside the waste disposal limits of a landfill cell that has been certified by EPD for waste disposal, 100% of the soil surface is uniformly covered in permanent vegetation with a density of 70% or greater, or landscaped according to the Plan (uniformly covered with landscaping materials in planned landscaped areas), or equivalent permanent stabilization measures as defined in the Manual (excluding a crop of annual vegetation and a seeding of target crop perennials appropriate for the region).
- (h). All sampling pursuant to this permit must be done in such a way (including generally accepted sampling methods, locations, timing, and frequency) as to accurately reflect whether stormwater runoff from the construction site is in compliance with the standard set forth in Parts III.D.4. or III.D.5., whichever is applicable.

d. Sampling Frequency.

- (1). The Primary Permittee must sample in accordance with the Plan at least once for each rainfall event described below. For a qualifying event, the permittee shall sample at the beginning of any stormwater discharge to a monitored receiving water and/or from a monitored outfall location within in forty-five (45) minutes or as soon as possible.
- (2). However, where manual and automatic sampling are impossible (as defined in this permit), or are beyond the permittee's control, the permittee shall take samples as soon as possible, but in no case more than twelve (12) hours after the beginning of the stormwater discharge.
- (3). Sampling by the permittee shall occur for the following qualifying events:
 - (a). For each area of the site that discharges to a receiving water or from an outfall, the first rain event that reaches or exceeds 0.5 inch with a

stormwater discharge that occurs during normal business hours after all clearing and grubbing operations have been completed, but prior to completion of mass grading operations, in the drainage area of the location selected as the sampling location;

(b). In addition to (a) above, for each area of the site that discharges to a receiving water or from an outfall, the first rain event that reaches or exceeds 0.5 inch with a stormwater discharge that occurs during normal business hours either 90 days after the first sampling event or after all mass grading operations have been completed, but prior to submittal of a NOT, in the drainage area of the location selected as the sampling location, whichever comes first;

(c). At the time of sampling performed pursuant to (a) and (b) above, if BMPs in any area of the site that discharges to a receiving water or from an outfall are not properly designed, installed and maintained, corrective action shall be defined and implemented within two (2) business days, and turbidity samples shall be taken from discharges from that area of the site for each subsequent rain event that reaches or exceeds 0.5 inch during normal business hours* until the selected turbidity standard is attained, or until post-rain event inspections determine that BMPs are properly designed, installed and maintained;

(d). Where sampling pursuant to (a), (b) or (c) above is required but not possible (or not required because there was no discharge), the permittee, in accordance with Part IV.D.4.a.(6), must include a written justification in the inspection report of why sampling was not performed. Providing this justification does not relieve the permittee of any subsequent sampling obligations under (a), (b) or (c) above; and

(e). Existing construction activities, i.e., those that are occurring on or before the effective date of this permit, that have met the sampling required by (a) above shall sample in accordance with (b). Those existing construction activities that have met the sampling required by (b) above shall not be required to conduct additional sampling other than as required by (c) above.

*Note that the permittee may choose to meet the requirements of (a) and (b) above by collecting turbidity samples from any rain event that reaches or exceeds 0.5 inch and allows for sampling at any time of the day or week.

7. Non-stormwater discharges. Except for flows from fire-fighting activities, sources of non-stormwater listed in Part III.A.2. of this permit that are combined with stormwater discharges associated with construction activity must be identified in the Plan. The Plan shall identify and ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge.

E. Reporting.

1. The applicable permittees are required to submit the sampling results to the EPD at the address shown in Part II.C. by the fifteenth day of the month following the reporting period. Reporting periods are months during which samples are taken in accordance with this permit. Sampling results shall be in a clearly legible format. Upon written notification, EPD may require the applicable permittee to submit the sampling results on a more frequent basis. Sampling and analysis of any stormwater discharge(s) or the receiving water(s) beyond the minimum frequency stated in this permit must be reported in a similar manner to the EPD. The sampling reports must be signed in accordance with Part V.G.2. Sampling reports must be submitted to EPD using the electronic submittal service provided by EPD. Sampling reports must be submitted to EPD until such time as a NOT is submitted in accordance with Part VI.

2. All sampling reports shall include the following information:

- a. The rainfall amount, date, exact place and time of sampling or measurements;
- b. The name(s) of the certified personnel who performed the sampling and measurements;
- c. The date(s) analyses were performed;
- d. The time(s) analyses were initiated;
- e. The name(s) of the certified personnel who performed the analyses;
- f. References and written procedures, when available, for the analytical techniques or methods used;
- g. The results of such analyses, including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine these results;
- h. Results which exceed 1000 NTU shall be reported as "exceeds 1000 NTU;" and
- i. Certification statement that sampling was conducted as per the Plan.

3. All written correspondence required by this permit shall be submitted by return receipt certified mail (or similar service) to the appropriate EPD District Office or delivery receipt email to the appropriate EPD District Office resource mailbox according to the schedule in Appendix A of this permit. The permittee shall retain a copy of the proof of submittal at the construction site or the proof of submittal shall be readily available at a designated location from commencement of construction until such time as a NOT is submitted in accordance with Part VI.

F. Retention of Records.

1. The Primary Permittee shall retain the following records at the construction site or the records shall be readily available at a designated alternate location from commencement of construction until such time as a NOT is submitted in accordance with Part VI:

- a. A copy of all Notices of Intent submitted to EPD;
- b. A copy of the Erosion, Sedimentation and Pollution Control Plan required by this permit;
- c. The design professional's report of the results of the inspection conducted in accordance with Part IV.A.5. of this permit;

- d. A copy of all sampling information, results, and reports required by this permit;
 - e. A copy of all inspection reports generated in accordance with Part IV.D.4.a. of this permit;
 - f. A copy of all violation summaries and violation summary reports generated in accordance with Part III.D. of this permit; and
 - g. Daily rainfall information collected in accordance with Part IV.D.4.a.(2). of this permit.
2. Copies of all Notices of Intent, Notices of Termination, inspection reports, sampling reports (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) or other reports requested by the EPD, Erosion, Sedimentation and Pollution Control Plans, records of all data used to complete the Notice of Intent to be covered by this permit and all other records required by this permit shall be retained by the permittee who either produced or used it for a period of at least three years from the date that the NOT is submitted in accordance with Part VI. of this permit. These records must be maintained at the permittee's primary place of business or at a designated alternative location once the construction activity has ceased at the permitted site. This period may be extended by request of the EPD at any time upon written notification to the permittee.

Part V. STANDARD PERMIT CONDITIONS

A. Duty to Comply.

1. Each permittee must comply with all applicable conditions of this permit. Any permit noncompliance constitutes a violation of the Georgia Water Quality Control Act (O.C.G.A. §§12-5-20, et seq.) and is grounds for enforcement action; for permit termination; or for denial of a permit renewal application. Failure of a Primary Permittee to comply with any applicable term or condition of this permit shall not relieve any other Primary Permittee from compliance with their applicable terms and conditions of this permit.
2. Each permittee must document in their records any and all known violations of this permit at his/her site within seven (7) days of his/her knowledge of the violation. A summary of these violations must be submitted to EPD by the permittee at the addresses shown in Appendix A within fourteen (14) days of his/her discovery of the violation.
3. Penalties for violations of permit conditions. The Federal Clean Water Act and the Georgia Water Quality Control Act (O.C.G.A. §§12-5-20, et seq.) provide that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit, makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine or by imprisonment, or by both. The Federal Clean Water Act and the Georgia Water Quality Control Act also provide procedures for imposing civil penalties which may be levied for violations of the Acts, any permit condition or limitation established pursuant to the Acts, or

negligently or intentionally failing or refusing to comply with any final or emergency order of the Director.

B. Continuation of the Expired General Permit. This permit expires on the date shown on the cover page of this permit. However, an expired general permit continues in force and effect until a new general permit is issued, final and effective.

C. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Duty to Provide Information. The permittee shall furnish to the Director; a State or local agency approving soil Erosion, Sedimentation and Pollution Control Plans, grading plans, or stormwater management plans; or in the case of a stormwater discharge associated with construction activity which discharges through a municipal separate storm sewer system with an NPDES permit, to the local government operating the municipal separate storm sewer system, any information which is requested to determine compliance with this permit. In the case of information submitted to the EPD such information shall be considered public information and available under the Georgia Open Records Act.

F. Other Information. When the permittee becomes aware that he failed to submit any relevant facts or submitted incorrect information in the Notice of Intent or in any other report required to be submitted to the EPD, the permittee shall promptly submit such facts or information.

G. Signatory Requirements. All Notices of Intent, Notice of Terminations, inspection reports, sampling reports or other reports requested by the EPD shall be signed as follows:

1. All Notices of Intent and Notices of Termination shall be signed as follows:

a. For a corporation: by a responsible corporate officer. For the purpose of this permit, a responsible corporate officer means: (1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or (2) the manager of one or more manufacturing, production or operating facilities provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where

authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

c. For a municipality, State, Federal, or other public facility: by either a principal executive officer or ranking elected official; and

d. Changes to authorization. If an authorization under Part II.B. is no longer accurate, a modification NOI satisfying the requirements of Part II.B. must be submitted to the EPD prior to or together with any inspection reports, sampling reports, or other reports requested by the EPD to be signed by a person described above or by a duly authorized representative of that person.

2. All inspection reports, sampling reports, or other reports requested by the EPD shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person(s) described above and submitted to the EPD;

b. The authorization specifies either an individual or a position having responsibility for specified operation(s) of the regulated facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may be either a named individual or any individual occupying a named position); and

c. *Certification.* Reports delineated in Part V.G.2. shall be signed by the permittee or duly authorized representative and shall make the following certification:

“I certify under penalty of law that this report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that certified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

H. Oil and Hazardous Substance Liability. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under the Georgia Hazardous Waste Management Act, O.C.G.A. § 12-8-60, et seq. or under Chapter 14 of Title 12 of the Official Code

of Georgia Annotated; nor is the Operator relieved from any responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act or Section 106 of Comprehensive Environmental Response Compensation And Liability Act.

I. Property Rights. The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

J. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

K. Other Applicable Environmental Regulations and Laws. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act. Nothing in this permit, unless explicitly stated, exempts the permittee from compliance with other applicable local, state and federal ordinances, rules, regulations, and laws. Furthermore, it is not a defense to compliance with this permit that a local government authority has approved the permittee's Erosion, Sedimentation and Pollution Control Plan or failed to take enforcement action against the permittee for violations of the Erosion, Sedimentation and Pollution Control Plan, or other provisions of this permit.

No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

L. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the required plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

M. Inspection and Entry. The permittee shall allow the Director or an authorized representative of EPA, EPD or to designated officials of the local government reviewing soil Erosion, Sedimentation and Pollution Control Plans, grading plans, or stormwater management plans; or, in the case of a construction site which discharges through a municipal separate storm sewer system, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit; and

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and
3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

N. Permit Actions. This permit may be revoked and reissued, or terminated for cause including but not limited to changes in the law or regulations. The filing of a request by the permittee for termination of the permit, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

Part VI. TERMINATION OF COVERAGE

A. Notice of Termination Eligibility. Notice of Termination signed in accordance with Part V.G.1. of this permit must be submitted:

1. For construction activities, by the permittee where the entire stand alone development has undergone final stabilization, all stormwater discharges associated with construction activity that are authorized by this permit have ceased, the site is in compliance with this permit and all temporary BMPs have been removed. For construction activities where the Primary Permittee has elected to submit NOIs for separate phases of the stand alone development, the phase or phases of the stand alone development on the NOT shall correspond to the phase or phases on the NOI.
2. By the Owner or Operator when the Owner or Operator of the site changes. Where stormwater discharges will continue after the identity of the Owner or Operator changes, the permittee must, prior to filing the Notice of Termination, notify any subsequent Owner or Operator of the permitted site as to the requirements of this permit.

B. Notice of Termination Contents:

1. The NPDES permit number for the stormwater discharge associated with construction activity identified by the Notice of Termination (i.e., GAR100001 – Stand Alone);
2. The project construction site name, GPS location (decimal degrees) of construction exit, construction site location, city (if applicable) and county of the construction site for which the notification is submitted. This information must correspond to the similar information as provided on the NOI. Where an address for the construction site is not available, the construction site location information must be sufficient to accurately locate the construction site;
3. The Owner's legal name, address, telephone number and email address and the Operator's legal name, address, telephone and email address;

4. The name of the initial receiving water(s), and when the discharge is through a municipal separate storm sewer system (MS4), the name of the local government operating the municipal separate storm sewer system and the name of the receiving water(s) which receives the discharge from the MS4;
5. If sampling was not conducted for the permitted site, then provide a written justification for why that sampling was not conducted within electronic NOT submittal;
6. Any other information specified on the NOT in effect at the time of submittal; and
7. The following certification signed in accordance with Part V.G.1. (signatory requirements):

“I certify under penalty of law that either: (a) all stormwater discharges associated with construction activity authorized by this permit have ceased, the site is in compliance with this permit and all temporary BMPs have been removed or (b) I am no longer an Owner or Operator at the construction site and a new Owner or Operator has assumed operational control of the permitted construction site where I previously had ownership or operational control; and that discharging pollutants in stormwater associated with construction activity to waters of Georgia is unlawful under the Georgia Water Quality Control Act and the Clean Water Act where the discharge is not authorized by a NPDES permit.”

C. Notice of Termination Submittal. All Notices of Termination (NOT) by this permit shall be submitted to EPD using the electronic submittal service provided by EPD no more than 14 days after the site has completed construction related activities, achieved final stabilization and temporary BMPs have been removed as referenced in Part VI.A.1.A copy of the NOT shall also be submitted to the Local Issuing Authority in jurisdictions authorized to issue a Land Disturbance Activity permit for the permittee's construction site pursuant to O.C.G.A. 12-7-1, et seq.

APPENDIX A

EPD DISTRICT OFFICES

A. For facilities/construction sites located in the following counties: Bibb, Bleckley, Chattahoochee, Crawford, Dooly, Harris, Houston, Jones, Lamar, Macon, Marion, Meriwether, Monroe, Muscogee, Peach, Pike, Pulaski, Schley, Talbot, Taylor, Troup, Twiggs, Upson

Information shall be submitted to: Wcd.epd.reporting@dnr.ga.gov
West Central District Office
Georgia Environmental Protection Division
2640 Shurling Drive
Macon, GA 31211-3576
(478) 751-6612

B. For facilities/construction sites located in the following counties: Burke, Columbia, Emanuel, Glascock, Jefferson, Jenkins, Johnson, Laurens, McDuffie, Montgomery, Richmond, Screven, Treutlen, Warren, Washington, Wheeler, Wilkinson

Information shall be submitted to: ECD.EPDReporting@dnr.ga.gov
East Central District Office
Georgia Environmental Protection Division
3525 Walton Way Extension
Augusta, GA 30909-1821
(706) 667-4343

C. For facilities/construction sites located in the following counties: Baldwin, Banks, Barrow, Butts, Clarke, Elbert, Franklin, Greene, Hall, Hancock, Hart, Jackson, Jasper, Lincoln, Madison, Morgan, Newton, Oconee, Oglethorpe, Putnam, Stephens, Taliaferro, Walton, Wilkes

Information shall be submitted to: epd.athens@dnr.ga.gov
Northeast District Office
Georgia Environmental Protection Division
745 Gaines School Road
Athens, GA 30605-3129
(706) 369-6376

D. For facilities/construction sites located in the following counties: Carroll, Clayton, Coweta, DeKalb, Douglas, Fayette, Fulton, Heard, Henry, Rockdale, Spalding

Information shall be submitted to: MDOAtlanta.SW@dnr.ga.gov
Mountain District - Atlanta Satellite
Georgia Environmental Protection Division

4244 International Parkway, Suite 114
Atlanta, GA 30354-3906
(404) 362-2671

E. For facilities/construction sites located in the following counties: Bartow, Catoosa, Chattooga, Cherokee, Cobb, Dade, Dawson, Fannin, Floyd, Forsyth, Gilmer, Gordon, Gwinnett, Habersham, Haralson, Lumpkin, Murray, Paulding, Pickens, Polk, Rabun, Towns, Union, Walker, White, Whitfield

Information shall be submitted to: MDOCartersville.SW@dnr.ga.gov
Mountain District - Cartersville Office
Georgia Environmental Protection Division
16 Center Road
Cartersville, GA 30120
(770) 387-4900

F. For facilities/construction sites located in the following counties: Appling, Atkinson, Bacon, Brantley, Bryan, Bulloch, Camden, Candler, Charlton, Chatham, Clinch, Coffee, Effingham, Evans, Glynn, Jeff Davis, Liberty, Long, McIntosh, Pierce, Tattnall, Toombs, Ware, Wayne

Information shall be submitted to: coast.epdreporting@dnr.ga.gov
Coastal District - Brunswick Office
Georgia Environmental Protection Division
1050 Canal Road
Brunswick, GA 31523-6856
(912) 264-7284

G. For facilities/construction sites located in the following counties: Baker, Ben Hill, Berrien, Brooks, Calhoun, Clay, Colquitt, Cook, Crisp, Decatur, Dodge, Dougherty, Early, Echols, Grady, Irwin, Lanier, Lee, Lowndes, Miller, Mitchell, Quitman, Randolph, Seminole, Stewart, Sumter, Telfair, Terrell, Thomas, Tift, Turner, Webster, Wilcox, Worth

Information shall be submitted to: southwest.districtreporting@dnr.ga.gov
Southwest District Office
Georgia Environmental Protection Division
2024 Newton Road
Albany, GA 31701-3576
(229) 430-4144

H. For facilities/construction sites required to submit Plans required under Part IV.A.4.a. of this Permit:

Information shall be submitted to: Watershed Protection Branch
Environmental Protection Division

2 Martin Luther King Jr. Drive
Suite 1462 East
Atlanta, Georgia 30334
(404) 463-1511

APPENDIX B

Nephelometric Turbidity Unit (NTU) TABLES

		Trout Streams							
		Surface Water Drainage Area, square miles							
		0-4.99	5-9.99	10-24.99	25-49.99	50-99.99	100-249.99	250-499.99	500+
Site Size, acres	1.00-10	25	50	75	150	300	500	500	500
	10.01-25	25	25	50	75	150	200	500	500
	25.01-50	25	25	25	50	75	100	300	500
	50.01-100	20	25	25	35	59	75	150	300
	100.01+	20	20	25	25	25	50	60	100

		Waters Supporting Warm Water Fisheries							
		Surface Water Drainage Area, square miles							
		0-4.99	5-9.99	10-24.99	25-49.99	50-99.99	100-249.99	250-499.99	500+
Site Size, acres	1.00-10	75	150	200	400	750	750	750	750
	10.01-25	50	100	100	200	300	500	750	750
	25.01-50	50	50	100	100	200	300	750	750
	50.01-100	50	50	50	100	100	150	300	600
	100.01+	50	50	50	50	50	100	200	100

To use these tables, select the size (acres) of the construction site. Then, select the surface water drainage area (square miles). The NTU matrix value arrived at from the above tables is the one to use in Part III.D.5.

Example 1: For a site size of 12.5 acres and a “trout stream” drainage area of 37.5 square miles, the NTU value to use in Part III.D.5. is 75 NTU.

Example 2: For a site size of 51.7 acres and “waters supporting warm water fisheries” drainage area of 72 square miles, the NTU value to use in Part III.D.5. is 100 NTU.

INDEX TO
SECTION 31 37 00 – RIP-RAP

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SECTION 31 37 00**RIP-RAP****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Material placed as bank protection and erosion control.

1.2 RELATED SECTIONS

- A. Section 31 25 00GA – Erosion and Sedimentation Controls
- B. Section 33 40 00 – Storm Drainage Utilities

1.3 ALLOWABLE TOLERANCES

- A. Depth of rip-rap blanket as shown on the drawings and in these specifications is a minimum depth.

1.4 MEASUREMENT AND PAYMENT

- A. Rip-Rap: Rip-rap shall not be measured for direct payment. No direct payment shall be made for rip-rap. Rip-rap shall be included in the item to which it pertains.

1.5 REFERENCES (LATEST REVISION)

- A. ASTM C 150 – Portland Cement.

PART 2 – PRODUCTS**2.1 MATERIALS**

- A. Stone Rip-Rap: Shall be hard quarry or field stone of such quality the pieces will not disintegrate on exposure to water, sunlight, or weather. Stone shall be solid and non-friable and range in weight from a minimum of 25 pounds to a maximum of 150 pounds. At least 50 percent of the stone pieces shall weigh more than 60 pounds. The stone pieces shall have a minimum dimension of 12 inches. Documents indicating stone analysis, source and other pertinent data (i.e. – filter fabric) shall be submitted for review by the Engineer prior to delivery.
- B. Sand-Cement Bag Rip-Rap:
 - 1. Bags: Shall be of cotton, burlap, or fiber-reinforced paper capable of containing the sand-cement mixture without leakage during handling and placing. Bags previously used for any purpose shall not be used. Capacity shall be not less than 0.75 cubic foot nor more than two cubic feet.

2. Cement: Portland cement shall be Type I meeting requirements of ASTM C 150. Cement which has been damaged, or which is partially set, lumpy, or caked shall not be used.
 3. Fine Aggregate: Shall be composed of hard, durable particles, free from injurious amounts of organic impurities and shall contain, in the material passing the No. 10 sieve, not more than 7 percent clay, and not more than 20 percent passing the No. 200 sieve.
- C. Filter Fabric: Shall be a woven fabric of monofilament and multifilament yarn equivalent to Mirafi FW700. Fabric shall be finished so the filaments will retain their relative position with respect to each other. Fabric shall contain stabilizers and/or inhibitors added to make filaments resistant to deterioration due to ultraviolet and/or heat exposure. Fabric shall be free of flaws, rips, holes, or defects.

2.2 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products before they are ordered.

PART 3 – EXECUTION

3.1 PREPARATION

- A. The surface to receive rip-rap shall be prepared to a relatively smooth condition free of obstruction, depressions, debris, rises, and soft or low density pockets of material. Contours and elevations on construction drawings are to the surface of rip-rap material.

3.2 PLACEMENT

- A. Filter fabric shall be placed with the long dimension running up slope. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. Fabric shall be anchored in place with securing pins of the type recommended by fabric manufacturer. Pins shall be placed on or within 3 inches of the overlap. Place fabric so upstream strip will overlap the downstream strip. Fabric shall be placed loosely to give and avoid stretching and tearing during placement of the stones.
- B. Minimum depth or thickness of stone blanket shall be 12 inches with no under tolerance. Stones shall be dropped no more than three feet during construction. Placing shall begin at bottom of slope. Provide a toe trench if required as detailed on the construction drawings. Entire mass of stone shall be placed to conform with lines, grades, and thickness shown on the plans. Rip-rap shall be placed to its full course thickness at one operation and in such a manner as to avoid displacing the underlying material. Placing of rip-rap in layers, or by dumping into chutes, or by similar methods likely to cause segregation, will not be permitted.

Larger stones shall be well distributed and the entire mass of stone shall conform to gradation specified. All material used in rip-rap protection shall be placed and distributed so there will be no large accumulations of either the larger or smaller sizes of stone.

It is the intent of these specifications to produce a fairly compact rip-rap protection in which all sizes of material are placed in their proper proportions. Hand placing or rearranging of individual stones by mechanical equipment may be required to secure the results specified.

- C. Sand-Cement Bag Rip-Rap: Bags shall be uniformly filled. Bagged rip-rap shall be placed by hand with tied ends facing the same direction, with close, broken joints. After placing, bags shall be rammed or packed against one another to produce the required thickness and form a consolidated mass. The top of each bag shall not vary more than 3 inches above or below required plane. When directed by the Engineer or required by construction drawings, header courses shall be placed.

END OF SECTION

INDEX TO
SECTION 32 11 23 – AGGREGATE BASE COURSES

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SECTION 32 11 23**AGGREGATE BASE COURSES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Aggregate base course.

1.2 RELATED SECTIONS

- A. Section 01 22 00 – Unit Prices: Requirements applicable for the work of this section.
- B. Section 01 45 00 – Quality Control.
- C. Section 31 00 00 – Earthwork
- D. Section 32 12 16 GA – Asphalt Paving

1.3 MEASUREMENT AND PAYMENT

- A. Aggregate Base Course: Payment for aggregate base course shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include supplying all material, labor, equipment, stockpiling, scarifying substrate surface, placing where required, compacting, and any other incidentals to installation.
- B. Prime Coat: Bituminous prime coat will not be measured for separate payment. All costs connected with applying prime coat will be included in the unit price bid for Aggregate Base Course.

1.4 REFERENCES (LATEST REVISION)

- A. ASTM C 131 – Resistance to Degradation of Small-Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine.
- B. ASTM D 1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
- C. ASTM D 3740 – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.
- D. ASTM D 6938 – In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- E. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.

1.6 TESTING

- A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).
- B. In place density tests in accordance with ASTM D 6938.
- C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.
- E. Testing shall be Contractor's responsibility and performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.
- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Aggregate shall consist of processed and blended crushed stone. Aggregates shall be free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material and shall be durable and sound. Coarse aggregate shall have a percentage of wear not to exceed 65% after 500 revolutions as determined by ASTM C 131. Coarse aggregate shall meet applicable requirements of Section 800, Coarse Aggregate of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition. Material shall meet the following gradation requirements of Section 815.

Sieve Size	Percent by Weight Passing
2"	100
1-1/2"	97 – 100
3/4"	60 – 90
# 10	25 – 45
# 60	5 – 30
# 200	4 – 11

- B. Prime Coat: Shall consist of low viscosity liquid asphalt such as MC-30, MC-70, MC-250, RC-30, RC-70, or RC-250, conforming to Section 412 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify subbase has been tested, is dry, and slopes and elevations are correct.
- B. ON SITE OBSERVATIONS OF WORK: Owner's Representative or Engineer will have the right to require any portion of the work be completed in their presence. If the work is covered up after such instruction, it shall be exposed by Contractor for observation at no additional cost to the Owner. However, if Contractor notifies Owner such work is scheduled, and the Owner fails to appear within 48 hours, Contractor may proceed. All work completed and materials furnished shall be subject to review by the Owner, Engineer, or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Owner, Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

3.2 PREPARATION

- A. Subbase shall be graded and shaped conforming to the lines, grades, and cross sections required and cleaned of all foreign substances prior to constructing base course. Do not place base on soft, muddy or frozen surfaces. Correct irregularities in subbase slope and elevation by scarifying, reshaping, and recompacting.
- B. At the time of base course construction, subbase shall contain no frozen material.
- C. Surface of subbase shall be checked by the Engineer or Project Representative for adequate compaction and surface tolerances. Ruts or soft yielding spots appearing in areas of subbase course having inadequate compaction, and areas not smooth or which vary in elevation more than 3/8 inch above or below required grade established on the plans, shall be corrected to the satisfaction of the Engineer or Project Representative. Base material shall not be placed until subbase has been properly prepared and test results have so indicated.

3.3 AGGREGATE PLACEMENT

- A. Aggregate shall be placed with an acceptable spreader in accordance with Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2013 Edition (or latest edition) Section 310 and in accordance with all terms included in these specifications. Spreader shall contain a hopper, adjustable screed and designed so there will be a uniform, steady flow of material from the hopper. Spreader shall be capable of laying material without segregation across full width of the lane to a uniform thickness and to a uniform loose density. Spreaders are not required on curb and gutter road sections.
- B. Level and contour surfaces to elevations and slopes indicated.

- C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- F. While at optimum moisture ($\pm 1-1/2\%$), compact base course with rollers capable of obtaining required density. Vibratory, flatwheel, and other rollers accepted by the Engineer may be used to obtain required compaction. Rolling shall continue until base is compacted to 98% of the maximum laboratory dry density as determined by ASTM D 1557. In-place density of the compacted base will be determined in accordance with ASTM D 6938.

3.4 PRIME COAT

- A. Bituminous material for the prime coat shall be applied uniformly and accurately in quantities of not less than 0.15 gallons per square yard nor more than 0.30 gallons per square yard of base course. All irregularities in the base course surface shall be corrected prior to application of prime coat. Clean the base course of all mud, dirt, dust, and caked and loose material
- B. Do not apply prime to a wet surface nor when temperature is below 40°F in the shade. Do not apply prime when rain threatens nor when weather conditions prevent proper construction and curing of prime coat.
- C. The primed base should be adequately cured before the binder or surface course is laid. In general, a minimum of 48 hours should be allowed for complete curing. Ordinarily, proper surface condition of the prime is indicated by a slight change in the shiny black appearance to a slightly brown color.

3.5 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with an acceptable 10-foot straight edge.
- B. Scheduled Compacted Thickness: Within 3/8 inch.
- C. Variation from Design Elevation: Within 3/8 inch.
- D. Depth measurements for compacted thickness shall be made by test holes through the base course. Where base course is deficient, correct such areas by scarifying, adding base material, and recompacting as directed by the Engineer.

3.6 FIELD QUALITY CONTROL

- A. Section 01 45 00 – Quality Control: Field observation.

- B. Density and moisture testing will be performed in accordance with ASTM D 1557 and ASTM D 6938.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests:
 - 1. Base Density and Thickness – One test per 5,000 square feet.

END OF SECTION

INDEX TO
SECTION 32 11 26 – ASPHALTIC BASE COURSES

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SECTION 32 11 26
ASPHALTIC BASE COURSES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Asphaltic Concrete Base Course

1.2 RELATED SECTIONS

- A. Section 01 22 00 – Unit Prices
- B. Section 01 45 00 – Quality Control
- C. Section 31 00 00 – Earthwork
- D. Section 32 12 16 – Asphalt Paving

1.3 MEASUREMENT AND PAYMENT

- A. Asphaltic Concrete Base Course: Payment will be made at the contract lump sum price. Payment will include furnishing and placing base, compaction, testing, and all equipment, labor, and materials necessary to complete the work. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity and will include the cost of all equipment, labor, materials, and all other incidentals.

1.4 REFERENCES (LATEST REVISION)

- A. ASTM D 946 – Penetration-Graded Asphalt Cement for Use in Pavement Construction.
- B. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspections.
- C. ASTM D 2726 – Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
- D. ASTM D 2950 – Density of Bituminous Concrete in Place by Nuclear Methods.
- E. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.
- F. AASHTO T 245 – Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
- G. AASHTO T 179 – Effect of Heat and Air on Asphalt Materials (Thin-Film Oven Test).
- H. AASHTO M 226 – Viscosity Graded Asphalt Cement.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.
- B. Mixing Plant: Conform to Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt mixture when ambient air temperature is less than that indicated in the Table nor when the surface is wet or frozen.

Lift Thickness	Min. Air Temperature, Degrees F.
1" or Less	55
1.1" to 2"	45
2.1" to 3"	35
3.1" to 4"	30
4.1" to 8"	Contractor's Discretion

- B. Place bitumen mixture when mixture temperature is not more than 15 degrees F below bitumen supplier's bill of lading and not more than the maximum specified temperature.

1.7 TESTING

- A. Testing laboratory shall operate in accordance to ASTM D 3740 and E 329 and shall be acceptable to the Engineer.
- B. The testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.
- C. Testing shall be the responsibility of the Contractor and shall be performed at the Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph A above.
- D. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Asphalt Cement: PG67-22 (GA).
- B. Anti-Stripping: Anti-stripping agents or other additives required shall be acceptable to the Engineer prior to their use. Additive delivery systems shall be acceptable to the Engineer.

- C. Aggregate shall consist of processed and blended crushed stone and be free from lumps and balls of clay, organic matter, objectionable coatings and other foreign material, and shall be durable and sound. Material shall meet the applicable requirements of Sections 800, 802 and 828 of the Georgia Department of Transportation Standard Specifications.
- D. Base Mixture: Shall meet 25 mm SuperPave Job Mix Formula from Section 828.2.03 of Georgia Department of Transportation Standard Specifications.

2.2 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01 45 00 – Quality Control, 01 45 23 – Testing and Inspecting Services. Provide mix design for asphalt.
- B. Submit proposed mix design for review prior to beginning of work.
- C. Test samples in accordance with the requirements of these specifications.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify subbase has been tested, is dry, and gradients and elevations are correct.
- B. ON-SITE OBSERVATIONS OF WORK: Owner's Representative or Engineer will have the right to require any portion of work be completed in their presence. If the work is covered up after such instruction, it shall be exposed by the Contractor for observation at no additional cost to Owner. However, if Contractor notifies Owner such work is scheduled, and Owner fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Owner, Engineer, or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Owner, Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

3.2 PREPARATION

- A. Subbase shall be leveled to lines and grades of plans and cleaned of all foreign substances prior to constructing the base course.

Do not place base on soft, muddy, or frozen surfaces.

Correct irregularities in subbase gradient and elevation by scarifying, reshaping, and recompacting.

- B. At the time of base course construction, the subbase shall contain no frozen material.
- C. The surface of subbase shall be checked by Engineer or Project Representative for adequate compaction and surface tolerances. Ruts or soft yielding spots appearing in areas of the subbase course having inadequate compaction, and areas not smooth or which vary in elevation more than 3/8 inch above or below required grade established on plans shall be corrected to satisfaction of Engineer or Project Representative. Base material shall not be placed until subbase has been properly prepared and test results have so indicated.

3.3 PLACEMENT

- A. Construction shall be in accordance with requirements of Section 400 of the Georgia Department of Transportation Standard Specifications.

3.4 TOLERANCES

- A. General: All paving shall be subject to visual and straightedge checking during construction operations and thereafter prior to final acceptance. A 10-foot straightedge shall be maintained in the vicinity of paving operation at all times for measuring surface irregularities on all paving courses. The straightedge and labor for its use shall be provided by Contractor. The surface of all courses shall be checked with a straightedge as necessary to detect surface irregularities. Irregularities such as ripping, tearing or pulling, which in the judgment of Engineer indicate a continuing problem in equipment, mixture or operating technique, will not be permitted to recur. The paving operation shall be stopped until appropriate steps are taken by Contractor to correct problem.
- B. Flatness: Maximum variation of 1/4 inch measured with an acceptable 10 foot straight edge.
- C. Scheduled Compacted Thickness: Within 3/8 inch under tolerance.
- D. Variation from Design Elevation: Within 3/8 inch.
- E. Base Deficient in Thickness: When measurement of any core indicates base is deficient in thickness, additional cores will be drilled 10 feet either side of the deficient core along centerline of lane until cores indicate thickness conforms to above specified requirements. A core indicating thickness deficiencies is considered a failed test. Base deficient in thickness shall be removed and replaced with the appropriate thickness of materials. If Contractor believes cores and measurements taken are not sufficient to indicate fairly the actual thickness of base, additional cores and measurements will be taken, provided Contractor will bear extra cost of drilling cores and filling holes in roadway as directed.

3.5 FIELD QUALITY CONTROL

- A. Section 01400 – Quality Assurance: Field Observation.
- B. Density Testing: Performed in accordance with ASTM D-2726 and ASTM D-2950. Core samples for each day's operation shall be taken, tested and results reported

to Engineer the following day. The areas sampled shall be properly restored by Contractor at no additional cost to Owner. Compaction must be accomplished when the temperature of mix is above 185 degrees F and below 300 degrees F. Nuclear gauge tests shall be taken during the asphaltic concrete placement.

- C. Density of each pavement course shall conform to one of the following:
 - 1. Average 96% of laboratory density with no test less than 94%.
 - 2. Average 92% of maximum theoretical density with no test less than 90%.
 - 3. Average 99% of control strip density.
- D. Temperature:
 - 1. Asphaltic concrete shall not exceed 325 degrees F at any time.
 - 2. Temperature at time of loading shall be recorded on the truck delivery ticket.
- E. Frequency of Tests:
 - 1. Asphaltic Concrete – One test for each 250 tons placed.
 - a. Asphalt extraction and gradation test.
 - b. Core Sample
 - 2. Field determination of density by nuclear method every 5,000 square feet during construction of the base course.

END OF SECTION

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SECTION 32 12 16GA – ASPHALT PAVING

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SECTION 32 12 16GA**ASPHALT PAVING****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Surface Course
- B. Binder Course

1.2 RELATED SECTIONS

- A. Section 01 22 00 – Unit Prices
- B. Section 01 45 00 – Quality Control
- C. Section 31 00 00 – Earthwork
- D. Section 32 11 23 – Aggregate Base Course
- E. Section 32 11 26 – Asphaltic Base Courses

1.3 MEASUREMENT AND PAYMENT

- A. Asphaltic Concrete Binder Course: Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.
- B. Asphaltic Concrete Surface Course: Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.
- C. Tack Coat: Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.
- D. Payment for pavement and tack coat will be for preparing and cleaning, providing all materials, labor and equipment including placing, compacting and testing, and all other incidentals to installation. Payment shall be included in the contract lump sum. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.

1.4 REFERENCES (LATEST REVISION)

- A. ASTM D 946 – Penetration-Graded Asphalt-Cement for Use in Pavement Construction.
- B. ASTM D 1188 – Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.
- C. ASTM D 1754 – Effect of Heat and Air on Asphalt Materials (Thin-film Oven Test).
- D. ASTM D 2726 – Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
- E. ASTM D 2950 – Density of Bituminous Concrete in Place by Nuclear Methods.
- F. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.
- G. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.
- B. Mixing Plant: Conform to Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.
- C. Method of Measurement for Handicap Parking and Access Aisle will be with a 24-inch digital smart-level. The 24-inch smart-level slope readings greater than specified tolerance within contract documents will be identified as non-compliant and not accepted.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt mixture when ambient air temperature is less than that indicated in the Table nor when the surface is wet or frozen.

Lift Thickness	Min. Air Temperature, Degrees F.
1" or Less	55
1.1" to 2"	45
2.1" to 3"	35
3.1" to 4"	30
4.1" to 8"	Contractor's Discretion

- B. Mixture shall be delivered to the spreader at a temperature between 250 degrees F and 325 degrees F.

1.7 GUARANTEE

- A. Contractor shall guarantee the quality of materials and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by the Contractor at no cost to the Owner.

1.8 TESTING

- A. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- B. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.
- C. Testing shall be Contractor's responsibility and performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph A above.
- D. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS**2.1 TACK COAT**

- A. Material: Shall be PG67-22, asphalt cement, conforming to Sections 413 and 820 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition. When the temperature in the shade exceeds 70 degrees F, an emulsion such as CRS – 2h or CRS – 3 may be used.

2.2 ASPHALT CEMENT AND ADDITIVES

- A. Asphalt Cement: Shall conform to the requirements of Section 820 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition. The material shall be PG67-22.
- B. Anti-Stripping: Shall be hydrated lime and conform to requirements of Section 831 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.

2.3 AGGREGATES

- A. General: Mineral aggregate shall be composed of fine aggregate or a combination of fine and coarse aggregate. Coarse aggregate shall be the portion of material retained on a No. 8 sieve.
- B. Fine aggregate shall be considered the portion passing a No. 8 sieve. Fine aggregate, coarse aggregate, and any additives in combination with the specified percentage of asphalt cement shall meet the requirements of tests specified, before acceptance may be given for their individual use.

- C. Fine Aggregate: Shall conform to the requirements of Section 802 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.
- D. Coarse Aggregate: Shall be granite stone and conform to the requirements of Section 802.02 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition.
- E. Surface Course: Shall consist of fine and coarse aggregate and mineral filler uniformly mixed with hot asphalt cement in an acceptable mixing plant. Job mix formula and design limits shall conform to 9.5 mm Superpave Level B requirements.
- F. Intermediate or Binder Course: Shall consist of fine and coarse aggregate and mineral filler uniform mixing with hot asphalt cement in an acceptable mixing plant. Job mix formula and design limits shall conform to 19 mm Superpave requirements.

2.4 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01 45 00 – Quality Control and Section 01 45 23 – Testing and Inspecting Services.
- B. Submit proposed mix design for review prior to beginning of work.
- C. Test samples in accordance with the requirements of these specifications.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. On-Site Observations: Owner's Representative or Engineer will have the right to require any portion of work be completed in their presence. If work is covered up after such instruction, it shall be exposed by the Contractor for observation at no additional cost to Owner. However, if Contractor notifies Engineer such work is scheduled, and Engineer fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Owner, Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

- B. Contractor shall verify base has been tested, is dry, and gradients and elevations are correct.

3.2 PREPARATION

- A. Apply tack coat in accordance with Section 413 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition. Rate of application shall be 0.04 to 0.06 gallons per square yard of surface.
- B. Work shall be planned so no more tack coat than is necessary for the day's operation is placed on the surface. All traffic not essential to the work shall be kept off the tack coat.
- C. Apply tack coat to contact surfaces of curbs and gutters. Apply in manner so exposed curb or gutter surfaces are not stained.
- D. Coat surfaces of manhole frames and inlet frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.3 PLACEMENT

- A. Construction shall be in accordance with Section 400 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition
- B. Asphaltic concrete shall not be placed on a wet or frozen surface.
- C. Compaction shall commence as soon as possible after the mixture has been spread to the desired thickness. Compaction shall be continuous and uniform over the entire surface. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks. Compaction rolling shall be complete before material temperature drops below 185° F.
- D. Areas of pavement with deficient thickness or density shall be removed and replaced at no additional cost to the Owner.

3.4 TOLERANCES

- A. General: All paving shall be subject to visual and straightedge evaluation during construction operations and thereafter prior to final acceptance. A 10 foot straightedge shall be maintained in the vicinity of the paving operation at all times for the purpose of measuring surface irregularities on all paving courses. The straightedge and labor for its use shall be provided by the Contractor. The surface of all courses shall be checked with the straightedge as necessary to detect surface irregularities. Irregularities such as rippling, tearing or pulling, which in the judgment of the Engineer indicate a continuing problem in equipment, mixture or operating technique, will not be permitted to recur. The paving operation shall be stopped until appropriate steps are taken by the Contractor to correct the problem.
- B. Flatness: All irregularities in excess of 1/8 inch in 10 feet for surface courses and 3/16 inch in 10 feet for intermediate and base courses shall be corrected.

1. General Paving: Less than 1/4 inch.
2. Accessible Routes: Shall not exceed 1/4 inch. However, accessible routes shall not exceed maximum ADA allowable slopes. Contractor shall remove and replace any and all portions of the accessible route that exceed maximum ADA allowable slopes.
3. Variation from Design Elevation: Less than 1/4 inch.
4. Scheduled Compacted Thickness: Less than 1/4 inch under tolerance.
5. Pavement Deficient in Thickness: When measurement of any core indicates the pavement is deficient in thickness, additional cores will be drilled 10 feet either side of the deficient core along the centerline of the lane until the cores indicate the thickness conforms to the above specified requirements. A core indicating thickness deficiencies is considered a failed test. Pavement deficient in thickness shall be removed and replaced with the appropriate thickness of materials. If the Contractor believes the cores and measurements taken are not sufficient to indicate fairly the actual thickness of the pavement, additional cores and measurements will be taken, provided the Contractor will bear the extra cost of drilling the cores and filling the holes in the roadway as directed.

3.5 FIELD QUALITY CONTROL

- A. Acceptance of the in-place density of the surface course shall be in accordance with the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition and these specifications.
- B. Density Testing: Performed in accordance with ASTM D-2726 and ASTM D-2950. Core samples for each day's operation shall be taken, tested and results reported to the Engineer the following day. The areas sampled shall be properly restored by the Contractor at no additional cost to the Owner. Nuclear gauge tests shall be taken during the asphaltic concrete placement.
- C. Density of each pavement course shall conform to one of the following:
 1. Average 96% of laboratory density with no test less than 94%.
 2. Average 92% of maximum theoretical density with no test less than 90%.
 3. Average 99% of control strip density.
- D. Temperature:
 1. Asphaltic concrete shall not exceed 325 degrees F at any time.

2. Asphaltic concrete shall not be placed once the temperature of the mix falls below 250 degrees F or the delivered temperature is more than 15 degrees F below the batch plant's delivery ticket.
3. Temperature at time of loading shall be recorded on the truck delivery ticket.

E. Frequency of Tests:

1. Asphaltic Concrete – One test for each 250 tons placed.
 - a. Asphalt extraction and gradation test.
 - b. Core Sample
2. Field determination of density by nuclear method every 5,000 square feet during construction of the asphaltic concrete binder/surface course.

END OF SECTION

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SECTION 32 17 23.13**PAVEMENT PAINTED MARKINGS****PART 1 – GENERAL****1.1 WORK INCLUDED**

- A. Striping shall consist of furnishing and applying traffic line paint in accordance with the contract drawings and specifications, and the requirements of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, latest Edition.

1.2 QUALITY ASSURANCE

- A. Material and equipment shall be standard product of a manufacturer who has manufactured them for a minimum of 2 years and who provides published data on quality and performance of the product.

1.3 GUARANTEE

- A. Contractor shall guarantee the quality of materials and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

1.4 MEASUREMENT AND PAYMENT

- A. Payment for striping will include all necessary equipment, labor, materials, and all other incidentals to apply the striping or traffic control symbols. Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.

PART 2 – PRODUCTS**2.1 PAINT**

- A. Paint shall be in conformance with Section 870 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, latest Edition.

2.2 EQUIPMENT

- A. The traveling traffic stripe painter shall be adaptable to traveling at a uniform, predetermined rate of speed both uphill and downhill in order to produce a uniform application of paint. Paint machine shall be of the spray type, capable of satisfactorily applying paint under pressure with a uniformity of feed through nozzles spraying directly upon pavement. Each machine shall be capable of applying three separate stripes, either solid or skip, in any specified pattern by utilizing three adjacent spray nozzles at the same time. Each paint tank shall be equipped with a mechanical agitator. Each nozzle shall be equipped with satisfactory cutoff valves

which will apply broken or skip lines automatically. Each nozzle shall have a mechanical bead dispenser operating simultaneously with spray nozzle and distribute beads in a uniform pattern at the rate specified. Each nozzle shall also be equipped with suitable line guides consisting of metallic shrouds or air blasts.

Hand painting equipment shall consist of suitable brushes, templates and guides necessary to produce satisfactory results.

Cleaning equipment shall consist of necessary brushes, brooms, scrapers, grinders, high pressure water jets and air blasters required to satisfactorily remove all foreign matter, from surfaces to be painted, without damage to the underlying pavement.

The traveling traffic stripe painter shall also be equipped with paint meters which will indicate amount of paint dispensed from each tank. Small, portable applicators or other special equipment may also be required.

2.3 GLASS BEADS

- A. Glass beads shall be in conformance with Section 652 of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, latest Edition.

2.4 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered.

PART 3 – EXECUTION

3.1 CONSTRUCTION OBSERVATION

- A. Engineer or Project Representative will have the right to require any portion of the work be completed in their presence. If the work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if Contractor notifies Engineer, or Project Representative such work is scheduled and they fail to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer. Improper work shall be reconstructed. All materials which do not conform to requirements of specifications shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such. Contractor shall give Engineer or Project Representative a minimum of 48 hours' notice for all required observations or tests.

3.2 STRIPING

- A. Cleaning of Surface – Surfaces to be painted shall be thoroughly cleaned of all dust, dirt, grease, oil and other foreign matter before application of the paint.
- B. Alignment – Traffic stripes shall be of the length, width and placement specified. On sections where no previously applied markings are present, Contractor shall establish

control points, satisfactory to Engineer, spaced at intervals insuring accurate locations of the stripe.

- C. Application – Traffic Stripe paint shall be applied by machine except for special areas and markings not adaptable to machine application, in which case, hand application will be permitted.

No paints shall be applied to areas of pavement when:

1. Any moisture or foreign matter is present on the surface,
2. The air temperature in the shade is below 50° F, or
3. Wind conditions are such as might cause dust to be deposited on prepared areas or to prevent satisfactory application of the paint and beads.

Painting shall be completed only during daylight hours and all painted areas shall be dry enough, before sunset, to permit crossing by traffic. All protective devices shall be removed not later than sunset to allow free movement of traffic at night.

Traffic stripe paint shall be thoroughly mixed in the shipping container before placing in machine tank. The paint machine tanks, connections and spray nozzles shall be thoroughly cleaned with thinner before starting each day's work.

The minimum wet film thickness for all painted areas shall be 15 mils.

Place a layer of glass beads immediately after laying the paint. Apply beads at a minimum rate of 6 pounds per gallon of paint.

- D. Protective Measures – When painting is completed around traffic, Contractor shall furnish and place all warning and directional signs necessary to direct, control, and protect traffic during the striping operations. Warning signs shall be set up before the beginning of each operation and extra signs shall be kept well ahead of painting equipment. When necessary, a pilot car shall be used to protect both traffic and the painting operation. The freshly painted stripe shall be protected by cones or other satisfactory devices. All stripe damaged by traffic, or pavement marked by traffic crossing wet paint, shall be repaired or corrected as specified below.

- E. Tolerance and Appearance – No stripe shall be less than the specified width. No stripe shall exceed the specified width by more than 1/2 inch. Alignment of the stripe shall not deviate from intended alignment by more than one inch on tangents and on curves up to and including one degree. On curves exceeding one degree, alignment of the stripe shall not deviate from the intended alignment by more than 2 inches.

Continued deviation from stated dimensions will be cause for stopping the Work and removing nonconforming stripe.

All stripes and segments of stripes shall present a clean cut, uniform and workmanlike appearance. All markings which fail to have a uniform, satisfactory appearance, either day or night, shall be corrected at the Contractor's expense.

- F. Corrective Measures – All traffic stripe which fails to meet the Specifications, permissible tolerances and appearance requirements, or is marred or damaged by traffic or from other causes, shall be corrected at Contractor's expense. All misted areas, drip and spattered paint shall be removed to the satisfaction of Engineer. In all instances, when it is necessary to remove paint, it shall take place by means satisfactory to Engineer, which will not damage the underlying surface of pavement. When necessary to correct a deviation that exceeds permissible tolerance in alignment, the portion of stripe so affected shall be removed plus an additional 25 feet in each direction, and a new stripe then painted in accordance with these specifications.
- G. Acceptance – All sections of painted stripe, words and symbols which have dried to the extent paint will not be picked up or marred by tires of vehicles, and which have been placed in reasonably close conformity with Plans and Specifications, will be accepted, and Contractor will be relieved of responsibility of maintenance on such sections.

END OF SECTION

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EXTRUDED OR HOT SPRAY APPLICATION

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SECTION 32 17 23.43

THERMOPLASTIC PAVEMENT MARKINGS EXTRUDED OR HOT SPRAY APPLICATION

PART 1 – GENERAL

1.1 DESCRIPTION:

- A. Work shall consist of furnishing and applying thermoplastic reflectorized pavement marking materials on surface of pavements to provide pavement markings of a color (white or yellow) and pattern as indicated on the construction drawings. Contractor shall supply all necessary equipment and materials for the installation of traffic markings.

1.2 WARRANTY:

- A. Contractor shall transfer warranty to the Owner on thermoplastic materials issued by manufacturer. Contractor shall also furnish the Owner a 12-month warranty for application. These warranties shall specify guaranteed retainage of material for a stated period beginning with the application date. Work will not be allowed to commence until warranties have been received by the Owner.

1.3 MEASUREMENT AND PAYMENT:

- A. No measurement will be made for this project.

Payment will be included in the contract lump sum price. Payment will include supplying of materials at rate specified, preparation of pavement surface, application of all materials, protection of markings, protection of traffic, and all work involved to provide pavement markings in place, complete in accordance with these specifications and special provisions, including labor, equipment, and incidentals necessary to satisfactorily complete the work specified.

PART 2 – PRODUCTS

2.1 MATERIALS:

- A. Pavement marking material shall be a reflectorized mixture of thermoplastic binder and reflectorized glass beads. Additional glass beads are applied by dropping immediately after marking material is applied to surface of the pavement. Prior to application of the pavement marking material, surface of all pavements shall be coated with a primer-sealer material if recommended by thermoplastic manufacturer.
- B. Thermoplastic Compound: The hydrocarbon type thermoplastic compound shall meet all requirements of AASHTO M 249. Except material may be shipped in the granulated form.

- C. Glass Beads – (Drop-on): The drop-on glass beads shall meet requirements of AASHTO M 247 – Type 1.
- D. Primer-Sealer – A primer-sealer as recommended by the manufacturer of thermoplastic pavement marking material shall be utilized on all portland cement pavement surfaces and all bridge surfaces which have not been overlaid with asphalt. Primer-sealer also shall be utilized on any type of pavement prior to the placing of Railroad Crossing Symbols. Primer-sealer shall be used on asphaltic concrete pavement surfaces if recommended by the manufacturer of thermoplastic pavement marking material. Primer-sealer shall form a continuous film which will mechanically adhere to pavement and shall not discolor nor cause any noticeable change in appearance of the pavement outside of finished pavement marking.
- E. Contractor shall obtain from manufacturer of the thermoplastic binder, tests results required by AASHTO M 249 for each batch of material furnished along with a final certification stating materials furnished met requirements of contract specifications. Contractor shall obtain from manufacturer of drop-on glass beads a certification stating material furnished met requirements of contract specifications. Copies of above described affidavits shall be furnished to the Owner.

PART 3 – EXECUTION

3.1 APPLICATION PROPERTIES OF AASHTO M 249 IS EXPANDED AS FOLLOWS:

- A. Equipment – Material shall be prepared by only means of an insulated batching machine recommended or furnished by manufacturer of compound and shall consist of a special kettle for melting and heating the composition. Applicators may be either a truck mounted liner or a portable unit. "Truck mounted" shall be defined as a self-propelled vehicle with six or more wheels and an enclosed cab for housing the driver.

If contract requires extruded application, material shall be applied to the pavement by an extrusion method wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of suitable equipment for heating and controlling the flow of the material.

The batching machine shall be constructed to provide continuous mixing and agitation of material. Conveying part of equipment between the main material reservoir and final dispensing nozzle/shaping die shall be constructed to prevent accumulation and clogging. All parts of equipment which come in contact with the material shall be constructed to be easily accessible and exposable for cleaning and maintaining.

Equipment shall be constructed so all mixing and conveying parts to final dispensing nozzle/shaping die maintain material at the plastic temperature.

Equipment shall be constructed to assure continuous uniformity in dimensions of the markings.

Controls shall be set up so the operator can override set automatic cycles in order to extend a line or to begin a new cycle at any selected point.

Applicators shall provide a means for cleanly cutting off square stripe ends. Truck mounted liner shall provide a method of automatically applying "skip" or solid longitudinal lines, including right and left edge lines, of any combination of single or double line configurations (color and pattern) with machine traveling in the direction of normal traffic flow. The use of pans, aprons, or similar appliance which the nozzle/die overruns will not be permitted.

Beads shall be applied to surface of completed stripe by an automatic bead dispenser attached to the applicator. Beads are dispensed almost instantly upon the completed line.

Applicators shall be constructed to produce varying widths of traffic markings as indicated on construction drawings.

Heating of kettles and melters shall be by controlled heat transfer systems which are oil jacketed or indirect flame air jacketed. Directed flame equipment will not be allowed. All kettles and melters must be equipped with an automatic thermostatic control device and proper thermometers to control temperature of the material at manufacturer's recommended application temperature range.

Applicator and kettle must be so equipped and arranged as to satisfy requirements of the National Fire Underwriters, and all state and local requirements.

Applicators shall be mobile and maneuverable so straight lines can be followed and normal curves can be made.

B. Construction Requirements – Traffic shall not be permitted through the project during construction.

1. Preparation of Surface – The pavement shall be dry and free of glaze, oil, dirt, grease or other foreign contaminants. Where directed by Engineer, Contractor shall buff or sand blast pavement surface for a width equal to two inches wider than the stripe to be applied in order to secure a proper surface for adequate bonding of thermoplastic material.
2. Application of Primer-Sealer – Where used, primer-sealer shall be sprayed on the pavement surface where the lines are to be applied. Thickness of application and time on the pavement prior to thermoplastic application shall be governed by recommendations of primer-sealer manufacturer.
3. Application of Marking Material – All longitudinal markings shall be placed with a truck-mounted applicator except where the length of a particular marking is too short, or curvature too great, to permit efficient use of the liner. Transverse markings may be applied with a portable unit.

The markings shall be straight or of uniform curvature and shall conform uniformly with tangents, curves and transitions. Symbols shall be of dimensions shown on the plans. Markings must be of dimensions and

placed as shown on the plans. The contractor shall provide sufficient control points to serve as guides for application of markings.

Finished line markings shall be free from waviness and the lateral deviation shall not exceed two (2) inches in fifteen (15) feet. Any greater deviation shall be sufficient cause for requiring the Contractor to remove and correct such markings at their own expense. Contractor shall also be required to remove and correct any symbol markings not meeting dimensional requirement shown on the plans.

Contractor shall protect the markings until dry by placing guarding or warning devices as necessary. In the event any vehicle should cross a wet marking, such marking shall be reapplied and lines made by moving vehicle removed by Contractor.

To avoid poor quality marks, markings are to be placed only when surface of pavement is dry as determined by visual inspection, when the relative humidity as reported by local weather authorities is 90% or less, and when the pavement surface temperature, as determined by means of surface thermometers, is 55 degrees F or above. Contractor shall provide appropriate surface thermometers, certified to be correct, to measure pavement temperatures during the work.

No markings shall be applied between October 15 and March 1 inclusive, except by permission of the Engineer.

Sufficient personnel experienced in handling and application of this type of material shall be provided by Contractor to assure work is completed properly.

Work shall be completed only during daylight hours, and all markings shall be sufficiently dry, before sunset, to permit crossing by traffic. All protective devices shall be removed before sunset to allow free movement of traffic at night.

Marking material shall be applied at a temperature providing best adhesion to the pavement and shall be between 380 degrees F and 420 degrees F or as recommended by the manufacturer. The material shall be heated uniformly throughout and shall have uniform disbursement of binder, pigment, and glass beads when applied to surface of the pavement.

All extruded lines 12 inches or less shall be applied with a die equal to the width of the line. All lines greater than 12 inches may be applied with two dies, the total widths of which equal the width of the line.

4. Rate of Application

- a. Marking material shall be applied at the specified widths and at a rate to result in a new material thickness at center of line as specified below.

5. Type of Marking

- a. Edge lines and median lines (5" solid white, 5" solid yellow and 5" broken yellow). 90 mils

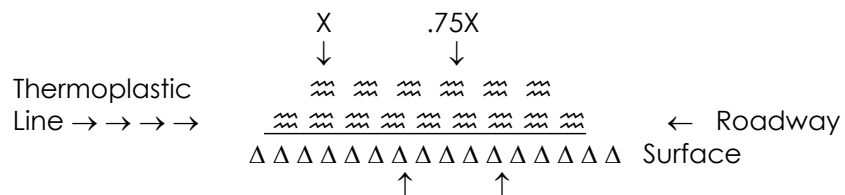
Lane lines (5" broken white) 90 mils

Center lines on two – lane roadways (5" broken yellow and 5" solid yellow) 90 mils

- b. All others 125 mils

The diagram below refers to applications of all thicknesses.

The edge of the line shall be not thinner than 75% of the center thickness.



NO SCALE

- c. Glass Beads – “Drop-on” glass beads shall be mechanically applied to surface of marking material immediately after material is applied to the pavement surface, and while marking material is still molten so beads will be held by and mechanically embedded in surface of material. Beads shall be uniformly distributed over the minimum rate of 12 pounds per 100 square feet of stripe. Drop-on beads shall be applied mechanically.

3.2 OBSERVATION AND ACCEPTANCE OF WORK:

- A. All thermoplastic markings shall be checked both day and night to determine whether the intent of these specifications has been achieved. Any markings failing to have satisfactory appearance, either day or night, shall be reapplied at Contractor's expense.

Final acceptance of thermoplastic pavement markings will be delayed for a period of 30 days after completion to permit observation of performance. Contractor shall be required to replace any markings or markers that, in the opinion of Owner, have not performed satisfactorily during this 30-day period due to defective materials and workmanship in manufacture and application.

Application of Pavement Markings and Non-recessed Pavement Markers – When pavement markings (centerline, lane lines, and edge lines) and non-recessed pavement markers are applied on a roadway opened to traffic and in a continuous operation of moving vehicles and equipment, the following minimum warning devices shall be required.

1. The vehicle applying the pavement markings shall have sequential or flashing arrows as directed by Engineer.
2. A shadow vehicle shall maintain at least a distance of 50' behind the vehicle applying pavement markings and shall have an acceptable sequential or flashing arrow board.

Application of pavement markings shall be accomplished without stopping traffic except when directed by the Owner. If Owner allows temporary closing of any part of the traveled width of any pavement, either on main roadway or intersecting roads and drives, and thereby restrict traffic, Contractor shall provide all barricades, lights, flagmen and such other protection to traffic as may be necessary for protection of work and safety of public.

Contractor shall at all times set up and operate equipment to encroach as little as possible upon the traveled width of any pavement opened to traffic.

Contractor shall submit a traffic control plan for application of thermoplastics. The plan will have to be reviewed and accepted by Owner before work begins.

END OF SECTION.

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SECTION 32 90 00**PLANTING****PART 1 – GENERAL****1.1 DESCRIPTION**

- A. The work covered in this section consists of soil preparation, fine grading, lawns, trees, shrubs and ground cover planting and protection and maintenance of planted areas until acceptance.

1.2 RELATED WORK

- A. Section 31 00 00 – Earthwork

1.3 QUALITY ASSURANCE

- A. Qualifications of Workmen: Contractor shall provide at least one person present at all times during execution of work that is thoroughly familiar with the type of materials being installed and proper equipment and methods for their installation and who shall direct all work performed under this section.
- B. Standards: All seed, sod, trees, shrubs, and ground covers shall meet or exceed the specifications of Federal, State, and County laws requiring inspection for disease and insect control.
 - 1. Plants and planting methods shall conform to the latest edition of American Standard for Nursery Stock, American Association of Nurserymen, 230 Southern Building, Washington, D.C. 2005
 - 2. Plants shall be true and representative of their genus, species, cultivar, or variety. One of each bundle or lot shall be tagged with name and size of the plant in accordance with American Association of Nurserymen. In all cases, botanical names shall take precedence over common names. Landscape Architect should be consulted in the event questions arise about nomenclature of plants to be used and their availability.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Deliver sod on pallets.
- D. Handling of plants shall be by lifting the root mass or container and not by lifting plant by trunk or branches. Handling of plants in an improper fashion shall be cause

for rejection of plant materials. Care must be taken during all phases of the location and planting procedures not to damage root system, trunk or branches. All plant materials shall be planted as soon after arrival at the site as possible. Contractor is responsible for keeping plants safe from injury by the construction activity and watered to prevent drying out before planting. Balled and burlapped plants shall be "Heeled-in" and protected with burlap or other accepted material if they cannot be planted upon delivery. Plants with broken major branches, badly bruised or damaged bark are not acceptable and will be rejected.

1.5 PLANTING DATES

- A. Permanent grass seed, sod, and plants shall be planted no earlier than March 15 and no later than September 1. Contractor has the option and assumes full responsibility for planting during unseasonable conditions.
- B. Temporary grass shall be planted between September 15 and November 15.
- C. Contractor is responsible for planting permanent grass the following Spring.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Contractor shall, at time of delivery, furnish Landscape Architect invoices of all materials received, in order the quality and source of materials may be determined.

2.2 TOPSOIL

- A. Topsoil shall be fertile, friable natural loam capable of sustaining vigorous plant growth. It shall be free of any admixture of subsoil, stones over 1" diameter, clods of hard earth, plants, roots, sticks or other extraneous material. It shall not be excessively acid or alkaline.

2.3 SEED

- A. Hulled common Bermuda grass, pure line seed to be 82% by weight, with a maximum weed seed of 0.50%.
- B. Temporary grassing shall consist of annual rye grass seed at a rate of 75 pounds per acre.

2.4 SOD

- A. Sod shall be centipede grass, with dense, healthy root systems free of weeds, insects, and diseases.
 - 1. Before cutting, sod shall be mowed to a height of not less than 1-1/2" or more than 3". Sod shall be cut in uniform widths of 12" or 18" and in lengths not exceeding 6'.

2. Sod shall be delivered to site in a fresh, moist condition with healthy green foliage. It shall be unloaded from delivery trucks on pallets and placed in final position within 24 hours of delivery. Sod shall be protected from wind and sun and shall not be allowed to dry out before planting.

2.5 PLANT MATERIALS

- A. Plants shall be sound, healthy and vigorous, well branched and densely foliated when in leaf. They shall be free of disease, insect pests, eggs or larvae, and shall have healthy, well developed root systems. Plants shall have been grown under climate conditions similar to those in the locality of project. Trees for planting in rows shall be uniform in size and shape.
- B. Plants shall possess a normal balance between height and width. Plants shall be measured when branches are in their normal position. Height and spread dimensions specified refer to the main body of plant and not from branch tip to tip. Plants larger in size than specified may be used with no change in contract price.
- C. Plants shall be dug with firm natural balls of earth, of diameter not less than recommended by American Standard for Nursery Stock and of sufficient depth to include fibrous and feeding roots. Plants will not be accepted if ball is cracked or broken before or during planting operations.
- D. Trees specified for Street Tree Grade shall conform to standards of the A.A.N.:
 1. Suitable for planting as street trees.
 2. Free of branches to approximately 50% of height from ground.
 3. Crown of tree shall be in good balance with the trunk.

2.6 FERTILIZER

- A. Commercial fertilizer shall be 5-10-10 or 6-12-12, uniform in composition, free flowing, and suitable for application with appropriate equipment. Deliver to site unopened in manufacturer's standard containers showing weight, analysis and name of manufacturer.

2.7 PEAT MOSS

- A. Peat moss shall be finely shredded, 90% organic moss peat, brown in color and suitable for horticultural purposes. Peat shall be measured in air dry condition, containing not more than 35% moisture by weight. Ash content shall not exceed 10%.

2.8 MULCH FOR TREES, SHRUBS, AND GROUND COVERS

- A. Mulch shall be pine straw.

2.9 STAKING EQUIPMENT

- A. Shall consist of treated wood stakes, 18 gauge galvanized guywire, 1/4" x 4" galvanized turnbuckle and 1/2 inch rubber hose.

PART 3 – EXECUTION

3.1 FINE GRADING

- A. All areas within limits of construction shall be fine graded to the desired grades. All areas within limits of construction are to be fine graded, free of roots, debris and/or other objectionable material, before planting or grassing commence. Any additional fill material needed to fill low or uneven areas shall be provided by the Contractor. Positive drainage shall be provided in all plant beds so standing water does not occur.
- B. Planting and grassing areas, if not loose, shall be loosened to a minimum depth of 3-inches before fertilizer, seed or sod is applied.

3.2 FERTILIZER

- A. Apply fertilizer after fine grading and mix thoroughly into upper 2 inches of soil.
- B. Fertilizer shall be applied at a rate of 12 pounds per 1,000 square feet of area to be grassed.

3.3 SODDING

- A. Do not begin grasswork until irrigation system is completely installed, tested and operational. Grassed areas lost due to an inoperable irrigation system shall be regressed at no additional cost to Owner.
- B. All areas to be sodded shall be brought to the proper line grade or cross section as was existing prior to construction. Sod shall be placed so edges of the sodded areas will be smooth and will conform to previous existing conditions. Sod shall be laid smooth, edge to edge, with staggered joints. Sod shall be immediately pressed firmly into contact with the sod bed by tamping or rolling, to eliminate any air pockets. A true and even surface shall be provided, to insure knitting without displacement of sod or deformation of the sodded surface area. Following compaction, screened soil of good quality shall be used to fill all cracks, and excess soil shall be worked into the grass with rakes or other suitable equipment. On slopes steeper than 3 to 1, the sod shall be fastened in place with suitable wood or metal pins to hold the sod in place. Any damage by erosion or other causes occurring after completion of grading operations shall be repaired before commencing with the sod placement.
- C. Immediately before sodding, moisten topsoil with a fine spray to a minimum 1" depth.
- D. Within 2 hours after sod has been placed, thoroughly water to a minimum depth of 4".

3.4 SEEDING

- A. Seeding shall be performed during the period between March 15 and September 1, unless otherwise accepted.
- B. Seed shall be sown within 24 hours following the application of fertilizer and preparation of seed-bed.
- C. Apply seed evenly at a rate of 40 pounds per acre using acceptable mechanical seed drills.
- D. Seeds shall be covered and lightly compacted by means of a cultipacker or light roller if the drill does not perform this operation.
- E. Apply water with fine spray immediately after each area has been sown.
- F. Do not sow immediately following rain, when ground is too dry, or during windy periods.

3.5 SEED PROTECTION

- A. All areas seeded with permanent grasses shall be uniformly mulched in a continuous blanket immediately following seeding and compacting operations, using at least 1-1/2 tons of straw per acre.

3.6 LAYOUT OF TREES, SHRUBS AND GROUND COVERS

- A. All plants shall be placed in the proper location as shown on construction plans, allowing Landscape Architect to review all plant locations prior to actual planting. Landscape Architect may make minor adjustments which shall not be cause for changes to the contract price.

3.7 OBSTRUCTIONS BELOW GROUND

- A. Prior to excavating planting holes, Contractor shall determine the exact location of electrical, phone, or television cables or conduits, water, drainage or sewer lines, and any other subsurface structures and take precautions to protect them. Any damage to underground utilities shall be repaired immediately at the Contractor's expense.
- B. In the event rock, underground construction work, or other obstructions are encountered in any plant hole excavation under this contract, alternate locations may be selected.

3.8 PLANTING HOLES

- A. For trees, shall be 12" deeper and 24" wider than the size of root ball. Planting holes for shrubs and containerized ground covers shall be 6" deeper and 12" wider than the root mass.

3.9 PLANTING HEIGHTS

- A. Shall be same as grown in the nursery and/or container soil level. Adjust bottom soil mix to insure proper planting level with the proposed surrounding grades. Check plants to insure proper vertical alignment.

3.10 BALLED AND BURLAPPED PLANTS

- A. Shall have all bindings removed and the top half of burlap removed from around root ball. The burlap can be laid back from root mass or can be cut away. All weeds growing on the root mass shall be removed prior to planting.

3.11 CONTAINER GROWN PLANTS

- A. Shall have the container removed prior to planting. Care shall be taken to protect root mass from injury and the root mass intact. If root mass shows evidence of being bound or matted, three vertical 1/2" deep cuts shall be made on alternate sides of the root mass and roots pulled away slightly. This is to untangle roots which have begun to "circle" the root mass and to encourage new root growth. All weeds growing in the root mass shall be removed prior to planting.

3.12 SOIL MIX

- A. Shall consist of 25% peat moss and 75% native soil. The soil mix shall be added to planting holes and compacted to the proper level prior to setting plants. Level of soil mix shall be adjusted to achieve the proper planting height. The soil mix shall be added to all sides equally and tamped until planting hole is 1/4 full. Water in well and then complete addition of soil mix and tamping soil until the level is at grade. Water in well once again.

3.13 EARTH SAUCERS

- A. Shall be constructed around the perimeter of planting holes of all trees and all single planted shrubs. Earth saucers shall be minimum 3" high and compacted to retain water. Earth saucers shall not be installed around mass shrub or groundcover plantings.

3.14 STAKING OF TALL PLANTS

- A. Shall take place immediately after planting of the trees. Three 2" x 2" x 2' – 6" stakes shall be driven into ground equidistant around the plant a distance from plant equal to one third of its height. Stakes shall be driven into ground at an acute angle away from the plant. Insert twisted guy wires through the rubber hose and loop around trunk of tree above first set of branches or at a point on trunk of plant equal to one third of height, whichever is higher. Twist guy wire tightly around itself to form a loose loop around the trunk. Make sure the hose makes contact with trunk rather than wire. Attach each section of guy wire to turnbuckles and then to the wood stakes and tighten turnbuckles and guy wire so plant is vertical and immobile to wind action. Attach flagging to all guy wires at eye level for proper visibility.

3.15 MULCHING

- A. All plants shall be mulched with an evenly thick 3" layer of clean pine straw immediately after planting. Mass plant beds shall be completely mulched to outer limits of all plants 12" past the existing dripline. Limit of mulching for individual trees and shrubs shall be slightly beyond the saucer berm. The areas mulched shall be tidy and clean in appearance.

3.16 WEEDING

- A. All planted areas shall be kept free from weeds and undesirable grasses until final acceptance by the Owner.

3.17 INSECT AND DISEASE CONTROL

- A. All plant materials shall be disease or insect free upon arrival to the site, however, should any plants show signs of insect or disease infestations, Contractor shall identify nature of infestation and submit to Architect a proposed method of control. Contractor shall treat all infested plants at its expense. Should the infestation be wide spread and uncontrollable, plants affected shall be removed from site, fresh plants brought in and all other plants treated to prevent infestation of remaining plants at Contractor's expense.

3.18 CLEAN UP

- A. Contractor is responsible for removing all trash, debris, rubbish and all other materials associated with the construction from site on a daily basis. All tags, flags and labels will be removed from plants and trees. The site shall be left broom clean and tidy. Clean up of the site is a prerequisite to final acceptance by the Owner.

PART 4 – MAINTENANCE AND WARRANTY**4.1 MAINTENANCE**

- A. All landscaping (grass, plants and trees) shall be protected and maintained by the Contractor immediately after installation.
- B. Maintenance shall include but is not limited to watering, weeding, cultivating, removal of dead material, resetting plants to proper grades or upright position, lawn mowing, fertilizing, and other necessary operations.
- C. The Contractor shall repair immediately any areas damaged as a result of construction operations or erosion.
- D. The Owner will be responsible for maintenance from time of acceptance.

4.2 WARRANTY

- A. All lawns, shrubs, ground cover, and trees shall be guaranteed by the Contractor to be alive and healthy for a two year period after substantial completion.
- B. Any lawn, plant, or tree which is dead or not showing satisfactory growth shall be replaced at Contractor's expense at the end of warranty period. All replacements shall be of original quality and of a size equal to adjacent plants or trees of the same kind.

END OF SECTION

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SECTION 32 92 00**TURF AND GRASSES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Seeding, planting grass, and fertilizing graded areas behind the structures, pipeline rights-of-way, roadway shoulders, and other disturbed areas.
- B. Seed protection.
- C. Maintaining seeded areas until final acceptance.

1.2 RELATED WORK

- A. Civil and Landscape plans and specifications.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging, and location of packaging. Damaged packages are not acceptable. Store in cool, dry locations away from contaminants.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer. Damaged bags are not acceptable. Store in cool, dry locations away from contaminants.
- C. Deliver sod on pallets.
- D. All material shall be acceptable to Engineer prior to use.

1.4 PLANTING DATES

- A. This specification provides for establishment of a permanent grass cover between the dates of March 1 and September 30. If finished earth grades are not completed in time to permit planting and establishment of permanent grass during the favorable season between dates specified above unless otherwise accepted, Contractor will be required to plant a temporary cover to protect new graded areas from erosion and to keep windborne dust to a minimum. The temporary cover shall be planted between October 1 and February 28 unless otherwise permitted.

1.5 MEASUREMENT AND PAYMENT

- A. When the season or stage of project is such results of grassing work cannot be determined, conditional acceptance will be made on work completed. When conditional acceptance is made for items of work covered, Contractor shall be entitled to 50% of bid price for the actual work placed and shall receive remaining 50% of bid price when final acceptance is made. Conditional acceptance shall not apply to the remaining items of work, and full bid price payment shall be made

when work is acceptably placed and completed in accordance with specifications.

- B. Payment for grassing shall be included in the contract lump sum price and shall constitute full compensation for furnishing and placing seed and fertilizer or sod where directed and protecting and maintaining seed and sod in all graded and disturbed areas. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.

PART 2 – PRODUCTS

- A. Contractor shall submit source and species certification documents to Engineer and Owner's Representative for review prior to installation. Supply complete information on all analysis/test methodologies and results; laboratory certifications, manufacturer's specifications, and agency approvals to the Landscape Architect/Project Engineer prior to placement of soil mixtures. In addition, provide the Landscape Architect/Project Engineer with thoroughly mixed sample of soil mixes for acceptance prior to placement. Landscape Contractor shall make modifications and improvements to soil mixes deemed necessary by the soil analysis to meet requirements specified here in before, and to ensure proper growing medium for plant material.

2.1 SEED

- A. All seed shall conform to State Laws and requirements and regulations of the State Department of Agriculture.
- B. The varieties of seed, as specified in Section 2.2, shall be individually packaged or bagged, and tagged to show name of seed, net weight, origin, germination, lot number, and other information required by the State Department of Agriculture.
- C. Engineer reserves the right to test, reject, or accept all seed before seeding.
- D. Multi-purpose fields shall be Bermuda grass.

2.2 SEEDING SCHEDULE

A.	<u>SEED</u>	<u>RATE</u>	<u>PLANTING DATES</u>
	Bermuda	15-lbs/acre	March 1 – September 30
	Rye	75-lbs/acre	October 1 – February 28

2.3 FERTILIZER

- A. Commercial fertilizer of accepted type, conforming to State fertilizer laws at the rate as recommended by soils test.

2.4 LIME

- A. Agricultural grade, ground limestone at the rate as recommended by soils test.

2.5 SOD

- A. Sod shall be premium grade, densely rooted, good quality grass of the species and certified variety as shown on the plans, free from noxious weeds with no surface soil being visible. The sod shall be obtained from areas where the soil is reasonably fertile. Sod of specified species shall be grown from seed or sprig with not less than 95 percent germination, 85 percent pure seed, and not more than 0.5 percent weed seed. The sod shall be machine cut to a uniform soil thickness that shall contain practically all of the dense root system and not be less than 1-inch thick.
- B. Before cutting, sod shall be mowed to a height of not less than 1-1/2- inches or more than 2- inches. Sod shall be cut in minimum uniform widths of 12- inches and lengths of 24 inches.
- C. Sod shall be delivered to site in a fresh, moist condition with healthy green foliage. It shall be unloaded from delivery trucks on pallets or in rolls and placed in final position within 24 hours of delivery. Sod shall be protected from wind and sun and shall not be allowed to dry out before planting.
- E. Sod shall be strong enough to support its own weight and retain its size and shape when suspended vertically from a firm grasp on the upper 10 percent of the section.

2.6 ACCESSORIES

- A. Straw Mulch: Oat or wheat straw, reasonably free from weeds, foreign matter detrimental to plant life, and in dry condition.
- B. Excelsior Mulch: Excelsior mulch shall consist of wood fibers cut from sound, green timber. The average length of fibers shall be 4 to 6 inches. Cut shall be made in such a manner as to provide maximum strength of fiber, but at a slight angle to natural grain of the wood to cause splintering of fibers when weathering in order to provide adherence to each other and to soil.
- C. Wood cellulose fiber shall be made from wood chip particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer. It shall remain in uniform suspension in water under agitation and blend with grass seed and fertilizer to form a homogenous slurry. Mulch fibers shall intertwine physically to form a strong moisture holding mat on the ground surface and allow rainfall to percolate into underlying soil. The mulch shall be heat processed to contain no germination or growth- inhibiting factors. It shall be dyed (non- toxic) an appropriate color to facilitate metering of material.

2.7 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Areas to be seeded shall be made smooth and uniform and shall conform to the finished grade indicated on plans.
- B. Remove foreign materials, plants, roots, stones, and debris from surfaces to be seeded.
- C. Grassing areas, if not loose, shall be loosened to a minimum depth of 3 inches before fertilizer, seed or sod is applied.
- D. Amendments to soils shall be incorporated into loosened 3- inch top soil layer as recommended by soils tests.
- E. Contractor shall provide Topsoil Analysis Tests performed by a State Agricultural Experiment Station, Soil and Water Conservation District, State University, or other qualified private testing laboratory, as acceptable to Landscape Architect/Project Engineer. Soils test shall identify existing pH and nutrient levels, as well as recommended adjustments based on the type of grass to be installed.

3.2 STAND OF GRASS

- A. Before acceptance of seeding, sodding, or sprigging is performed for the establishment of permanent vegetation, Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and winter weather and be capable of re-establishment in spring.
- B. Before acceptance of seeding is performed for the establishment of temporary vegetation, Contractor will be required to produce a stand of grass sufficient to control erosion for a given area and length of time before the next phase of construction or establishment of permanent vegetation is to commence.

3.3 SEEDING AND SPRIGGING DATES

- A. Seeding and sprigging shall be performed during periods and at rates specified in their respective schedules. Seeding and sprigging work may, at discretion of Contractor, be performed throughout the year using schedule prescribed for given period. Seeding and sprigging work shall not be conducted when the ground is frozen or excessively wet. Contractor will be required to produce a satisfactory stand of grass regardless of the period of year work is performed.

3.4 APPLYING LIME AND FERTILIZER

- A. Following advance preparation and placing selected material for shoulders and slopes, lime and fertilizer, if called for based on soil tests, shall be spread uniformly over the designated areas, and shall be thoroughly mixed with the soil to a depth of approximately 2 inches. Fertilizer and lime shall be applied at the rate recommended by required soils test. Unless otherwise provided, lime will not be applied for temporary seeding. In all cases where practicable, acceptable

mechanical spreaders shall be used for spreading fertilizer. On steep slopes subject to slides and inaccessible to power equipment, the slopes shall be adequately scarified. Fertilizer may be applied on steep slopes by hydraulic methods as a mixture of fertilizer and seed. When fertilizer is applied with combination seed and fertilizer drills, no further incorporation will be necessary. The fertilizer and seed shall be applied together when Wood Cellulose Fiber Mulch is used. Any stones larger than 2- 1/2 inches in any dimension, larger clods, roots, or other debris brought to the surface shall be removed.

3.5 SEEDING

- A. Seed shall be sown within 24 hours following application of fertilizer and lime and preparation of the seedbed as specified in Section 3.4. Seed shall be uniformly sown at rate specified by the use of acceptable mechanical seed drills. Rotary hand seeders, power sprayers or other satisfactory equipment may be used on steep slopes or on other areas inaccessible to seed drills.
- B. Seeds shall be covered and lightly compacted by means of cultipacker or light roller if the drill does not perform this operation. On slopes inaccessible to compaction equipment, the seed shall be covered by dragging spiked chains, by light harrowing or by other satisfactory methods.
- C. Apply water with fine spray immediately after each area has been sown.
- D. Do not sow seed when ground is too dry, during windy periods or immediately following a rain.
- E. If permitted by the special provisions, wood cellulose fiber mulch or excelsior fiber mulch may be used.

3.6 SEED PROTECTION (STRAW MULCH)

- A. All seeded areas seeded with permanent grasses shall be uniformly mulched in a continuous blanket immediately following seeding and compacting operations, using at least 2 tons of straw per acre.

3.7 SEED PROTECTION (EXCELSIOR MULCH)

- A. Seed shall be sown as specified in Section 3.5. Within 24 hours after covering of seed, excelsior mulch shall be uniformly applied at the rate of 2 tons per acre. The mulch may be applied hydraulically or by other acceptable methods. Should the mulch be placed in a dry condition, it shall be thoroughly wetted immediately after placing. Engineer may require light rolling of the mulch to form a tight mat.

3.8 SEED PROTECTION (WOOD CELLULOSE FIBER MULCH)

- A. After the lime has been applied and ground prepared as specified in Section 3.4, wood cellulose fiber mulch shall be applied at a rate of 1,500 pounds per acre in a mixture of seed and fertilizer. Hydraulic equipment shall be used for application of fertilizer, seed, and slurry of the prepared wood pulp. This equipment shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed, and water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which will

provide an even distribution of slurry on various areas to be seeded. The slurry tank shall have a minimum capacity of 1,000 gallons.

Seed, fertilizer, wood pulp mulch, and water shall all be combined into the slurry tank for distribution of all ingredients in one operation by hydraulic seeding method specified herein. Materials shall be combined in a manner recommended by the manufacturer. The slurry mixture shall be regulated so amounts and rates of application shall result in a uniform application of all materials at rates not less than amount specified. Using the color of wood pulp as a guide, equipment operator shall spray prepared seedbed with a uniform visible coat. The slurry shall be applied in a sweeping motion, in an arched stream to fall like rain, allowing wood fibers to build upon each other until an even coat is achieved.

3.9 SODDING

- A. Sod shall be placed between March 1st and December 1st. However, if sod is to be placed during periods of temperatures over 90 degrees F., the Contractor shall take extra care for quick placement of sod with adequate, consistent watering necessary to ensure sod thrives as planted.
- B. Sod shall be placed within 24 hours of cutting.
- C. Place top elevation of sod 1/2 inch below adjoining paving or curbs.
- D. All areas to be sodded shall be brought to the proper line grade or cross section as was existing prior to construction. Sod shall be placed so, upon completion, edges of sodded areas will be smooth and will conform to the proposed finished grade. Sod shall be laid smooth, edge to edge, with staggered joints. Sod shall be immediately pressed firmly into contact with the sod bed by tamping or rolling, to eliminate any air pockets. A true and even surface shall be provided, to insure knitting without displacement of the sod or deformation of the sodded areas surfaces. Do not stretch or overlap sod pieces. Following compaction, screened soil of good quality shall be used to fill all cracks. Excess soil shall be worked into the grass with rakes or other suitable equipment. On slopes steeper than 3 to 1, sod shall be fastened in place with suitable wood or metal pins to hold the sod in place. Any damage by erosion or other causes occurring after completion of grading operations shall be repaired, before commencing with the sodding operations.
- E. Immediately before sodding, moisten topsoil with a fine spray to a minimum 1-inch depth. Sod shall not be laid on dry or powdery soil.
- F. Sod shall be moist when laid and placed on moist ground. The sod shall be carefully placed by hand, beginning at the toe of slopes and working upwards. The length of strips shall be at right angles to flow of surface water. All joints shall be tightly butted and end joints shall be staggered at least 12 inches. Sod shall be immediately pressed firmly into the ground by tamping or rolling. Fill all joints between strips with fine screened soil. Sod on slopes shall be pegged with sod pegs to prevent movement.
- G. Within two hours after sod has been placed, thoroughly water to a minimum depth of 4- inches. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove depressions and irregularities. Roll sodded areas with a roller not exceeding 150 lbs. per foot of roller width.

PART 4 – MAINTENANCE, WARRANTY AND ACCEPTANCE

4.1 MAINTENANCE

- A. Maintain grassed surfaces until final acceptance.
- B. Maintenance shall consist of providing protection against traffic, watering to ensure uniform seed germination and to keep surface of soil damp, and repairing any areas damaged as a result of construction operations or erosion. Maintenance shall also include, but is not limited to, watering, weeding, cultivating, removal of dead material, lawn mowing, fertilizing, and other necessary operations.
- C. The Contractor shall maintain all proposed plantings until the date of substantial completion issued by the Owner.

4.2 WARRANTY

- A. All grassed areas shall be guaranteed by Contractor to be alive and healthy for a one year period from date of substantial completion issued by the Owner. A final walk through with the Owner shall be conducted at end of warranty period to determine if any areas require replanting. At end of warranty period, sod shall show evidence of rooting to underlying soil and shall have no competitive weed growth from either the sod or from between sod joints.
- B. Any grassed area which is dead or not showing satisfactory growth shall be replaced at Contractor's expense at the end of warranty period. All replacement shall be of original quality. Replacement required because of vandalism, excessive use, or other causes beyond the control of Contractor are not part of this contract.

4.3 ACCEPTANCE

- A. Before acceptance of seeding performed for the establishment of permanent vegetation, Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and winter weather and be capable of re- establishment in spring.
- B. A minimum coverage of 80% density over 100% of the disturbed area is required for seeded areas before project acceptance. Sprig and sod areas shall have 95% coverage over 100% of the disturbed area prior project acceptance.

END OF SECTION

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SECTION 33 10 00**WATER UTILITIES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Piping
- B. Valves
- C. Fittings
- D. Connect to Existing System
- E. All necessary appurtenances to convey potable water from existing system to the location shown on plans.

1.2 RELATED SECTIONS

- A. Section 31 00 00 – Earthwork
- B. Section 31 10 00 – Site Clearing
- C. Section 32 92 00 – Turf and Grasses

1.3 OPTIONS

- A. The bid form and specifications describe several pipe materials. Where manufacturers of material or equipment are named in the specifications, Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by Engineer as meeting specifications prior to ordering such equipment or materials.

1.4 REFERENCES (LATEST REVISION)

- A. ASTM A 53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- B. ASTM A 139 – Electric-Fusion (Arc) – Welded Steel Pipe (NPS 4 and Over).
- C. ASTM C 443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
- D. ASTM C 478 – Precast Reinforced Concrete Manhole Sections.
- E. ASTM D 1557 – Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- F. ASTM D 1784 – Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- G. ASTM D 2241 – Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR – Series).

- H. ASTM D 2737 – Polyethylene (PE) Plastic Tubing.
- I. ASTM D 2774 – Underground Installation of Thermoplastic Pressure Piping.
- J. ASTM D 3139 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- K. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- L. ASTM D 6938 – In-Place Density and Water Content of Soil and Soil – Aggregate by Nuclear Methods (Shallow Depth).
- M. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- N. AWWA C 104– Cement–Mortar Lining for Ductile Iron Pipe and Fittings for Water.
- O. AWWA C 110 – Ductile–Iron and Gray–Iron Fittings.
- P. AWWA C 111– Rubber Gasket Joints for Ductile–Iron Pressure Pipe and Fittings.
- Q. AWWA C 115 – Flanged Ductile–Iron Pipe with Ductile–Iron or Gray–Iron Threaded Flanges.
- R. AWWA C 150 – Thickness Design of Ductile Iron Pipe.
- S. AWWA C 151 – Ductile Iron Pipe, Centrifugally Cast, for Water.
- T. AWWA C 153 – Ductile–Iron Compact Fittings.
- U. AWWA C 200 – Steel Water Pipe 6 Inch (150 mm) and Larger.
- V. AWWA C 500 – Metal–Seated Gate Valves for Water Supply Service.
- W. AWWA C 502 – Dry–Barrel Fire Hydrants.
- X. AWWA C 504 – Rubber–Seated Butterfly Valves, 3 inch through 72 inch.
- Y. AWWA C 509 – Resilient–Seated Gate Valves for Water Supply Service.
- Z. AWWA C 512 – Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
- AA. AWWA C 515 – Reduced–Wall, Resilient–Seated Gate Valves for Water Supply Service.
- BB. AWWA C 600 – Installation of Ductile Iron Water Mains and Their Appurtenances.
- CC. AWWA C 605 – Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
- DD. AWWA C 651 – Disinfecting Water Mains.

- EE. AWWA C 800 – Underground Service Line Valves and Fittings.
- FF. AWWA C 900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 inch through 12 inch for Water Transmission and Distribution.
- GG. AWWA C 901 – Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inch through 3 inch, for Water Service.
- HH. AWWA C 905 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 inch through 48 inch (350 mm through 1,200 mm), for Water Transmission and Distribution.
- II. ASME B18.2.1 – Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (inch series).
- JJ. ASME B18.2.2 – Nuts for General Application: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (inch series).
- KK. NSF/ANSI 61 – Drinking Water System Components – Health Effects.
- LL. ASSE 1003 – Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems.

1.5 QUALITY ASSURANCE

- A. Materials – Contractor will furnish the Engineer and Owner a description of all material before ordering. Engineer will review the Contractor's submittals and provide in writing an acceptance or rejection of material.
- B. Manufacturer – Material and equipment shall be standard products of a manufacturer who has manufactured them for a minimum of 2 years and who provides published data on quality and performance of the products.
- C. Subcontractor – A subcontractor for any part of the work must have experience on similar work, and if required, furnish Engineer with a list of projects and Owners or Engineers who are familiar with its competence.
- D. Design – If Contractor wishes to furnish devices, equipment, structures, and systems not designed by Engineer, these items shall be designed by either a Professional Engineer registered in the state of this project, or by someone Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before acceptance.
- E. Testing Agencies – Soil testing shall be conducted by a testing laboratory which operates in accordance with ASTM D 3740 and E 329 latest revision and be acceptable to the Engineer prior to engagement. Mill certificates of tests on materials made by manufacturers will be accepted provided manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests that are spot checked by an outside laboratory, and furnishes satisfactory certificates with name of entity making the test.
- F. Hydrostatic tests on pipe shall be made by Contractor with equipment qualified by the Engineer. Engineer or Project Representative reserves the right to accept

or reject testing equipment. Hydrostatic testing shall be conducted in the presence of Engineer or Project Representative and a representative of water supplier.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

- A. Water mains shall be sterilized to meet requirements of the appropriate Health Department. Sterilization shall be in accordance with AWWA Standards C-651, latest revision.

1.7 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. Contractor shall repair any damage caused by the storage. Material shall be examined before installation. Neither damaged nor deteriorated material shall be used in the work.

1.8 SEQUENCING AND SCHEDULING

- A. Contractor shall arrange the work so sections of mains between valves are tested, sterilized, pavement replaced, and the section placed in service as soon as reasonable after installation.

1.9 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If Contractor suggests alternative material, equipment or procedures will improve the results at no additional cost, Engineer and Owner will examine suggestion, and if accepted, it may be used. The basis upon which acceptance of an alternative will be given is its value to the Owner, and not for the Contractor's convenience.

1.10 GUARANTEE

- A. Contractor shall guarantee the quality of materials, equipment, and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

1.11 EXISTING UTILITIES

- A. All known utility facilities are shown schematically on the construction drawings and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown will not relieve the Contractor of responsibility under this requirement. "Existing Utilities Facilities" means any utility existing on the project in its original, relocated, or newly installed position. Contractor will be held responsible for the cost of repairs to damaged underground facilities, even when such facilities are not shown on drawings.
- B. Contractor shall call for underground utility locations before starting work. Underground utilities location service can be contacted at 811.

1.12 CONNECT NEW MAIN TO EXISTING SYSTEM

- A. Contractor shall furnish the necessary pipe and perform all excavation, dewatering, shoring, backfilling, etc., necessary to make the connection of a new main to existing water system. Contractor shall contact the Superintendent of Water Utility a minimum of 48 hours in advance of construction. Contractor shall be responsible for coordinating construction with the utility operator.

1.13 DAMAGE TO EXISTING WATER SYSTEM

- A. Damage to any part of the existing water system by Contractor or Subcontractors, repaired by Utility Owner's forces, shall be charged to Contractor on basis of time and material, plus 30% for overhead and administration.

1.14 MEASUREMENT AND PAYMENT

- A. Measurement – The length of mains and branch lines to be paid for will be determined by measurement along the centerline of the various sizes and types of pipe actually furnished and installed, from the center of fitting, and from the center of the main to the end of the branch connection. No deduction will be made for the space occupied by valves and fittings.
- B. Payment –
 - 1. Pipe – Payment for pipe shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Per linear foot for the various types and sizes of pipe that are actually placed, as shown on the plans, or as directed by the Engineer. Excavation, dewatering, installation, backfill, compaction, testing, metal detector tape, tracing wire, and all other incidentals to installation of the mains shall be considered as subsidiary obligations of the Contractor for completion of the line in place.
 - 2. Fittings – Fittings for iron and plastic pipe in the distribution system shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Per pound of ductile iron fittings at the weights listed in AWWA Specification C-153 for mechanical joint compact fittings. (Excluding Accessories.) No distinction will be made between the weight of compact ductile iron, cast iron or ductile iron fittings, unless the fittings used are not manufactured as compact fittings. Fittings not manufactured as compact fittings will be paid for on the basis of the unit price per pound of ductile iron fittings at the weights listed in AWWA C-110. P.V.C. fittings used for P.V.C. pipe, at the Contractor's option, will be considered a subsidiary obligation to the pipe and will not be measured for separate payment. Payment for P.V.C. fittings shall be included in the unit price per foot for P.V.C. The adapters necessary to connect to valves shall be considered a part of the line in which they are installed.
 - 3. Valves – Payment for valves shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid,

executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include furnishing and installing the valve, valve boxes, extensions, or manholes.

4. Fire Hydrants – Payment for fire hydrants shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include the cost of furnishing, installing and connecting the hydrant, gravel sump, restrained joints, backfilling, and painting. The 6-inch pipe from the main line to the hydrant will be paid for as 6-inch pipe. Gate valve and valve box will be paid for separately.
5. Cleaning and Disinfecting – No separate payment will be made for cleaning and disinfecting. Cleaning and disinfecting piping in the distribution system will be included in the lump sum and unit prices for the appropriate items.
6. Connections – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include the cost of furnishing and installing the tapping saddle, corporation stop, curb stop and marking stake at the property line. Service pipe will be paid for at the contract unit price for each size specified.
7. Grassing – There will be no separate measurement or payment. Grassing shall be considered as a subsidiary obligation of the Contractor in the restoration of disturbed areas.
8. Metal Detector Tape – No separate payment will be made for tape. The cost of furnishing and placing metal detector tape shall be included in the contract unit price for installing pipe.
9. Connections to Existing Mains – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Each type of connection will include all equipment, labor, and materials required to locate, excavate, cut, connect, backfill, and compact.
10. Tapping Sleeves and Crosses – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include all labor, materials, and equipment necessary to locate, excavate, furnish, and install the sleeve or cross, valve, valve boxes or manholes, tap the existing main, backfilling and compaction.
11. Remove and Replace Existing Pavement – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Any changes

will be on a square yard basis and constructed in accordance with the detail shown.

12. Flush Valves – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include furnishing and installing the ball valve, riser pipe and cap, valve or meter box and the concrete collar.
13. Tracer Wire – No separate payment will be made for wire. The cost of furnishing and placing tracer wire shall be included in the contract unit price for installing pipe.
14. Restrained Joints – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include all labor, materials, and equipment necessary to furnish and install each restrained joint.
15. Backflow Preventer Assembly – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include furnishing and installing the backflow preventer assembly, vault, cover, testing, and certification.
16. Air Release Valve in Manhole – Payment shall be included in the contract lump sum. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include furnishing and installing the air release valve, saddle, ball valve, manhole, frame, and cover.

1.15 TESTING

- A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).
- B. In place density tests in accordance with ASTM D 6938.
- C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.
- E. Testing shall be Contractor's responsibility and shall be performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.
- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

Products and materials used in work shall conform to the following:

2.1 PIPE

- A. Ductile Iron Pipe – Shall conform to AWWA C-150 and AWWA C-151. All pipe shall be Pressure Class 350 unless otherwise noted. It shall be cement lined in accordance with AWWA C-104.
- B. P.V.C. – All pipe shall be blue in color with factory marked homing lines. Pipe 4 inches through 12 inches shall conform to all requirements of AWWA C-900, DR 18, pressure class of 235 p.s.i. and shall have the following minimum wall thickness:

4 inches	0.267 inches
6 inches	0.383 inches
8 inches	0.503 inches
10 inches	0.617 inches
12 inches	0.733 inches

PVC pipe 14 inches through 18 inches shall conform to all requirements of AWWA C905 with CI outside diameter, DR 18, with a pressure rating of 235 p.s.i.

Pipe with diameter less than 4 inches shall conform to all requirements of ASTM D-1784 and D-2241 (SDR 21). The pipe shall have a minimum pressure rating of 200 p.s.i. Certificates of conformance with the foregoing specifications shall be furnished with each lot of pipe supplied. All P.V.C. pipe shall bear the National Sanitation Foundation Seal of Approval.

- C. Plastic Tubing – Tubing for service lines shall be:

Polyethylene Tubing: CTS PE 3408 conforming to all requirements of AWWA C-901 and ASTM D-2737 (SDR9). The tubing shall be copper tubing size and rated for a minimum working pressure of 200 p.s.i. Marking on the tubing shall include nominal tubing pipe size; type of tubing material – PE 3408; SDR 9; pressure rating – 200 p.s.i.; ASTM D-2737; manufacturer's name and seal of the National Sanitation Foundation.

2.2 JOINTS

- A. Flanged Joints – Shall conform to ANSI A-21.15 (AWWA C-115). Bolts shall conform to ANSI B-18.2.1 and nuts shall conform to ANSI B-18.2.2. Gaskets shall be rubber, either ring or full face, and shall be 1/8 inch thick. Gaskets shall conform to the dimensions recommended by AWWA C-115 latest revision.
- B. Mechanical Joints – In ductile iron pipe shall conform to ANSI A-21.11 (AWWA C-111).
- C. Push-On-Joints – In ductile iron pipes shall conform to ANSI A-21.11 (AWWA C-111).

- D. Plastic Pipe – Joints in plastic pipe 4 inches through 12 inches shall meet all requirements of AWWA C-900. Joints in plastic pipe 14 inches through 18 inches shall meet all requirements of AWWA C905. Joints in plastic pipe with a diameter less than 4 inches shall conform to ASTM D-3139.
- E. Restrained Joints – Restrained joints for pipe, valves and fittings shall be mechanical joints with ductile iron retainer glands equivalent to "Megalug" or push-on type joints equivalent to "Lok-Ring," "TR Flex," or "Super Lock" and shall have a minimum rated working pressure equal to the item restrained with a minimum safety factor of 2:1. The joints shall be in accordance with the applicable portions of AWWA C-111. The manufacturer of the joints shall furnish certification, witnessed by an independent laboratory, that the joints furnished have been tested without signs of leakage or failure. Restrained joints shall be capable of being deflected after assembly.
- F. Natural rubber or other material which will support microbiological growth may not be used for any gaskets, o-rings, and other products used for jointing pipes, setting meters, and valves or other appurtenances which will expose such material to water.

2.3 FITTINGS

- A. Fittings for Ductile Iron or Plastic Pipe – Shall be ductile iron, manufactured in accordance with ANSI A-21.53 (AWWA C-153). They shall be cement lined in accordance with ANSI A-21.4 (AWWA C-104). Fittings shall be designed to accommodate the type of pipe used.
- B. Fittings for Flanged Pipe – Shall be manufactured in accordance with ANSI A-21.10 (AWWA C-110), Class 125 flanges.
- C. Fittings for Plastic Pipe – Less than 4 inches shall be PVC with ring tite rubber joints conforming to ASTM D-3139.

2.4 GATE VALVES

- A. Two Inches and Larger – Shall be cast iron or ductile iron body, bronze mounted, double disc or resilient wedge design, with non-rising stems, conforming to AWWA C-500, C-509, or C-515. Valves shall have a working pressure of 200 p.s.i. and be tested at 400 p.s.i.

Valves shall be furnished with "O" ring packing. Two "O" rings shall be located above the thrust collar and one "O" ring below. The thrust collar shall be permanently lubricated and have an anti-friction washer on top of the thrust collar.

Valves installed in pits or above ground shall be furnished with hand wheels. Buried valves shall be furnished with square operating nuts.

- B. Smaller Than 2 Inches – Shall be all brass, ball valve type. The pressure rating shall be 175 p.s.i.
- C. Valve Boxes – Underground valves shall be installed in acceptable valve boxes. The valve boxes shall have a suitable base which does not damage the pipe,

and shaft extension sections to cover and protect the valve and permit easy access and operation. The box, cover, and any extensions needed shall be cast or ductile iron having a crushing strength of 1,500 pounds per linear foot. Valve boxes shall conform to the detail shown.

D. Valve Manholes

1. Masonry – Shall be new whole brick of good quality laid in masonry mortar or cement made of one part Portland cement and two parts clean sharp sand. Every brick shall be fully bedded in mortar. Manholes shall conform to the locations and details shown on the plans.
2. Precast Concrete – Shall be reinforced concrete constructed in accordance with ASTM C 478 and the details shown on the plans "Precast Concrete Manholes." The joints shall be tongue and groove sealed with flexible gaskets or mastic sealant. Gaskets shall be O-Ring or equivalent to Type A or B "Tylox" conforming to ASTM C 443. Mastic shall be equivalent to "Ram-nek" with primer. The primer shall be applied to all contact surfaces of the manhole joint at the factory in accordance with the manufacturer's instructions.
3. Frames and Covers – Shall be cast iron equivalent to the following:

Pursuant the details included in the construction plans.

E. Flush valves – Shall conform to the details shown.

2.5 BUTTERFLY VALVES

- A. All butterfly valves shall be of the tight-closing, rubber seated type, with rubber seat positively locking in place sealing against flow from either direction. No metal-to-metal seating surfaces will be permitted. Valves shall be bubble-tight at rated pressures with flow in either direction. Butterfly valves shall conform to ANSI/AWWA C504, Class 150B. Butterfly valves shall not be used on pipe smaller than 14-inches unless otherwise specified.
1. Valve body end connections for buried valves shall be installed using restrained joints equivalent to those manufactured by EBAA Iron, Inc.
 2. Valve shafts shall be stainless steel and may consist of a one-piece unit or may be the "Stub Shaft" type. A stub shaft comprises two separate shafts inserted into the valve disc hubs. Each stub shaft shall be inserted into the valve disc hubs for a distance of at least 1½ shaft diameters.
 3. Valve discs shall be solid ductile iron with an epoxy coating making it corrosion resistant. The thickness of the discs shall not exceed 2¼ times the shaft diameter.
 4. Valve seats shall be natural or synthetic rubber providing 360 degrees uninterrupted seating. The resilient seat shall be adjustable or replaceable in the field without burning or grinding. The seat shall be molded over a stainless steel ring for support and secured to the disc by corrosion resistant, self locking stainless steel screws.

5. All internal ferrous metal surfaces in the waterway shall be factory coated with a non-toxic, two-component, holiday-free, thermosetting epoxy to a nominal thickness of 4 mils.
 6. All butterfly valves shall be manually operated. Operators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position without creeping or fluttering. Operators shall be furnished with externally adjustable mechanical stop limiting devices. Valves shall have a 2 inch square operating nut and shall be installed with extension stem to extend the operating nut in accordance with the project details. The operator shall be integrally mounted on the valve mounting flange and shall have a gearing totally enclosed for buried service. Maximum force for operating nut shall be 40 pounds.
- B. Valve Boxes – Underground valves shall be installed in approved valve boxes. The valve boxes shall have a suitable base that does not damage the pipe, and shaft extension sections to cover and protect the valve and permit easy access and operation. The cover, box, and any extensions needed shall be cast or ductile iron having a crushing strength of 1,500 pounds per linear foot. Valve boxes shall conform to the detail shown.
- C. Valve Manholes –
1. Masonry – Shall be new whole brick of good quality laid in masonry mortar or cement made of one part Portland cement and two parts clean sharp sand. Every brick shall be fully bedded in mortar. Manholes shall conform to the locations and details shown on the plans.
 2. Precast Concrete – Shall be reinforced concrete constructed in accordance with ASTM C 478 and the details shown on the plans "Precast Concrete Manholes." The joints shall be tongue and groove sealed with flexible gaskets or mastic sealant. Gaskets shall be O-Ring or equivalent to Type A or B "Tylox" conforming to ASTM C 443. Mastic shall be equivalent to "Ram-nek" with primer. The primer shall be applied to all contact surfaces of the manhole joint at the factory in accordance with the manufacturer's instructions.
 3. Frames and Covers – Shall be cast iron equivalent to the following:

Pursuant the details included in the construction plans.

2.6 FIRE HYDRANTS

- A. General – Hydrants shall be manufacturer's current model design and construction. All units to be complete including joint assemblies. Physical characteristics and compositions of various metal used in the hydrant components shall meet the requirements as specified in AWWA C-502 latest revision. Hydrants shall be suitable for working pressure of 150 p.s.i.

- B. Bonnet – Bonnet may have oil filled or dry reservoir. If oil filled, bonnet must have "O" ring packing so all operating parts are enclosed in a sealed oil bath. Oil filler plug shall be provided in bonnet to permit checking of oil level and adding oil when required. If dry type, hydrant top must have lubricating hole or nut for ease of lubrication. All parts must be removed through top of hydrant without moving entire barrel section from safety flange.
- C. Nozzles and Caps – The hydrant shall have two 2-1/2 inch connections and one 4-1/2 inch steamer connection, National standard threads. Nozzles shall be bronze and have interlocking lugs to prevent blowout. Nozzle caps shall be secured to fire hydrant with non-kinking type chain with chain loop on cap ends to permit free turning of caps.
- D. Seat Ring – Seat ring shall be bronze.
- E. Drain Valves and Openings – Positive operating drain valves shall be provided to assure drainage of fire hydrant when the main valve is closed. Drain openings shall have bronze bushings.
- F. Main Valve – Valve shall be designed to close with the pressure and remain closed. Valve shall be made from material resisting damage from rocks or other foreign matter. Valve shall have a full 5-1/4 inch opening.
- G. Barrel and Safety Flanges – Hydrants shall have a safety-type vertical barrel with 4 foot bury and be designed with safety flanges and/or bolts to protect the barrel and stem from damage and to eliminate flooding when hydrant is struck. Bury depth shall be cast on barrel of hydrant.
- H. Operating Stop and Nut – Hydrant shall have a positive stop feature to permit opening of hydrant without over travel of stem. Operating nut shall be bronze 1 1/2 inch, point to flat, pentagon.
- I. Bolts and Nuts – Bolts, washers and nuts shall be corrosion resistant.
- J. Inlet – Bottom inlet of hydrant shall be provided with mechanical joint connection as specified and shall be 6 inch nominal diameter.
- K. Direction of Opening – Hydrant shall be designed to close "right" or clockwise and open "left" or counter-clockwise.
- L. Coatings – All inside and outside portions of hydrant shall be coated in accordance with AWWA C-502. The exterior portion of hydrant above ground level shall be painted with two coats of best grade zinc chromate primer paint and with two coats of approved hydrant enamel. Color shall be Federal Safety Yellow unless otherwise designated by Owner.
- M. Joint Assemblies – Complete joint assemblies consisting of gland, gasket, bolts, and nut shall be furnished for mechanical joint inlets.

2.7 SERVICE CONNECTIONS

- A. Taps in pipe larger than 3 inches shall be made with a tapping machine. A corporation stop shall be installed at the connection to the main. The

corporation stop shall be brass manufactured in conformance with AWWA C-800. Inlet and outlet threads shall conform to AWWA C-800.

Corporation stops shall be 1 inch equivalent to Mueller H-15008 or B-25008 with a stainless steel stiffener. Service saddles shall have 1 inch AWWA taps, equivalent to Ford Styles 202B or S70. Contractor shall adhere to pipe manufacturer's recommendations on maximum tap sizes for each main size.

- B. Taps for services in PVC pipe 3 inches and smaller shall be equivalent to Romac Industries Style 306 Saddle or made with a PVC Tee. The connection shall be capable of withstanding internal water pressure continuously at 150 p.s.i. House service lines will be 1 inch polyethylene tubing with a curb stop at the property line. The end of the service lateral at the property line shall be marked with a 2 x 4 stake, 36 inches long with the top 6 inches above the ground and painted blue. The depth of the pipe shall be marked on the back of the stake. Location of service line must appear on the "as-built" information and record drawings.

2.8 TAPPING SLEEVES

- A. Cast or Ductile Iron – Shall be mechanical joint type sized to fit the intercepted pipe. They shall have duck-tipped end gaskets and shall be equivalent to Mueller H-615/715 with a tapping valve attached. Outlet end of valve shall have a joint suitable for type of pipe installed in the new branch. Sleeve shall be sized to fit the intercepted pipe without leaking.
- B. Stainless Steel – Shall be all stainless steel construction with full circumferential gasket equivalent to JCM 432 with a tapping valve attached. Outlet end of valve shall have a joint suitable for type of pipe installed in the new branch. Sleeve shall be sized to fit the intercepted pipe without leaking.

2.9 CURB STOPS

- A. At the end of the service line, where the meter is to be installed, a 1 inch brass ball valve with padlock wing shall be installed. The unconnected end shall be closed inside I.P. thread. All ball valves shall be 1/4 turn and the full open and closed position shall be controlled by check lugs. The pressure rating shall be 175 p.s.i. The ball valves shall be equivalent to Ford Ball Valve No. B41-444W.

2.10 METAL DETECTOR TAPE

- A. The tape shall consist of 0.35 mils thick solid foil core encased in a protective plastic jacket resistant to alkalis, acids, and other destructive elements found in the soil. The lamination bond shall be strong enough that the layers cannot be separated by hand. Total composite thickness to be 5.0 mils. Foil core to be visible from unprinted side to ensure continuity. The tape shall have a minimum 3 inch width and a tensile strength of 35 lbs. per inch.

A continuous warning message indicating "potable water" repeated every 16 inches to 36 inches shall be imprinted on the tape surface. The tape shall contain an opaque color concentrate designating the color code appropriate to the line being buried (Water Systems – Safety Precaution Blue).

2.11 BACKFLOW PREVENTER ASSEMBLY

- A. Reduced Pressure – Shall consist of two independently operating check valves, one differential relief valve located between the two check valves, two resilient seat gate valves, and four properly placed resilient seated test cocks. Backflow preventer 2 inches and smaller shall have a bronze valve body. Backflow preventer greater than 2 inches shall be ductile iron or stainless steel. All internal parts in the check and relief valves shall be made of series 300 stainless steel or polymer materials suitable for potable water and rated for 175 p.s.i. working pressure. The assembly shall be constructed so all internal parts can be serviced or removed while in line. Assembly must be factory assembled and tested. Backflow preventer shall be equivalent to Febco Model 860 or Ames Model 4000 SS.
- B. Double Check – Shall consist of two independently operating check valves, two resilient seat gate valves, and four properly placed resilient seated test cocks. Backflow preventer 2 inches and smaller shall have a bronze valve body. Backflow preventer greater than 2 inches shall be ductile iron or stainless steel. All internal parts in the check valves shall be made of Series 300 stainless steel or polymer materials suitable for potable water and rated for 175 p.s.i. working pressure. The assembly shall be constructed so all internal parts can be serviced or removed while in line. Assembly must be factory assembled and tested. Backflow preventer shall be equivalent to Febco Model 805YD or Ames Model 2000 SS.

2.12 TRACER WIRE

- A. Tracer wire shall be #12 AWG High-Strength Copper Clad Steel (HS-CCS) Conductor, insulated with 30 mil High Density Polyethylene (HDPE) Insulation, and rated for direct burial. Insulation color shall meet APWA color code standards for identification of buried utilities.
- B. Wire connectors shall be designed for direct burial and moisture resistance. Connectors shall be equivalent to 3M DBR/Y-6 Direct Bury Splice Kit.

2.13 AIR RELEASE, AIR/VACUUM, AND COMBINATION AIR VALVES

- A. Shall be designed for water service with a minimum working pressure of 100 p.s.i. The valve shall be constructed of a cast iron body, stainless steel or bronze trim, and stainless-steel float. The inlet shall be 2 inches, 5/16 inch orifice, and a minimum venting capacity of 35 c.f.f.a.m. It shall conform to the detail shown on the drawings. Valves shall conform to AWWA C 516 and equivalent to Crispin or Valmatic.

2.14 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered.

PART 3 – EXECUTION

3.1 ON-SITE OBSERVATION

- A. Owner's Representative or Engineer shall have the right to require any portion of work be completed in their presence. If any work is covered up after such instruction, it shall be exposed by the Contractor for observation. However, if Contractor notifies Engineer such work is scheduled, and Engineer fails to appear within 48 hours, Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed. All materials which do not conform to requirements of specifications shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Project Engineer or Project Representative a minimum of 48-hours' notice for all required observations or tests.

It will also be required of Contractor to keep accurate, legible records of the location of all water lines, service laterals, valves, fittings, and appurtenances. These records will be prepared in accordance with the paragraph on "Record Data and Drawings" in Special Conditions. Final payment to the Contractor will be withheld until all such information is received and accepted.

3.2 INSTALLATION

- A. Ductile iron pipe shall be laid in accordance with AWWA C-600; Plastic pipe shall be laid in accordance with AWWA C 605, ASTM D 2774, UNI-Bell UNI-B 3, and the pipe manufacturer's recommendations. The standards are supplemented as follows:
1. Depth of Pipe – Contractor shall perform excavation of whatever substances are encountered to a depth providing a minimum cover over top of pipe of 36 inches from the existing or proposed finished grade.
 2. Alignment and Grade – Water mains shall be laid and maintained to lines and grades established by the plans and specifications, with fittings, valves, and hydrants at required locations unless otherwise accepted by Owner. Valve-operating stems shall be oriented in a manner to allow proper operation. Hydrants shall be installed plumb.
 - a. Prior Investigation – Prior to excavation, investigation shall be made to the extent necessary to determine location of existing underground structures, utilities, and conflicts. Care shall be exercised by the Contractor during excavation to avoid damage to existing structures and utilities. Pipe manufacturer's recommendations shall be used when the watermain being installed is adjacent to a facility cathodically protected.
 - b. Unforeseen Obstructions – When obstructions not shown on plans are encountered during progress of work and interfere so a change of the plans is required, Engineer will revise plans, or order a deviation in line

and grade, or arrange for removal, relocation, or reconstruction of obstructions.

- c. Clearance – When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the acceptance of Engineer, to provide clearance as required by federal, state, and local regulations or as deemed necessary by Engineer to prevent future damage or contamination.
3. Trench Construction – The trench shall be excavated to alignment, depth, and width specified or shown on plans and shall be in conformance with all federal, state, and local regulations for protection of workers.
4. Joint Restraint – All bends, plugs, valves, caps and tees on 2-inches pipe and larger, shall be provided with stainless steel tie rods or joint restraints equivalent to Megalugs. Additional restraint shall be as indicated on the drawings.
5. Anchorage for Hydrants – A concrete block 1 foot x 1 foot x 2 feet shall be poured between back of hydrant and undisturbed earth of the trench side without covering weep holes and bolts. Joint restraints equivalent to Megalugs manufactured by EBAA Iron may be used in lieu of concrete blocking.
6. Hydrostatic and Leakage Tests – Ductile iron pipe shall be tested in accordance with AWWA Standard C 600, Section 5.2 – Hydrostatic Testing. Allowable leakage shall not exceed the formula $L = \frac{SDP^{1/2}}{148,000}$, in which L is allowable leakage in gallons per hour; S is length of pipe in feet tested; D is nominal diameter of the pipe in inches; and P is average test pressure during leakage test in pounds per square inch gauge. Test shall be conducted for at least 2 hours and a minimum pressure of 150 p.s.i. or 1-1/2 times the working pressure shall be maintained during the test. Fire lines shall be tested at 225 p.s.i. for the same duration.

P.V.C. pipe shall be tested in accordance with AWWA Standard C 605, Section 7.3 – Hydrostatic Testing. Allowable leakage shall not exceed the formula $Q = \frac{LDP^{1/2}}{148,000}$, in which Q is allowable leakage in gallons per hour; L is length of pipe in feet tested; D is nominal diameter of the pipe in inches; and P is average test pressure during leakage test in pounds per square inch gauge. Test shall be conducted for at least 2-hours and a pressure of 150 p.s.i. shall be maintained during the test. Fire lines shall be tested at 225 p.s.i. for the same duration.

Should any test of pipe laid disclose leakage greater than the above specified, Contractor shall at its own expense, locate and repair defective joints until leakage is within specified allowance. Contractor is responsible for notifying the Engineer 48 hours (minimum) prior to applying pressure for testing. Pressure test will be witnessed by the Engineer or Project Representative. All visible leaks shall be repaired regardless of the leakage amount.

7. Bedding, Backfilling and Compaction – Continuous and uniform bedding shall be provided for all buried pipe. All trenches and excavation shall be backfilled immediately after pipes are laid therein, unless other protection of the pipe line is directed. The backfilling material shall be selected and deposited with special reference to future safety of pipes. The material shall be completely void of rocks, stones, bricks, roots, sticks, or any other debris causing damage to pipe and tubing or preventing proper compaction of backfill. Except where special methods of bedding and tamping are provided for, clean earth or sand shall be solidly tamped about pipe up to a level at least 2 feet above top of pipes, and shall be carefully deposited to uniform layers, each layer solidly tamped or rammed with proper tools to not injure or disturb the pipeline. The remainder of trench backfilling shall be carried on simultaneously on both sides of pipe in such manner preventing injurious side pressure. Material used shall be selected from excavations anywhere on site if any of the soil is suitable.

Under traffic areas, the top 24 inches of backfill material shall be compacted to a density of not less than 98% of maximum laboratory density at optimum moisture as determined by ASTM D 6938. Below the 24 inch line, and including area around pipe, density shall not be less than 95% of maximum laboratory density, at optimum moisture. In areas other than traffic areas, the backfill shall be compacted to 90% of maximum laboratory density at optimum moisture.

Whenever trenches have not been properly backfilled, or if settlement occurs, they shall be refilled, smoothed off, and finally made to conform to the ground surface. Backfilling shall be carefully performed, and original surface restored to the full satisfaction of Engineer immediately after installation.

Where thermoplastic (PVC) pipe is installed, Contractor shall take precautions, in accordance with ASTM D-2774, during backfilling operations not to create excessive side pressures, or horizontal or vertical deflection of the pipe, nor impair flow capacity.

8. New Service Connections – Contractor shall tap the main and install a service connection to each lot or as directed by Engineer in accordance with details shown on plans for Water Service Connections. Plastic tubing for service lines shall be installed in a manner preventing abrupt changes or bends in any direction. Contractor shall exercise extreme caution to prevent crimping of the tubing during handling, storage, and installation. Tubing shall have an absolute positive connection to the water main to prevent leakage. Taps shall be made perpendicular to the main. A water service connection shall be marked on the curb with a "W." The mark shall be made with a branding iron on vertical face of curb and shall be a minimum of 1/4 inch in depth.
9. Detection Tape – Detection tape will be used over all pipe and tubing. The tape shall be laid 18 inches below finished grade.
10. Tracer Wire – Tracer wire will be installed on all water mains and water service laterals directly on top of the pipe. The wire shall be secured to

the pipe with tape or other acceptable methods at spacings of no more than 36 inches apart. Where water service laterals connect to water mains, the wire connection shall be made with a direct bury moisture resistant connector. Installation of connector shall be per manufacturer's instructions. The insulated wire must maintain electrical continuity. The tracer wire shall also be stubbed up into each valve box and at each fire hydrant. Stub up connections shall be installed as previously described for water service laterals. This tracer wire system shall be checked and tested by Contractor, in the presence of Engineer or water department, prior to acceptance of water main installation. All equipment, meters, detectors, etc., needed for testing shall be furnished by the Contractor.

11. Jacking and Boring – Steel casing of diameter shown on the plans shall be jacked and bored in location indicated. Joints between sections of the steel casing shall be of a continuous weld made by a certified welder. Jacking and boring shall be in accordance with the State Department of Transportation Standard Specifications. Carrier pipe shall be installed as shown on the detail. After carrier pipe has been installed, ends of the casing shall be sealed using a rubber enclosure and stainless steel straps or brick and mortar.

Where work involves a highway, Resident Engineer of the State Department of Transportation shall be notified 3 days before crossing is started. Where the work involves a railroad, installation shall conform to requirements of AREA specifications. Division Superintendent of the Railroad shall be notified three 3 days prior to beginning work. Before commencing work within right-of-way of railroads or highways, Contractor shall verify the Owner has obtained required permits.

3.3 AIR RELEASE, AIR/VACUUM, AND COMBINATION AIR VALVES

- A. Valves shall be installed in locations as shown on the contract drawings. The Contractor shall verify high points in the water line and notify Engineer of differing conditions from the drawings.
- B. Valves shall be opened during initial filling of the water main. Valves shall be closed during hydrostatic testing. Once tested and the system is accepted for operation, valves shall be opened when water lines are put on line.

3.4 CONNECTIONS OF WATER MAINS

- A. Any physical connection of untested water mains with existing water mains is prohibited except when acceptable backflow prevention devices have been installed and checked by Engineer or Engineer's Representative.
 1. Any new water main to be tested must be capped and restrained with retaining glands or thrust blocks to prevent blow out or leakage during the pressure testing.
 2. Water for filling or flushing a new water main will be obtained through a Temporary Jumper Connection to the existing main. Appropriate taps of

sufficient size must be made at the end of new system to allow air to escape during filling sequence.

3. This physical tie-in with the existing system must be physically disconnected after sufficient water for hydrostatic testing and disinfection has been obtained.
4. Once the new water system has demonstrated adequate hydrostatic testing and has been flushed and chlorinated in accordance with paragraph 3.5, the new system or main will then be subjected to bacteriological testing.
5. Permanent connection to the new system must be made with clean materials. The connection may be made with either solid or split ductile iron sleeves. Any connection with stainless steel or similar metal full circle clamps is prohibited. Once connection has been made, the new system must be flushed using water from existing system to insure adequate flow and velocity into new water system.

3.5 DISINFECTION

- A. After hydrostatic and leakage tests have been completed, water pipes shall be disinfected and tested in accordance with AWWA C 651 and Regulations of the local Health Department.

All new mains shall be thoroughly flushed then chlorinated with not less than fifty parts per million (50 ppm) of available chlorine. Chlorine gas or 70% high-test calcium hypochlorite can be used. Water from existing distribution system or other source of supply should be controlled to flow slowly into the newly laid pipeline during application of chlorine. The solution shall be retained in pipeline for not less than 24 hours and a chlorine residual of 25 ppm shall be available at this time. Then system shall be flushed with potable water and the sampling program started. The chlorine residual during sampling shall be between 0.5 and 1.5 ppm.

After final flushing and before new water main is connected to the distribution system, two consecutive sets of bacteriologically acceptable samples, taken at least 24 hours apart, shall be collected from new main. One set of samples shall be collected from every 1,200 feet of new water main, plus one set from end of the line and at least one set from each branch. All samples shall be tested for bacteriological (chemical and physical) quality in accordance with standard methods for examination of water and wastewater; and shall show the absence of coliform organisms. The results, clearly showing sample locations, non-coliform growth, coliform growth, and chlorine residuals, shall be submitted to Engineer by Contractor.

3.6 PARTIAL ACCEPTANCE OF THE WORK

- A. Owner reserves right to accept and use any part of the work. Engineer shall have power to direct on what line Contractor shall work and the order thereof.

3.7 GRASSING

- A. Grassing of areas disturbed during construction shall be in accordance with the Section 32 92 00 "Turf and Grasses."

3.8 SEPARATION BETWEEN WATER AND SANITARY SEWER

A. Parallel Installation:

1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer, force main, storm sewer, or sewer manhole. The distance shall be measured edge-to-edge.
2. When conditions prevent a horizontal separation of 10 feet, the water main may be laid closer to a sewer (on a case-by-case basis) provided the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation where the bottom of the water main is at least 18 inches above the top of the sewer. It is advised the sewer be constructed of materials and with joints equivalent to water main standards of construction and be pressure tested to assure water-tightness prior to backfilling.

B. Crossing:

1. Water mains crossing house sewers, storm sewers, or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer. At the crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.
2. When conditions prevent a vertical separation of 18 inches, the sewer passing over or under water mains shall be constructed of materials and with joints equivalent to water main standards of construction and shall be pressure tested to assure water-tightness prior to backfilling.
3. When water mains cross under sewers, additional measures shall be taken by providing:
 - a. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water main;
 - b. Adequate structural support for the sewers to prevent excessive deflection of joints settling on and breaking the water mains;
 - c. The length of water pipe be centered at the point of crossing so the joints will be equidistant and as far as possible from the sewer; and
 - d. Both the sewer and water main shall be constructed of water pipe and subjected to hydrostatic tests, as prescribed in this document. Encasement of the water pipe in concrete shall also be considered.

3.9 REMOVE AND REPLACE PAVEMENT

- A. Pavement shall only be removed after prior written authorization by the Owner. Pavement removed and replaced shall be constructed in accordance with latest specifications of the State Department of Transportation. Traffic shall be maintained and controlled per State Department of Transportation regulations.

Edges of the pavement shall be cut to a neat straight line with a masonry saw. Backfill shall be compacted and tested and a concrete base course of 5,000 p.s.i. placed on compacted fill as shown in the details. The concrete base shall be placed within 24 hours after water line is installed. A temporary wearing surface may be used provided it presents a smooth surface. The final wearing surface shall be 1-1/2 inches of 12.5 mm Superpave asphaltic concrete.

3.10 FIELD QUALITY CONTROL

- A. Soil and density tests shall be made by a testing laboratory acceptable to Engineer. Laboratory tests of the soil shall be made in accordance with ASTM D 1557. In-place density tests shall be made in accordance with ASTM D 6938. Results of tests shall be furnished to the Engineer.

The minimum number of tests required shall be:

Backfill over pipe

in traffic areas. 1 per 100 linear feet or less for each 4 feet of depth or portion thereof.

Backfill over pipe

in non-traffic areas. 1 per 500 linear feet or less for each 4 feet of depth or portion thereof.

The minimum percent of backfill, compaction, in accordance to ASTM D1557, shall be the following:

In traffic Areas. 98% of maximum laboratory density.

In non-traffic Areas. 90% of maximum laboratory density, unless otherwise accepted by the Engineer.

END OF SECTION

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SECTION 33 30 00 – SANITARY SEWERAGE UTILITIES

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SECTION 33 30 00**SANITARY SEWERAGE UTILITIES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Sewer Pipes.
- B. Manholes.
- C. Connect to existing system.
- D. All necessary appurtenances to collect the sanitary sewerage and deliver it to the existing system.
- E. Pumping Station
- F. Force Main

1.2 RELATED SECTIONS

- A. Section 31 00 00 – Earthwork.
- B. Section 33 10 00 – Water Utilities.

1.3 OPTIONS

- A. The specifications describe several materials. Where manufacturers and models of equipment are named in the specifications, it is intended these are to describe quality and function required. Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by the Engineer and Owner as equivalent to those specified.

1.4 REFERENCES (Latest Revision)

- A. ASTM A 139 – Electric-Fusion (Arc) Welded Steel Pipe (NPS 4 and Over).
- B. ASTM A 377 – Index of Specifications for Ductile Iron Pressure Pipe.
- C. ASTM A 615/A 615 M – Deformed and Plain Carbon – Steel Bars for Concrete Reinforcement.
- D. ASTM A 746 – Ductile Iron Gravity Sewer Pipe.
- E. ASTM C 39/C 39M – Compressive Strength of Cylindrical Concrete Specimens.
- F. ASTM C 443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

- G. ASTM C 478 – Precast Reinforced Concrete Manhole Sections.
- H. ASTM C 890 – Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
- I. ASTM C 891 – Installation of Underground Precast Concrete Utility Structures.
- J. ASTM C 913 – Precast Concrete Water and Wastewater Structures.
- K. ASTM C 1613 – Grease Interceptor Tanks.
- L. ASTM D 714 – Evaluating Degree of Blistering of Paints.
- M. ASTM D-1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
- N. ASTM D 2241 – Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- O. ASTM D 2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
- P. ASTM D 2774 – Underground Installation of Thermoplastic Pressure Piping.
- Q. ASTM D 2794 – Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- R. ASTM D 3034 – Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- S. ASTM D 3139 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- T. ASTM D 3212 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- U. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- V. ASTM D-6938 – In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- W. ASTM E 96 – Water Vapor Transmission of Materials.
- X. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- Y. ASTM F 477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- Z. ASTM F 1417 – Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air.
- AA. ASTM G 154 – Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for UV Exposure of Nonmetallic Materials.

- BB. AWWA C 111 – Rubber–Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
- CC. AWWA C115 – Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges.
- DD. AWWA C 150 – Thickness Design of Ductile Iron Pipe.
- EE. AWWA C 151 – Ductile Iron Pipe, Centrifugally Cast, for Water.
- FF. AWWA C–500 – Metal–Seated Gate Valves for Water Supply Service.
- GG. AWWA C–509 – Resilient–Seated Gate Valves for Water Supply Service.
- HH. AWWA C 600 – Installation of Ductile Iron Water Mains and their appurtenances.
- II. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inches through 12 inches, for Water Transmission and Distribution.
- JJ. AWWA C905 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 Inches through 48 inches, for Water Transmission and Distribution.
- KK. ACI 318 – Building Code Requirements for Structural Concrete.

1.5 MEASUREMENT AND PAYMENT

- A. Measurement – Items listed in the proposal shall be considered as sufficient to complete work in accordance with plans and specifications. Any portion of work not listed in the bid form shall be deemed to be a part of item it is associated with and shall be included in costs of unit shown on bid form. Payment for unit shown on the bid form shall be considered satisfactory to cover cost of all labor, material, equipment, and performance of all operations necessary to complete work in place. The unit of measurement shall be unit shown on bid form. Payment shall be included in the contract lump sum. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Where work is to be performed at a lump sum price, the contract lump sum shall include all operations, elements, and appurtenances necessary to complete work.
- B. Payment
 - 1. Gravity Sewer Pipe – Measurements will be made between the centers of manholes or to other pipe ends. No deduction will be made for the space occupied by fittings. Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Depths of cut are measured from existing ground unless otherwise noted. Payment will include cost of pipe, plugs, dewatering, excavating all material, testing, backfilling, compaction, cleaning, metal detector tape, tracing wire, and all work necessary to complete the sewer lines.

2. Trench Wall Supports – No separate payment will be made for bracing and sheeting.
3. Manholes – Payment for manholes shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Manhole depths are measured from invert to proposed finish grade unless otherwise noted. Payment shall include cost of excavating, dewatering, constructing manholes in accordance with plans, furnishing and installing a frame and cover, steps, interior and exterior coatings, pipe connectors, backfilling, and compacting material around the manhole.
4. Stone Bedding – There will be no separate measurement and payment for stone bedding. Stone bedding shall be considered incidental to pipeline installation.
5. Sand Bedding – There will be no separate measurement and payment for stone bedding. Sand bedding shall be considered incidental to pipeline installation.
6. Service Connection – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment shall include the fitting, plug, and marking stake.
7. Metal Detector Tape – No separate payment will be made for tape. Cost of furnishing and placing metal detector tape shall be included in the contract unit price for installing sewer and force main pipe.
8. Tracer Wire – No separate payment will be made for wire. The cost of furnishing and placing tracer wire shall be included in the contract unit price for installing force main pipe, sanitary sewer, and service laterals.
9. Laterals – Payment shall be included in the contract lump sum price. Shall be measured from center of main to the point where lateral reaches property line. Payment will include furnishing the pipe, excavation, installation, metal detector tape, tracing wire, backfilling, compaction, and all work and materials necessary to complete laterals.
10. Grassing – There will be no separate measurement or payment. Grassing shall be a subsidiary obligation of Contractor in the restoration of disturbed areas.
11. Remove and Replace Existing Pavement – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity and in accordance with the detail shown.

12. Pumping Stations – All work except the force main covered in this subsection will be paid for at the contract lump sum price. Work described in other sections necessary to make Pumping Station complete will also be included in the lump sum payment. Such work will include dewatering, excavation, backfilling, compaction, site preparation, access road, fencing, grassing, potable water system, electrical, hoist system, standby generator, clean-up, and all other incidentals.
13. Force Mains – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include the pipe, fittings, thrust blocking, restrained joints, excavation, backfilling, compaction, testing, grassing, metal detector tape, tracing wire, and clean-up.
14. Air Release Valve and Manhole – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity and will include furnishing and installing valve and manhole, backfilling, compacting, grassing, and clean-up.
15. Plug, Check & Gate Valves – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity and will include furnishing and installing valve, valve box or manhole, backfilling, compacting, grassing, and clean-up.
16. Connect Sewers to Existing Structures – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. For precast structures payment shall include cost of dewatering, excavation, coring, furnishing and installing flexible sleeve, installing and connecting pipe to sleeve, backfilling, compaction, clean-up, and all work necessary to complete the connection. For brick structures, payment shall include cost of dewatering, excavation, cutting a hole, installing and grouting in pipe, backfilling, compaction, cleanup, and all work necessary to complete the connection.

1.6 QUALITY ASSURANCE

- A. Contractor will furnish the Engineer and Owner a description of all material before ordering. Engineer will review the Contractor's submittals and provide in writing an acceptance or rejection of material.
- B. Where ductile iron pipe is indicated on the plans, or required by Engineer, it shall be used.

- C. Material and equipment shall be the standard products of a manufacturer who has manufactured them for a minimum of two years and provides published data on their quality and performance.
- D. A subcontractor for any part of the work must have experience on similar work, and if required, furnish Engineer with a list of projects and Owners or Engineers who are familiar with its competence.
- E. If Contractor wishes to furnish devices, equipment, structures, and systems not designed by Engineer, these items shall be designed by either a Professional Engineer registered in the project state or by someone Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before acceptance.
- F. Testing shall be by a testing laboratory which operates in accordance to ASTM D 3740 or E 329 and shall be acceptable to Engineer prior to engagement. Mill certificates of tests on materials made by manufacturers will be accepted provided the manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests, spot checked by an outside laboratory, and furnishes satisfactory certificates with name of entity making test.
- G. Infiltration, line and grade of sewer, pump performance, and hydrostatic tests on force mains shall be made by Contractor with equipment qualified by Engineer and in the presence of Engineer. Engineer or Project Representative reserves the right to accept or reject testing equipment.

1.7 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. If stored on private property, Contractor shall obtain permission from property owner and shall repair any damage caused by the storage. Material shall be examined before installation. Neither damaged nor deteriorated material shall be used in the work.

1.8 JOB CONDITIONS

- A. Installation of sanitary sewerage utilities must be coordinated with other work on the site. Generally, sanitary sewer pipes will be installed first and shall be backfilled and protected so subsequent excavating and backfilling of other utilities does not disturb them. Contractor shall replace or repair any damaged pipe or structure at no additional expense to the Owner.

1.9 SEQUENCING AND SCHEDULING

- A. Contractor shall arrange the work so sections of sewers between manholes are backfilled and tested, lateral sewers connected, pavement replaced, and placed in service as soon as reasonable after installation.

1.10 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If the Contractor suggests alternate material, equipment or procedures will improve results at no additional cost, Engineer and Owner will examine suggestion, and if accepted, it may be used. The basis upon which acceptance of an alternate will be given is its value to Owner, and not for Contractor's convenience.

1.11 GUARANTEE

- A. Contractor shall guarantee quality of materials, equipment, and workmanship for 12 months after acceptance of the completed Project. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

1.12 EXISTING UTILITIES

- A. All known utility facilities are shown schematically on the construction drawings and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown will not relieve the Contractor of responsibility under this requirement. "Existing Utilities Facilities" means any utility existing on the project in its original, relocated, or newly installed position. Contractor will be held responsible for cost of repairs to damaged underground facilities, even when such facilities are not shown on the drawings.
- B. The Contractor shall call for underground utility locations before starting work. Underground utilities location service can be contacted at 1-800-282-7411 (GA) or 811.

1.13 TESTING

- A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).
- B. In place density tests in accordance with ASTM D 6938.
- C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48-hours notice prior to taking any tests.
- E. Testing shall be Contractor's responsibility and shall be performed at the Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.
- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

Materials used in the work shall be those named in Bid Form. In multiple type bids, selection of material types will be at the opinion of Owner. Materials and products used in work shall conform to one of the following:

2.1 SEWER PIPE

- A. PVC Pipe – Shall be polyvinyl chloride plastic (PVC) and shall meet all requirements of ASTM D 3034 SDR 26, except for depths less than 3 feet where ductile iron pipe must be installed. All pipe shall be suitable for use as a gravity sewer conduit. Provisions must be made for contraction and expansion at each joint with a rubber gasket. Pipe sizes and dimensions shall be as shown below. All pipe shall be green or white in color with factory marked homing lines. Fittings shall meet the same specification requirements as pipe.

Nom. Size	Outside Diameter		Min. Wall Thickness SDR-26
	Average	Tolerance	
4	4.215	± 0.009	.162
6	6.275	± 0.011	.241
8	8.400	± 0.012	.323
10	10.500	± 0.015	.404
12	12.500	± 0.018	.481

Tests on PVC Pipe – Pipe shall be designed to pass all tests at 73 ° F. (± 3° F.).

- B. Ductile Iron – Shall conform to AWWA C 150, AWWA C 151 and ASTM A 746. All pipe shall be Pressure Class 350 unless otherwise noted. All ductile iron pipes and fittings shall be bituminous coated on the outside and lined with Protecto 401 Ceramic Epoxy or equivalent on inside.
- Coating on the outside shall be an asphaltic coating approximately 1 mil thick. Finished coating shall be continuous, smooth, neither brittle when cold or sticky when exposed to sun and shall be strongly adherent to the iron.
 - Protecto 401 Ceramic Epoxy or equivalent interior lining shall conform to ASTM E 96, ASTM D 714, ASTM D 2794 and ASTM G 53. Interior of the pipe shall receive 40 mils nominal dry film thickness of epoxy. Lining application, inspection, certification, handling, and surface preparation of area to receive the protective coating shall be in accordance with manufacturer's specifications and requirements.

2.2 JOINTS – GRAVITY SYSTEM

- A. Joints for Ductile Iron Pipe – Shall be slip-on rubber equivalent to "Fastite," "All-tite," or "Tyton."
- B. Joints for PVC Pipe – Shall be integral wall bell and spigot with a rubber ring gasket. Joints shall conform to ASTM D 3212 and gaskets to ASTM F 477.

2.3 FORCE MAIN

- A. P.V.C. – All pipe shall be green in color with factory marked homing lines. Pipe with diameter less than 4 inches shall conform to all requirements of ASTM D 2241, SDR 26, Class 160. Pipe 4 inches through 12 inches shall conform to all requirements of AWWA C900, DR 25, Pressure Class of 165 p.s.i. Pipe 14 inches through 18-inches shall conform to all requirements of AWWA C905 with C1 outside diameter, DR 25, with a pressure rating of 165 p.s.i. Joints shall be in accordance with ASTM D 3139.
- B. Ductile Iron pipe shall be in accordance with Paragraph 2.1-B and conform to ASTM A 377. Push-on-Joints shall be slip-on rubber equivalent to "Fastite," "All-tite," or "Tyton." Flanged joints shall conform to AWWA C 115. Gaskets shall conform to AWWA C 111.
- C. Thrust blocking shall be sized as detailed on the construction drawings of 3,000 p.s.i. concrete. Blocking shall be provided at all bends deflecting 11-1/4 degrees or more and bear directly against the undisturbed trench wall.
- D. Restrained Joints – Restrained joints for pipe, valves and fittings shall be mechanical joints with ductile iron retainer glands equivalent to "Megalug" or push-on type joints equivalent to "Lok-Ring," "TR Flex," or "Super Lock" and shall have a minimum rated working pressure equal to the item restrained with a minimum safety factor of 2:1. Joints shall be in accordance with the applicable portions of AWWA C-111. Manufacturer of joints shall furnish certification, witnessed by an independent laboratory, stating joints furnished have been tested without signs of leakage or failure. Restrained joints shall be capable of being deflected after assembly.

2.5 MANHOLES

- A. Masonry – Shall be new whole brick of good quality laid in masonry mortar or cement mortar made of one part Portland cement and two parts clean sharp sand. Every brick shall be fully bedded in mortar. Manholes shall conform to locations and details shown on the plans.
- B. Precast Concrete – Shall be reinforced concrete constructed in accordance with ASTM C 478 and details shown on the plans "Precast Concrete Manholes." Coarse aggregate shall be granite stone. The joints shall be tongue and groove sealed with flexible gaskets or mastic sealant. Gaskets shall be O-Ring or equivalent to Type A or B "Tylox" conforming to ASTM C 443. Mastic shall be equivalent to "Ram-nek" with primer. Primer shall be applied to all contact surfaces of manhole joint at the factory in accordance with manufacturer's instructions.
- C. Frames and Covers – Shall be cast iron equivalent to the following:

Per the details included in the construction plans.

- D. Manhole Steps – Shall be equivalent to M.A. Industries, Type PS-1 or PS-2-PF. Steps shall be installed at the manhole factory and in accordance with

recommendations of step manufacturer. Manholes will not be acceptable if steps are not installed accordingly.

- E. Pipe Connections – Shall have flexible watertight joints at sewer main point of entry into the manhole. The joint shall be an EPDM or polyisoprene sleeve equivalent to "Kor-N-Seal."
- F. Coatings – New manholes shall have all interior surfaces coated with a factory applied acrylic polymer-based coating and sealant. The coating shall be ConSeal CS-55 manufactured by Concrete Sealants, New Carlisle, Ohio or an accepted equivalent. The coating shall be applied in three coats to achieve a total dry film thickness of at least 3.5 mils in accordance with manufacturer's recommendations. Surfaces shall be cleaned of all dust, form oils, curing compounds and other foreign matter prior to the coating application.

New or existing manholes requiring a force main tie-in and the next downstream manhole shall be coated with 125 wet film mils of Raven 405 ultra high build epoxy or an accepted equivalent. The interior surfaces shall be cleaned and prepared according to manufacturer's recommendations.

2.7 TEES AND WYES

- A. Gravity sewer tees shall be four or six inches and same diameter as the run of pipe. They shall be of same material as the sewer main.
- B. Wyes for cleanouts shall be of same material as the lateral pipe.

2.8 LATERALS AND CLEANOUTS

- A. Shall be Ductile Iron Pipe conforming to paragraph 2.1-B, with push-on joints or Polyvinyl Chloride pipe with bells and rubber gaskets for jointing, conforming, to Paragraph 2.1-A, PVC Pipe.
- B. Cleanout Access Box shall be equivalent to U.S. Foundry USF 7623 in pavement or Genova Products 4-inch Schedule 40 PVC-DWV cleanout fitting with threaded plug out of pavement.

2.9 STONE BACKFILL

- A. Shall be graded crushed granite with the following gradation:

Square Opening Size	Percent Passing
1 inch	100%
3/4 inch	90 to 100%
3/8 inch	0 to 65%
No. 4	0 to 25%

2.10 SAND BACKFILL

- A. Shall be clean sand free from clay and organic material. Not more than 10% shall pass the No. 100 sieve.

2.11 BORROW

- A. Where it is determined sufficient suitable material is not available from the site to satisfactorily backfill pipe to at least two feet above top of pipe, Contractor shall furnish suitable sandy borrow material to accomplish requirements. Material shall not have more than 60% passing the No. 100 sieve, nor more than 20% passing a No. 200 sieve.

2.12 AIR RELEASE VALVE

- A. Shall be designed for sewage service. The valve shall be constructed of a cast iron body, stainless steel or bronze trim, and stainless steel float. The inlet shall be 2 inches, 5/16 inch orifice, and a venting capacity of 35 c.f.f.a.m. The working pressure shall be 0 to 50 p.s.i. It shall conform to detail shown on the drawings.

2.13 METAL DETECTOR TAPE

- A. Will be installed above all pipe. Tape shall consist of 0.35 mils thick solid foil core encased in a protective plastic jacket resistant to alkalis, acids, and other destructive elements found in the soil. The lamination bond shall be strong enough so layers cannot be separated by hand. Total composite thickness shall be 5.0 mils. Foil core to be visible from unprinted side to ensure continuity. The tape shall have a minimum 3 inch width and a tensile strength of 35 lbs. per inch.

A continuous warning message indicating "sewer line" repeated every 16 inches to 36 inches shall be imprinted on the tape surface. Tape shall contain an opaque color concentrate designating color code appropriate to the line being buried (Sewer Line – Green).

2.14 TRACER WIRE

- A. Will be used over all force main, [sanitary sewer and service lateral] lines. Tracer wire shall be #12 AWG High-Strength Copper Clad Steel (HS-CCS) Conductor, insulated with 30 mil High Density Polyethylene (HDPE) Insulation, and rated for direct burial. Insulation color shall meet APWA color code standards for identification of buried utilities.
- B. Wire connectors shall be designed for direct burial and moisture resistance. Connectors shall be equivalent to 3M DBR/Y-6 Direct Bury Splice Kit.

2.15 SUBMERSIBLE SEWAGE PUMPING STATION

- A. Shall be prepackaged duplex basin system, pre-plumbed, w/railsystems (stainless steel pump lifting cables included) ball valves and check valves installed. Pumps shall be equivalent to Zoeller conforming to characteristics shown on the drawings.

- B. Wet Well – Shall be precast reinforced concrete sections. The product design, performance, materials, manufacturing, handling, and installation shall conform to following references and project specifications:

ACI 318 – Building Code Requirements for Reinforced Concrete

ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens

ASTM C-478 – Precast Reinforced Concrete Manhole Sections

ASTM C 890 – Minimal Structural Design Loading for Precast Concrete Water and Wastewater Structures

ASTM C 891 – Installation of Underground Precast Concrete Utility Structures

ASTM C 913 – Precast Concrete Water and Wastewater Structures

Contractor or supplier shall provide for design of the precast structure. Each section of the structure shall be designed and manufactured for its individual depth, loading conditions (lateral, surcharge and hydrostatic), and opening requirements. All concrete in the precast structure shall have a minimum compressive strength of 4,500 p.s.i. after 28 days. Reinforcing steel shall comply with ASTM A 615 Grade 60 (min. $f_y = 60,000$ p.s.i.). Bar bending and placement shall comply with the ACI latest standards.

Precast structure manufacturer shall have necessary equipment and facilities for proper manufacture of the sections and to perform compressive strength tests on concrete tests specimens. Test cylinders shall be made for each structure and test conducted in accordance with ASTM C 39, except compressive strength shall be equal to or greater than design of the concrete. Structure design computations, concrete mix design, and test reports certifying design strength has been achieved at the 28 day break shall be submitted to Engineer. Design of structure shall be performed by a Professional Engineer registered in the state of installation at Contractor's expense. The design parameters for a precast structure shall include:

Lateral load based on a water table at the surface using equivalent fluid pressure of 80 p.c.f. from surface grade down and a vehicle wheel load designation of HS20-44. Design live load for the top slab shall be 300 p.s.f. The precast concrete sections shall have a minimum wall thickness of 6 inches and minimum top and bottom slab thicknesses of 8 inches. Actual thicknesses greater than minimum shall be as required by the loading conditions.

Access hatches in the top slab of wet-well structure shall be for clear opening dimensions indicated and have a load capacity of 300 p.s.f. The material shall be Aluminum Alloy 6063-T5 and T6, minimum 1/4 inch thick plate, flush-type lock with inside spoon handle. The frame shall be complete with hinged and hasp-equipped cover, upper guide holders, chain holders and cable holder. Chain and cable holders shall be stainless steel or aluminum. Frame shall be securely mounted above the pumps. The hatch covers shall be torsion-bar loaded for ease of lifting and shall have a safety-locking handle in open position.

Contractor shall furnish and install guide bars for each pump to permit raising and lowering the pump. Guide bars shall be stainless steel and of adequate length and strength to extend from lower guide holders on the pump discharge connection to upper guide holder mounted on access frame.

The wet well shall be provided with sleeves, 24 inches below finished grade, for access of power and control conduits. The sleeves shall be of proper size and number to accommodate all necessary power and control conduits.

All interior concrete surfaces shall have either a minimum 125 mils coating of Raven 405, factory installed 5 mm Agri Sure Grip HDPE Liner, or an accepted equivalent. When using the liner, all seams shall be sealed with welded HDPE material and all penetrations shall be sealed with a welded HDPE boot.

The structure manufacturer shall prepare and submit six sets of shop drawings showing wall and slab thicknesses, structural reinforcing and opening locations. The manufacturer shall also provide design analyses and calculations to show all sections have been designed for burial depths shown on construction drawings as well as stresses incurred during transport, handling and installation. Calculations and analyses must be performed and sealed by a Licensed Professional Engineer from the state project is located and submitted for review. All shop drawings and design calculations shall be submitted to the Contractor for review. Contractor shall forward these documents to the Engineer. Such documents shall bear the stamp or written statement of Contractor indicating Contractor's review for completeness and receipt. Contractor shall be responsible for the accuracy of shop drawings and for their conformity to plans and specifications. Shop drawings with insufficient or incomplete data required to indicate compliance with these specifications are not acceptable and will be returned to the Contractor. Rejected shop drawings shall not relieve Contractor from completing the project within time allowed by Contract Documents.

- C. Pump Design – Pumps shall be capable of handling raw, unscreened sewage with the capacity to pass 3 inch diameter spheres. Pumping units shall be automatically connected to discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastening to be removed for this purpose, and no need for personnel to enter wet well. Each pump shall be fitted with a stainless steel chain of adequate strength and length to permit raising the pump for inspection and removal.
- D. Pump Construction – The pump(s) shall be designed to pump sewage, storm water, heavy sludge and other fibrous materials without injurious damage during operation. The lifting cover, stator housing and volute casing shall be of gray iron construction with all nuts, bolts, washers and other fastening devices coming into contact with sewage, constructed of stainless steel and protected by primer coat and a coat of rubber-asphalt or epoxy paint. The impeller shall be hard alloy gray iron construction, dynamically balanced, double shrouded, non-clogging design with a long thoroughfare and no acute angles.

The pump motor shall be of Class F Insulation, NEMA B design, watertight and positively oil cooled, filled with a transformer oil, equivalent to BP JS-HA, Shell Diala D, or housed in an air-filled watertight chamber. The pump motor shall be guaranteed to run in a totally, partially or non-submerged condition continuously

for a period of 24 hours without injurious damages. Water cooled pumps shall not be considered equal. Before final acceptance, a field running test at job site demonstrating the ability to operate continuously for 24 hours under a non-submerged condition, shall be performed for all pumps being supplied, if required. The pump shall be provided with a tandem double mechanical seal running in an oil bath. The seals shall be of lapped tungsten carbide and welded to stainless steel retainers and held in contact by separate springs. Conventional double mechanical seals with a spring assembly between the rotating faces, requiring constant differential pressure to effect sealing and subject to penetration and opening by pumping forces shall not be considered equal to tandem seal specified and required. The pump shaft shall be of stainless steel and supported by a double row inboard bearing for axial thrust and a single row outboard bearing for radial thrust. The impeller shall be connected to a short sturdy shaft in order to minimize shaft deflection. Shaft shall not extend more than 2-1/2 times its diameter below the nearest support bearing.

The pump cable shall be of proper length to reach from pumps in wet well to control panel without any splices. Cable shall be the "SO" or hypalon jacketed SPC type and in compliance with industry standards for loads, resistance against sewage and of stranded construction. Cable shall enter the pump through a heavy duty entry assembly, which shall be provided with an internal grommet assembly to protect against leakage once secured and must have a strain relief assembly as part of standard construction. Power cable shall connect to a terminal board separating incoming service from pump motor, where if leakage occurs, terminal board will short out and not cause damage to the motor.

Each pump shall be supplied with a universal coupling which bolts to pump discharge flange and shall accept the discharge elbow provided by pump manufacturer. Seal of the pump at discharge flange shall be accomplished by a single downward linear motion of pump with entire weight of pump guided to and pressing against discharge connection. No part of pump shall bear directly on the sump floor and no rotary motion of pump shall be required for sealing. Sealing at the discharge shall be designed to insure a positive leakproof system and for ease of removal. Pump shall be guaranteed not to leak at the discharge flange.

- E. Pump Test – Pump manufacturer shall perform following tests on each pump before shipment from the factory:
1. Megger the pump for insulation breaks or moisture.
 2. Prior to submergence, the pump shall be run dry and be checked for correct rotation.
 3. Pump shall be run for 30 minutes in a submerged condition.
 4. Pump shall be removed from test tank, meggered immediately for moisture; oil plugs removed for checking of upper seal and possible water intrusion of stator housing.
 5. A written certified test report giving above information shall be supplied with each pump at the time of shipment.

6. All pump cable ends will then be fitted with a rubber shrink fit boot to protect cable prior to electrical installation.

F. Pump Controls – To synchronize the operation of pumps with variations of sewage level in wet well, Contractor shall provide a liquid level sensor system equivalent to ITT Flygt MultiTrobe. The system shall utilize a single piece multi-sensored probe to determine pump-on, lag pump on, pump-off, and high-level alarm conditions. Probe shall be constructed from PVC 1.25 inch tubing with molded sensor units at regular intervals along the probe. Each sensor unit will be PVC injected to prohibit ingress of moisture, and the sensor material shall be Avesta SMO 254 stainless steel.

Mounting – Probe will be mounted in a turbulent area of wet well, suspended on its own cable and connected to a 0.23 inch stainless steel hook which will be hooked to a 1.18-inch stainless steel angle containing a polyurethane squeegee pad positioned in the opening into wet well, so probe can be removed without entering wet well. The squeegee will have a 1.18 inch hole and slot, enabling probe to be pulled through and cleaned.

This installation will be in accordance with the manufacturer's instructions.

Probe shall be covered by the manufacturer's two-year warranty.

Probe and Sensors – 10 sensors will be spaced along the length of probe assembly, and each will be individually connected to a correspondingly numbered PVC/PVC 0.03 inch flexible cable.

The molded sensor unit will contain two Avesta sensors mounted on opposing sides of sensor unit. Each Avesta sensor will be 0.94 inches high and no wider than 0.08-inches and will protrude from surface of the PVC.

The probe shall be pressure injected with an epoxy resin to encapsulate all internal components and connections to form a rigid, homogenous unit.

Each sensor unit containing the two Avesta sensors will be rotated 90 degrees to previous sensor unit to eliminate tracking between sensors.

Cable – The cable will be numbered (number and text) along entirety of cable and at intervals not greater than 7.5 inches for identification. This cable will be dark blue in color, with the cores light blue.

Flexible cables shall be capable of supporting the weight of probe and cable, without need for additional support.

The cable shall be secured to top of probe by a synthetic rubber compression fitting.

MTR Relay – The conductance level control relay shall be a Din rail mounted device with supply and activation LEDs, eight programmable activation delays, charge/discharge settable and four sensitivity settings (2k, 4k, 20k, 80k) all easily carried out while installed. A green LED shall be provided on front of relay and

shall remain lit while power is connected to the unit. A red LED shall be provided on front of device and shall remain lit while the output relay is active. Each output shall be capable of a five amp resistance load at 250 VAC.

Floats – Furnish one high-level alarm float and one low-level shut off float. The low level float shall be capable of over-riding the Multi Trode Controller.

An alternator shall also be provided to change operation sequence of pumps at the completion of each pumping cycle. Provisions shall also be made for pumps to operate in parallel if level in wet well continues to rise above the "pump-on" cycle. Contractor shall furnish and install one automatic control center, equipped with individual disconnects, across-the-line magnetic starters, 3 phase, overload and phase protection, electrical alternator, automatic transfer to non-operating pump in event of overload in operating pump, overload reset, hand-off-automatic pump operation selector switch, 24 volt control circuit transformer, and terminal board with connections for high-level alarm. All components shall be housed in a NEMA 4X enclosure. Control center shall be installed on a treated timber rack next to the station. Cables provided for pump feeders and pump controls shall be installed in conduit from control center to entrance point in wet well. See detail sketch on construction drawings.

- G. Alarm – A high water alarm shall be supplied. A red flashing light shall be supplied in separate NEMA 4X enclosure for mounting at the control box. An audible alarm consisting of a weatherproof bell with automatic reset silencer switch and signal light shall be installed in addition to the flashing red light alarm.
- H. Submersible Pump Station Valve Pit – The valve pit shall be precast concrete of dimensions shown on construction drawings. Valve pit design shall meet the requirements for precast concrete specified in section 2.15, paragraph B. Each pit shall have a hatch cover. The covers shall be:

Clear Opening	3-feet-0-inches x 4-feet-0-inches
Capacity	300 lbs/sq. ft.
Material	Aluminum Alloy 6063-T5 & T6 1/4 inch plate with a Neoprene gasket to make hatch watertight

- I. Hydrants – Shall be frost-proof with 36 inch bury, 1 inch male outlet, and 1 inch male inlet, with outlet 36 inches above the ground. Water line from the main to hydrant shall be 1 inch diameter, rated for a minimum working pressure of 200 p.s.i.
- J. Backflow Preventer – Shall be a 1 inch reduced pressure zone assembly mounted in a plastic meter box. Backflow preventer shall be equivalent to Watts Regulator Model No. 009.
- K. Fencing – A new fence shall be installed at pump station site where shown on the drawing and shall be in accordance with Section 32 31 13 – "Chain Link Fences and Gates."

A 3 inch x 5 inch, 7 gauge, stainless steel plate with an emergency phone number shall be furnished and installed at a conspicuous location on the fence or control panel.

- L. Access Road – Access road to station shall be as shown on the drawing. Stabilization shall be accomplished by constructing a base using granite crusher run stone aggregate composed of 50% screenings and 50% stone, compacted to 6–inch thickness.
- M. Shop Drawings – Contractor shall submit for review by Engineer a complete schedule and data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive material, such as catalogs, diagrams, performance curves, and charts published by the manufacturer, to show conformance to specification and drawing requirements. Model numbers alone will not be acceptable. Complete electrical characteristics shall be provided for all equipment.

All shop drawings shall be completely checked and marked accordingly with Contractor's stamp prior to submitting drawings to the Engineer for review. Shop drawings with insufficient or incomplete data required to indicate compliance with these specifications are not acceptable and will be returned to the Contractor. Where shop drawings are "Furnished as Corrected," the reviewer has noticed deficiencies in compliance with contract specifications and drawings. It is understood corrections indicated will be incorporated by Contractor in the final product, operation and maintenance manuals and shop drawings submitted at completion of project. Rejected shop drawings shall not relieve Contractor from completing the project within time allowed by contract documents.

- N. Pump Warranty – The pump manufacturer shall warrant pumps being supplied to Owner against defects in workmanship and materials for a period of 5–years under normal use, operation, and service. In addition, the manufacturer shall replace certain parts which become defective through normal use and wear on a progressive schedule of cost for a period of 5–years. Parts included are the mechanical seal, impeller pump housing, wear ring, and ball bearings. The warranty shall be in published form and apply to all similar units.
- O. Operation and Maintenance Manual – The pump manufacturer shall furnish Owner with a minimum of six manuals for pumps installed.
- P. Electrical Service – Service to the pumping station shall be pursuant to manufacturer recommendations. Service shall be underground originating in weatherhead on service pole at site and terminating in the main breaker.

Conduits below grade shall be Schedule 40 PVC and above grade shall be rigid galvanized. Conduits shall be sealed to prevent sewer gases entering the control panel. Sealing shall be accomplished by stuffing both ends of the conduit with duct–seal, or other accepted material.

Conductor shall be copper.

The neutral conductor of each service shall be grounded to a ground rod system. Grounding conductor shall be sized in accordance with Article 250 of the N.E.C. and shall be installed in non-metallic conduit to points of ground connection.

Ground rod system shall consist of three 3/4 inch x 10 foot copper weld ground rods. Ground rods shall be installed 3 feet apart with top of rods 12 inches below grade and shall be interconnected with a bare copper grounding conductor. Connections to ground rods shall be with chemical weld connectors.

1. Running Time Meters – Shall be installed for measuring the elapsed running time for each pump. Meters shall be installed on the face of control panel with counter visible when door or panel is opened. One meter shall be provided for each starter and shall be connected to operate simultaneously with the starter it is monitoring. Meters shall be non-reset type, hermetically sealed, 115 volts, 60 hertz, with a five digit counter registering 1/10 hour and a total range of 99,999–hours.

2.16 CHECK VALVES

- A. Shall be designed for sewage service. The valve shall be cast iron and bronze fitted. The valve shall be a spring and lever type with neoprene seat and O-Ring seals on a stainless steel valve pin, for pipes 3 inches and larger in diameter. For check valves smaller than 3 inches, the valve shall be a fully ported 150 p.s.i. rated ball check valve with a corrosion resistant phenolic base and a rubber seat. Check valve shall be of full waterway design for quiet operation and with a flow area through the valve equal to or exceeding flow area of pipe to which it is installed.

2.17 GATE VALVES

- A. Two Inches and Larger – Shall be cast iron or ductile iron body, bronze mounted, double disc or resilient wedge design, with non-rising stems, conforming to AWWA C 500, C 509, or C 515. Valves shall have ends to match the pipe to which they are attached. Attachment to plastic pipe shall be made by special adapters. Valves shall have a working pressure of 200 p.s.i. and be tested at 400 p.s.i.

Valves shall be furnished with "O" ring packing. One "O" ring shall be located above the thrust collar and one below. Thrust collar shall be permanently lubricated and have an anti-friction washer on top of the thrust collar.

- B. Smaller Than 2 inches – Shall be all brass, ball valve type. The pressure rating shall be 175 p.s.i.
- C. Valve Boxes – Underground valves shall be installed in acceptable valve boxes. Valve boxes shall have a suitable base which does not damage valve or pipe, and shaft extension sections to cover and protect the valve and permit easy access and operation. The box, cover, and extensions shall be cast or ductile iron having a crushing strength of 1,500 pounds per linear foot.

2.18 PLUG VALVES

- A. Shall be fully ported and of the same diameter as pipes to which they are attached. They shall have semi-steel bodies, all metal plugs, stainless steel bearings, and be equivalent to DeZurik Series 100 eccentric valves, lever operated. All valves 6 inches and larger shall be equipped with gear actuator and handwheel.

2.19 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products before they are ordered by Contractor.

PART 3 – EXECUTION

3.1 CONSTRUCTION OBSERVATION

- A. The line, grade, deflection, and infiltration of sewers and pump station operation shall be tested by Contractor under the direction of Engineer. Engineer or Project Representative will have the right to require any portion of work be completed in their presence. If work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if Contractor notifies Engineer such work is scheduled and Engineer fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed. All materials not conforming to requirements of specifications shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

It will also be required by Contractor to keep accurate, legible records of the location of all sanitary lines, service laterals, manholes, force mains, valves, bends, and appurtenances. These records will be prepared in accordance with "Record Data and Drawings" paragraph in the Special Conditions. Final payment to the Contractor will be withheld until all such information is received and accepted.

3.2 LOCATION AND GRADE

- A. Line and grade of sewers and position of all manholes and other structures are shown on the drawings. Grade line as given on the profile or mentioned in these specifications means invert or inside bottom of pipe and price for trenching shall include trench for depth below this line necessary to lay sewer to this grade, but measurements for payment will be made only to grade line. Master control lines and bench marks have been provided by the Engineer. The Contractor shall be responsible for proper locations and grades of sewers.

3.3 SEWER EXCAVATION

- A. Contractor shall perform all excavations of every description and of whatever substance encountered to the depth shown on the plans or specified for all sewers, manholes, and other appurtenances. All excavations shall be properly dewatered before installations are made, by the use of well points, pumping, or other methods accepted by Engineer. Trenches shall be excavated in conformance with the Occupational and Safety Health Administration's (OSHA) Regulations.

Where the character of soil is unsuitable for pipe bedding as determined by Engineer or Geotechnical Consultant, additional excavation will be authorized. Engineer or Geotechnical Consultant shall determine the depth needed for additional bedding and whether material will be sand or stone. The unsuitable material shall be disposed of at Contractor's expense in a proper manner. Bottom of all trenches shall be rounded to conform to bottom of pipe, to afford full bearing on pipe barrel. Excavation in excess of depths and widths required for sewers, manholes, and other structures shall be corrected by pouring sub foundations of 3,000 p.s.i. concrete and half cradle at the Contractor's expense.

- B. Trenches shall not be excavated more than 400 feet in advance of pipe laying.

3.4 TRENCH WALL SUPPORT

- A. Bracing and Sheeting – The sides of all trenches shall be securely held by stay bracing, or by skeleton or solid sheeting and bracing, as required by soil conditions encountered, to protect adjoining property and for safety. Where shown on drawings or where directed by Engineer, the Contractor must install solid sheeting to protect adjacent property and utilities. Sheeting shall be steel or timber and Contractor shall submit design data, including the section modulus of members and arrangement for bracing at various depths, to Engineer for review before installing sheeting. It shall penetrate at least 3-feet below the pipe invert. Contractor shall ensure support of pipe and its embedment is maintained throughout installation and ensure sheeting is sufficiently tight to prevent washing out of the trench wall from behind sheeting.
- B. Sheeting Removal – Sheeting shall be removed in units and only when backfilling elevation has reached the level necessary to protect pipe, adjoining property, personnel, and utilities. Removal of sheeting or shoring shall be accomplished in a manner to preclude loss of foundation support and embedment materials. Fill voids left on removal of sheeting or shoring and compact all materials to required densities.
- C. Movable Trench Wall Supports – Do not disturb installed pipe and its embedment when using movable trench boxes and shields. Movable supports should not be used below top of pipe zone unless acceptable methods are used for maintaining the integrity of embedment material. Before moving supports, place and compact embedment to sufficient depths to ensure protection of the pipe. As supports are moved, finish placing and compacting embedment.
- D. When sheeting or shoring cannot be safely removed, it shall be left in place. Sheeting left in place shall be cut off at least 2 feet below the surface. No

separate payment shall be made for bracing and sheeting except where shown on drawings or authorized by the Engineer.

3.5 LAYING PIPE

- A. All sewer pipe shall be laid upgrade with spigots pointing downgrade and in accordance with ASTM D 2321. The pipe shall be laid in a ditch prepared in accordance with Paragraph 3.3 "Sewer Excavation." When sewer is complete, the interior surface shall conform on bottom accurately to grades and alignment fixed or given by Engineer. Special care shall be taken to provide a firm bedding in good material, select borrow, stone backfill or 3,000 p.s.i. concrete, as authorized, for length of each joint and 1/2 of the circumference. Holes shall be provided to relieve bells from bedding strain, but not so large to allow separation of the bell from barrel by settlement after backfilling. All pipe shall be cleaned out and left clean. Every third joint shall be filled around immediately after being properly placed.
- B. Jointing – Comply with manufacturer's recommendations for assembly of joint components, lubrication, and making joints. When pipe laying is interrupted, secure piping against movement and seal open ends to prevent the entrance of water, mud, or foreign material.
- C. Placing and Compacting Pipe Embedment – Place embedment materials by methods which will not disturb or damage the pipe. Work in and tamp haunching material in area between the bedding and underside of pipe before placing and compacting remainder of embedment in pipe zone. Do not permit compaction equipment to contact and damage the pipe. Use compaction equipment and techniques compatible with materials used and location in the trench. Before using heavy compaction or construction equipment directly over the pipe, place sufficient backfill to prevent damage, excessive deflections, or other disturbance of the pipe.
- D. Rock or Unyielding Materials in Trench Bottom – If ledge rock, hard pan, shale, or other unyielding material, cobbles, rubble, debris, boulders, or stones larger than 1.5-inches are encountered in the trench bottom, excavate a minimum depth of 6-inches below pipe bottom and replace with proper embedment material.
- E. Vertical Risers – Provide support for vertical risers as commonly found at service connections, cleanouts, and drop manholes to preclude vertical or lateral movement. Prevent the direct transfer of thrust due to surface loads and settlement and ensure adequate support at points of connection to main lines.
- F. Exposing Pipe for Making Service Line Connections – When excavating for a service line connection, excavate material from above the top of main line before removing material from sides of pipe. Materials and density of service line embedment shall conform to specifications for the main line.
- G. Manhole Connections – Use flexible water stops, resilient connectors, or other flexible systems acceptable to the Engineer making watertight connections to manholes and other structures. Fill annular space between pipe and precast concrete on inside of manhole with non-shrink grout.

3.6 SEPARATION BETWEEN WATER & SANITARY SEWER

A. Parallel Installation:

1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer, storm sewer, or sewer manhole. The distance shall be measured edge-to-edge.
2. When conditions prevent a horizontal separation of 10 feet, water main may be laid closer to a sewer (on a case-by-case basis) provided water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation where bottom of water main is at least 18 inches above top of sewer. It is advised the sewer be constructed of materials and with joints equivalent to water main standards of construction and be pressure tested to assure water-tightness prior to backfilling.

B. Crossing:

1. Water mains crossing house sewers, storm sewers, or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of water main and top of sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.
2. When conditions prevent a vertical separation of 18 inches, the sewer passing over or under water mains shall be constructed of materials and with joints equivalent to water main standards of construction and shall be pressure tested to assure water-tightness prior to backfilling.
3. When water mains cross under sewers, additional measures shall be taken by providing:
 - a. a vertical separation of at least 18 inches between bottom of the sewer and top of water main;
 - b. adequate structural support for sewers to prevent excessive deflection of joints settling on and breaking the water mains;
 - c. length of water pipe be centered at the point of crossing so joints will be equidistant and as far as possible from sewer; and
 - d. both sewer and water main shall be constructed of water pipe and subjected to hydrostatic tests, as prescribed in this document. Encasement of the water pipe in concrete shall also be considered.

3.7 BACKFILLING

- A. All trenches and excavation shall be backfilled immediately after pipes are laid therein, unless other protection of the pipe line is directed. Backfilling material shall be selected and deposited with special reference to the future safety of

pipes. Except where special methods of bedding and tamping are provided for, clean earth or sand shall be solidly tamped about pipe up to a level at least 2 feet above top of pipes, and shall be carefully deposited to uniform layers, each layer solidly tamped or rammed with proper tools to not injure or disturb the pipeline. Remainder of the trench backfilling shall be carried on simultaneously on both sides of pipe in such a manner preventing injurious side pressure. The material used shall be selected from excavated material anywhere on site if any of this material is suitable. Backfill material shall be clean and free of rock, organic and other deleterious matter.

Under traffic areas, the top 24 inches of backfill material shall be compacted to a density of not less than 98% of maximum laboratory density at optimum moisture. Below the 24 inch line and to and including area around pipe, density shall not be less than 95% of maximum laboratory density at optimum moisture. In non-traffic areas, the backfill material shall be compacted to a density of not less than 90% of maximum laboratory density at optimum moisture unless otherwise accepted by Engineer. Compaction tests shall be conducted in accordance with ASTM D 6938 by an independent testing laboratory. Tests are to be taken at the direction of Engineer.

Whenever trenches have not been properly backfilled, or if settlement occurs, they shall be refilled, smoothed off and finally made to conform to the ground surface. Backfilling shall be carefully performed, and original surface restored to the full satisfaction of Engineer immediately after installation.

Where thermoplastic (PVC) pipe is installed, Contractor shall take precautions in accordance with ASTM D 2321, during backfilling operations so not to create excessive side pressures, or vertical or horizontal deflection of the pipe nor impair flow capacity.

3.8 MANHOLES

- A. Manholes shall be constructed where shown on the drawings or where directed by Engineer. The channel in bottom of manholes shall be smooth and properly rounded. Special care must be exercised in laying the channel and adjacent pipes to grade. Manhole top elevations shall be greater than or equal to the 50 year flood elevation, unless watertight covers are provided. Tops of manholes outside of roads shall be built to grades 1-inch above ground surface in developed areas and 6 inches above ground surface in undeveloped areas unless otherwise shown on the plans. Manholes in roads shall be built to grades designated by the Engineer. Manhole sections with either honeycomb defects; exposed reinforcing; broken/fractured tongue or groove; or cracked walls will be subject to rejection by Engineer for use on the project. When mastic sealant is used, improperly applied primer will also be cause for rejection.
No leaks in any manhole will be acceptable. All repairs made from inside the manhole shall be made with mortar composed of one part Portland cement and two parts clean sand. The mixing liquid shall be straight bonding agent equivalent to "Acryl 60."

3.9 STONE BEDDING

- A. Where, in the Engineer's or Geotechnical Consultant's opinion, subgrade of pipe trench is unsuitable material, Contractor shall remove unsuitable material to a depth determined by Engineer or Geotechnical Consultant and furnish and place stone backfill in trench to stabilize subgrade. Presence of water does not necessarily mean stone backfill is required. If well points or other types of dewatering will remove the water, Contractor shall be required to completely dewater trench in lieu of stone backfill. Stone bedding will be limited to areas where well pointing and other conventional methods of dewatering will not produce a dry bottom. Stone shall be placed 4 feet wider than the outside diameter of pipe. The pipe shall be carefully bedded in stone as specified, or in accordance with manufacturer's recommendations.

3.10 SAND BEDDING

- A. Where, in the Engineer's or Geotechnical Consultant's opinion, character of soil is unsuitable for pipe bedding, even though dewatered, additional depth of excavation as determined by Engineer or Geotechnical Consultant shall be made and replaced with clean sand furnished by Contractor.

3.11 DEFLECTION

- A. It is the Contractor's responsibility to assure backfill is sufficient to limit pipe deflection to no more than 5%. When flexible pipe is used, a deflection test shall be made by Contractor on the entire length of installed pipeline, not less than 30-days after completion of all backfill and placement of any fill. Deflection shall be determined by use of a deflection device or by use of a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Ball, cylinder, or circular sections shall have a diameter, or minor diameter as applicable, of 95% of the inside pipe diameter. The ball, cylinder, or circular sections shall be of a homogeneous material throughout, shall have a density greater than 1.0 as related to water at 39.2 degrees F, and shall have a surface brinell hardness of not less than 150. The device shall be center bored and through bolted with a 1/4 inch minimum diameter steel shaft having a yield strength of 70,000 p.s.i. or more, with eyes at each end for attaching pulling cables. The eye shall be suitably backed with flange or heavy washer; a pull exerted on opposite end of shaft shall produce compression throughout remote end of ball, cylinder, or circular section. Circular sections shall be spaced so distance from the external faces of front and back sections shall equal or exceed diameter of circular section. Failure of the ball, cylinder, or circular section to pass freely through a pipe run, either by being pulled through by hand or by being flushed through with water, shall be cause for rejection of individual run. When a deflection device is used for the test in lieu of a ball, cylinder, or circular sections described, such device shall be acceptable to Engineer prior to use. Device shall be sensitive to 1.0% of diameter of pipe being measured and shall be accurate to 1.0% of indicated dimension. Installed pipe showing deflections greater than 5% of the normal diameter of pipe shall be retested by a run from opposite direction. If retest also fails, the suspect pipe shall be repaired or replaced at no cost to Owner.

3.12 LEAKAGE

- A. In no stretch of sewer between any two adjoining manholes shall infiltration/exfiltration exceed 25 gallons/day/inch of pipe diameter per mile of pipe. In case leakage exceeds this amount, the sewer shall not be accepted until such repairs and replacements are made to comply with above requirements. Such corrections will be made at the Contractor's expense. All visible leaks shall be repaired, regardless of the amount of leakage.
- B. Lines shall be tested for leakage by low pressure air testing, infiltration tests, or exfiltration tests, as appropriate. Low pressure air testing for PVC pipe shall be as prescribed in ASTM F 1417. Prior to infiltration or exfiltration tests, trench shall be backfilled up to at least the lower half of pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When water table is 2 feet or more above top of pipe at upper end of pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to Engineer. When Engineer determines infiltration cannot be properly tested, an exfiltration test shall be made by filling the line to be tested with water so a head of at least 2 feet is provided above both water table and top of pipe at upper end of pipeline to be tested. The filled line shall be allowed to stand until pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be re-established. The amount of water required to maintain this water level during a 2 hour test period shall be measured. Leakage as measured by either the infiltration test or exfiltration test shall not exceed 25 gallons per inch diameter per mile of pipeline per day. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correction, and retesting shall be made at no additional cost to the Owner.
- C. The Contractor shall furnish equipment and plugs and subject force mains to hydrostatic tests at 100 p.s.i. for a period of 2 hours. Any leaks shall be located and repaired. Each section tested shall be slowly filled with water, care being taken to expel all air from the pipes. No pipe installation will be accepted until leakage during pressure test is less than the number of gallons listed for each 1000-feet of pipe tested:

6 inches & less – 0.9 gallons	12 inches – 1.80 gallons
8 inches – 1.20 gallons	14 inches – 2.10 gallons
10 inches – 1.50 gallons	16 inches – 2.40 gallons

3.13 CLEANING AND ACCEPTANCE

- A. Before acceptance of sewer system, it shall be tested and cleaned to the satisfaction of Engineer. Where any obstruction is met, Contractor will be required to clean sewers by means of rod and swabs or other instruments. The pipe line shall be straight and show a uniform grade between manholes. The Engineer shall check lines by lamping or other methods to determine final acceptance.

3.14 CLOSING PIPE

- A. When work or pipe installation is suspended, either for the night or at other times, end of sewer must be closed with a tight cover. Contractor will be held responsible for keeping the sewer free from obstruction.

3.15 PARTIAL ACCEPTANCE OF THE WORK

- A. Owner reserves right to accept and use any part of the work. Engineer shall have power to direct on what line the Contractor shall work and order thereof.

3.16 GRASSING

- A. Grassing of areas disturbed during construction shall be in accordance with Section 32 92 00 – "Turf and Grasses."

3.17 RECORD DATA

- A. It will be required of the Contractor to keep accurate, legible records, locating all sewers, force mains, tees, and laterals. These records will be made available to Engineer before final review for incorporation into the Engineer's Record Drawings. Final payment to the Contractor will be withheld until all such information is received and accepted.

3.18 REMOVE AND REPLACE PAVEMENT

- A. Pavement shall only be removed after prior written authorization by the Owner. Pavement removed and replaced shall be constructed in accordance with latest specifications of the State Department of Transportation. Traffic shall be maintained and controlled per State Department of Transportation regulations.

Edges of the pavement shall be cut to a neat straight line with a masonry saw. Backfill shall be compacted and tested and a concrete base course of 5,000 p.s.i. placed on the fill as shown on details. The concrete base shall be placed within 24 hours after pipeline is installed. A temporary wearing surface may be used provided it presents a smooth surface. The final wearing surface shall be 1-1/2 inches or 2 inches of 9.5 mm asphaltic concrete, depending on locations with respective pavement duty level.

3.19 METALLIC DETECTOR TAPE

- A. Contractor shall place metallic detector tape, suitably coded, directly over all installed pipes at a depth of 18 inches below the finished surface.

3.20 TRACER WIRE

- A. Tracer wire will be installed on all force mains, sanitary sewer and service lateral directly on top of the pipe. Wire shall be secured to the pipe with tape or other acceptable methods at spacings of no more than 36-inches apart. Where service laterals connect to main lines, the wire connection shall be made with a direct bury moisture resistant connector. Installation of connector shall be per

manufacturer's instructions. The insulated wire must maintain electrical continuity. This tracer wire system shall be checked and tested by the Contractor, in presence of Engineer or Owner prior to acceptance of force main, sanitary sewer and service laterals. All equipment, meters, detectors, etc., needed for testing shall be furnished by the Contractor.

3.21 CONNECT SEWERS TO EXISTING STRUCTURES

- A. Contractor shall connect the system to existing structures where indicated. For brick structures, a hole not more than 4 inches larger than the outside diameter of new pipe shall be cut neatly in structure, new pipe laid so it is flush with inside face of structure, and annular space around pipe filled with a damp, expanding mortar or grout to make a watertight seal. For precast structures, core proper size hole in structure for pipe being connected, attach flexible sleeve into cored hole and connect new pipe into flexible sleeve with a stainless steel band.

3.22 FIELD QUALITY CONTROL

- A. Soil and density tests shall be made by a testing laboratory acceptable to the Engineer. Laboratory tests of the soil shall be made in accordance with ASTM D 1557. In-place density tests shall be made in accordance with ASTM D 6938. Results of the tests shall be furnished to the Engineer.
The minimum number of tests required shall be:

Backfill over sewer in traffic areas.....	1 per 100 linear feet or less for each 4 feet of depth or portion thereof.
Backfill over sewer in non-traffic areas...	1 per 500 linear feet or less for each 6 feet of depth or portion thereof.

3.23 AIR RELEASE VALVE

- A. The manhole and installation of valve shall be in accordance with detail on drawings. Prior to deciding on the location of any air release valve, Contractor shall provide Engineer with an accurate profile of installed force main so high points in system can be determined.

3.24 SEWAGE PUMPING STATION

- A. The precast sections shall be carefully handled and placed in position undamaged. Spalled areas, cracks, or exposed reinforcing in any section shall be cause for rejection of a section. Damaged elements shall be promptly removed from the job-site.

The structure shall be installed plumb and level by Contractor on a prepared, evenly distributed and level, minimum 12 inch thick crushed-stone bed. Joints between sections shall be sealed with butyl-rubber or neoprene sealant. Asphaltic-based material or similar products shall not be used. The sealant shall be applied in accordance with sealant manufacturer's recommendation. Leakage through joints or around pipes will not be acceptable. Grout used at construction joints and around pipes shall be Five Star brand non-shrink grout or an acceptable equivalent.

Excavation shall be accomplished in a manner as required to protect adjacent property and utilities and for safety. Backfilling shall be accomplished as soon as practicable after the structure has been placed and sealed. Backfilling shall be achieved by placing material in equal lifts (max. 2 feet) and compacting each lift to maintain stability and plumbness of the structure. Backfill material shall be a select granular material with a maximum plasticity index (P.I.) of 12. Compaction shall be accomplished by means of mechanical tamping to 98% of maximum laboratory density at optimum moisture when tested by ASTM D 6938. During backfilling operation and until its completion, the wet well sections shall be maintained in an absolute plumb position. To prevent structure from possibly becoming buoyant in hydrostatic or flooded conditions, Contractor shall take necessary steps to avoid flotation of the structure.

Pumping station site shall be graded to drain to conform to the drawings. The fence, access road, and grassing shall be constructed after site has been graded.

Contractor shall connect to water main with a saddle or tee and lay water line to the hydrant per location on drawings. The hydrant shall be set in a gravel pocket with a 12 inch x 12 inch x 4 inch concrete collar at ground level. Connection shall be disinfected and tested in accordance with AWWA C 651. Water shall not be used until favorable written test results have been furnished to the Engineer.

Drawings indicate the general arrangement and location of electrical equipment, conduit, piping, transformer, and generator. Installation and location of these items shall be coordinated with the pump station operating personnel.

3.25 FORCE MAIN

- A. Ductile Iron Force Main shall be installed in accordance with AWWA C 600.
- B. PVC Force Main shall be installed in accordance with ASTM D 2774.

3.26 BYPASSING

- A. Bypassing of raw wastewater onto the ground or into a receiving stream is prohibited.
- B. Bypassing shall be accomplished with sufficient pumping equipment to maintain the flow of wastewater. Contractor shall provide pump, hoses, materials, and labor to operate and maintain the bypassing operation. A backup pump shall also be made available by the Contractor. Bypassing operations shall be reviewed and acceptable to the sewer system operator before implementing.

END OF SECTION

INDEX TO
SECTION 33 40 00 – STORM DRAINAGE UTILITIES

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SECTION 33 40 00**STORM DRAINAGE UTILITIES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Construction of pipes, drainage inlets, manholes, headwalls, and various drainage structures.

1.2 RELATED SECTIONS

- A. Section 03 00 00 –Concrete
- B. Section 33 30 00 – Sanitary Sewerage Utilities

1.3 OPTIONS

- A. The bid form and specifications describe several pipe materials. Where manufacturers of material or equipment are named in the specifications, Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by Engineer as equivalent to those specified.

1.4 REFERENCES (Latest Revision)

- A. ASTM B 745/B 745M – Corrugated Aluminum Pipe for Sewers and Drains.
- B. ASTM C 55 – Concrete Building Brick.
- C. ASTM C 62 – Building Brick (Solid Masonry Units Made from Clay or Shale).
- D. ASTM C 76 – Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- E. ASTM C 144 – Aggregate for Masonry Mortar.
- F. ASTM C 150 – Portland Cement.
- G. ASTM C 207 – Hydrated Lime for Masonry Purposes.
- H. ASTM C 443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
- I. ASTM C 478 – Precast Reinforced Concrete Manhole Sections.
- J. ASTM C 913 – Precast Concrete Water and Wastewater Structures.
- K. ASTM C 1433 – Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers.
- L. ASTM D 1056 – Flexible Cellular Materials – Sponge or Expanded Rubber.

- M. ASTM D 1557 – Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- N. ASTM D 1751 – Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- O. ASTM D 1752 – Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- P. ASTM D 2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
- Q. ASTM D 3212 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- R. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- S. ASTM D 6938 – In Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- T. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- U. ASTM F 405 – Corrugated Polyethylene (PE) Pipe and Fittings.
- V. ASTM F 477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- W. ASTM F667 – 3 through 24 in. Corrugated Polyethylene Pipe and Fittings.
- X. ASTM F 2306/F 2306M – 12 to 60-Inch (300 to 1,500 mm) Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications
- Y. AASHTO M 294 – Corrugated Polyethylene Pipe, 300 to 1500-mm (12 – to 60-in.) Diameter.
- Z. ASTM D 3350 – Standard Specification for Polyethylene Plastics Pipe And Fittings Materials
- AA. ASTM F 2881 – Standard Specification For 12 To 60 In. 300 To 1500 Mm Polypropylene (PP) Dual Wall Pipe And Fittings For Non-Pressure Storm Sewer Applications
- BB. ASTM F 3080 – Standard Practice for Laser Technologies for Measurement of Cross-Sectional Shape of Pipeline and Conduit by Non-Rotating Laser Projector, Infrared Measurement, and CCTV Camera System
- CC. GDOT Section 845 Department of Transportation State of Georgia Special Provision Section 845 – Thermoplastic Pipe

- DD. Current Edition of Advanced Drainage System, Inc. (ADS) Water Management Drainage Handbook including the referenced ADS Technical Notes

1.5 QUALITY ASSURANCE

- A. Material Review – Contractor will furnish the Engineer and Owner a description of all material before ordering. Engineer will review the Contractor's submittals and provide in writing an acceptance or rejection of material.
- B. Manufacturer – Material and equipment shall be standard products of a manufacturer who has manufactured them for a minimum of 2 years and provides published data on their quality and performance.
- C. Subcontractor – A subcontractor for any part of the work must have experience on similar work, and if required, furnish Engineer with a list of projects and Owners or Engineers who are familiar with their competence.
- D. Design – Devices, equipment, structures and systems not designed by Engineer and Contractor wishes to furnish, shall be designed by either a Registered Professional Engineer or by someone the Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before ordering.
- E. Testing Agencies – Soil tests shall be taken by a testing laboratory operating in accordance to ASTM D-3740 and E-329 and be acceptable to the Engineer prior to engagement. Mill certificates of tests on materials made by manufacturers will be accepted provided the manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests, spot checked by an outside laboratory and furnishes satisfactory certificates.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. Contractor shall repair any damage caused by the storage. Material shall be examined before installation. Neither damaged nor deteriorated material shall be used in the work.

1.7 SEQUENCING AND SCHEDULING

- A. Contractor shall arrange work so sections of pipes between structures are backfilled, checked, pavement replaced and the section placed in service as soon as reasonable after installation.

1.8 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If Contractor suggests alternate material, equipment or procedures will improve results at no additional cost, the Engineer and Owner will examine suggestion, and if accepted, it may be used. The basis upon which acceptance of an alternate will be given is its value to Owner and not for Contractor's convenience.

1.9 GUARANTEE

- A. Contractor shall guarantee quality of materials, equipment and workmanship for a minimum period of 12 months or as required by the local governing agency after acceptance. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

1.10 EXISTING UTILITIES

- A. All known utility facilities are shown schematically on the construction drawings and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown, will not relieve the Contractor of responsibility under this requirement. "Existing Utilities Facilities" means any utility existing on the project in its original, relocated or newly installed position. Contractor will be held responsible for cost of repairs to damaged underground facilities; even when such facilities are not shown on the drawings.
- B. The Contractor shall call for underground utility locations before starting work. Underground utilities location service can be contacted at 1-800-282-8411 GA or 811.

1.11 MEASUREMENT AND PAYMENT

- A. Pipe Culverts and Storm Drains – Length of pipe shall be included in the contract lump sum price. Measurement shall be along the centerline, from end of pipe to end of pipe, end of pipe to center of structure or center of structure to center of structure. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment of which will constitute full payment for all pipe, joints, filter fabric and bedding, including trenching, dewatering, excavation, backfill and compaction, surface clean-up, and all incidental labor, testing and material necessary to complete the construction of pipe as required by this section of specifications.
- B. Drainage Structures – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will constitute full payment for all dewatering, excavation, formwork, precast concrete, backfill, compaction, frames, gratings or covers, concrete, brick and all miscellaneous materials, surface clean-up and labor necessary to complete the construction.
- C. Sheet piling and Bracing – Will not be measured for direct payment. All costs and charges in connection therewith shall be reflected and included in the item of work to which it pertains.
- D. Subgrade Drain – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will constitute full payment for trenching, furnishing and installing perforated drain pipe with sock, furnishing and placing fine aggregate, proper

backfilling, surface cleanup, acceptable connection to structures, and all work necessary to make the installation complete.

- E. Stone Foundation – There will be no separate measurement and payment for stone bedding. Stone bedding shall be considered incidental to pipeline installation.
- F. Sand Foundation – There will be no separate measurement and payment for stone bedding. Sand bedding shall be considered incidental to pipeline installation.
- G. Borrow – Payment for borrow material shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. For change orders, borrow material will be measured at the site by truck count, measuring capacity of truck if full, or estimating quantity if not full. The width of trench in which borrow is placed shall be limited to 4 feet wider than outside diameter of pipe barrel. If additional width is excavated, it shall be backfilled at Contractor's expense and a deduction of the extra quantity determined by truck count. Payment will include furnishing, hauling, placing, compacting "borrow" material, and all other incidentals to installation. Payment will also include disposing of unsuitable material in an area furnished by the Contractor.
- H. Ditch and Swale Excavation – Excavations required for the construction of new ditches or swales and regrading of existing ditches or swales shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity.
- I. Connect Pipe to Existing Structures – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. For precast structures, payment shall include cost of dewatering, excavation, coring, installing and grouting in pipe, backfilling, compaction and all work necessary to complete the connection. For brick structures, payment shall include cost of dewatering, excavation, cutting a hole, installing and grouting in pipe, backfilling, compaction and all work necessary to complete the connection.
- J. Pipe Video – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include all equipment, labor, and materials necessary to televise and video record pipes under roadways as chosen by the Engineer. Contractor shall provide Engineer with one copy of the video recording.

1.12 TESTING

- A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).
- B. In place density tests in accordance with ASTM D 1556 or ASTM D 6938.

- C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48-hours notice prior to taking any tests.
- E. Testing shall be the Contractor's responsibility and shall be performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.
- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 PIPE

- A. Concrete Pipe – Shall be reinforced Class III, Class IV, or Class V and shall conform to ASTM Specification C-76. Pipe shall be manufactured without lifting holes. Gasketed single offset joints may be used in lieu of 'O' ring joints if acceptable to the Engineer.

Joint design shall be bell and spigot. Joints shall be water tight and soil tight using a confined gasket joint consisting of an O-ring rubber gasket conforming to requirements of ASTM C 443. Joint assemblies shall be accurately formed so when each pipe section is forced together, the assembled pipe shall form a continuous watertight conduit with smooth and uniform interior surface. Gaskets shall be the sole element of providing joint water tightness. Ends of pipe shall be in planes at right angles to the longitudinal centerline of pipe. Ends shall be finished to regular smooth surfaces.

- C. Polyethylene (HDPE) – Shall be high density polyethylene corrugated pipe having an integrally formed smooth interior, equivalent to Advanced Drainage Systems N-12WT, N-12STIB or Hancor Blue Seal or Sure-Lok ST. Pipe shall conform to ASTM F667 and F2306.
 - 1. Joints – Pipe shall be joined using an integral bell and spigot joint meeting ASTM F2306 specifications. The joint shall be soil and water tight and gaskets, when applicable, shall meet requirements of ASTM F477. A joint lubricant supplied by manufacturer shall be used on the gasket and bell during assembly.
- D. Trench Drain – Shall be ACO Sport System 4000 or approved equivalent. Products and installation shall be per manufacturer's recommendations.

2.2 DRAINAGE STRUCTURES

- A. Details – See plans.
- B. Concrete – Reinforced and non-reinforced.

1. Minimum compressive strength = 3,000 p.s.i. at 28 days.
 2. Reinforcing shall be covered by a minimum 1 inch of concrete for top slabs and 1-1/2 inches for walls and bases and 3 inches where concrete is deposited directly against the ground.
 3. Expansion joint filler materials shall conform to ASTM D 1751 or D 1752.
- C. Mortar – Connection of pipe and drainage structures shall be composed of one part by volume of Portland cement and two parts of sand. The Portland cement shall conform to ASTM C-150, Type I or II. The sand shall conform to ASTM C-144 and shall be of an accepted gradation. Hydrated lime may be added to the mixture of sand and cement in an amount equal to 25% of cement volume used. Hydrated lime shall conform to ASTM C-207, Type S. Quantity of water in the mixture shall be sufficient to produce a workable mortar but shall in no case exceed 7 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalis and organic impurities. The mortar shall be used within 30 minutes from time ingredients are mixed with water. After mortaring, flexible pipe connections, including HDPE, PP and corrugated aluminum shall include a 12" filter fabric extending a minimum 12" up the pipe and structure adhered with a bituminous coating.
- D. Brick Masonry – Brick shall conform to ASTM Specification C-62, Grade SW or C-55, Grade S. Mortar for jointing and plastering shall consist of one part Portland cement and two parts fine sand. Lime may be added to the mortar in an amount not more than 25% of the cement volume used. Joints shall be completely filled and shall be smooth and free from surplus mortar on the inside of structure. Brick structures shall be plastered with 1/2 inch of mortar over entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course, and for round structures, brick shall be laid radially with every sixth course a stretcher course.
- E. Precast – Shall be constructed in accordance with ASTM C-478, C-913, or C-1433 and conform to details on the project drawings.
1. Joints – Shall be tongue and groove sealed with flexible gaskets or mastic sealant. Gaskets shall be O-Ring or Type A or B "Tylox" conforming to ASTM C443 and mastic shall be "Ram-nek" or equivalent with primer. Primer shall be applied to all contact surfaces of manhole joints at the factory in accordance with manufacturer's instructions.
 2. Steps – Shall be polypropylene equivalent to M.A. Industries, Type PS-1 or PS-1-PF. Steps shall be installed at the manhole factory and in accordance with recommendations of step manufacturer. Manholes will not be acceptable if steps are not installed accordingly.
 3. Leaks – No leaks in the manhole will be acceptable. All repairs made from inside the manhole shall be made with mortar composed of one part Portland cement and two parts clean sand; mixing liquid shall be straight bonding agent equivalent to "Acryl 60."

- F. Frame, cover & grating shall conform to details shown on the project drawings. Grates in pavement and in other flush-mounted type surfaces shall be of a "bicycle-safe" configuration consisting of 45 degree diagonal bars or slotted grates with a maximum clear opening of 1 inch and a maximum length of 9-inches. In any case, the long dimension of openings should be located transverse to direction of traffic when possible.

2.3 FILTER FABRIC

- A. Shall be a non-woven heat-bonded fiber of polypropylene and nylon filaments equivalent to Mirafi 140 N. The fabric shall be finished so filaments will retain their relative position with respect to each other. Fabric shall contain stabilizers and/or inhibitors added to the base plastic to make filaments resistant to deterioration due to ultraviolet and/or heat exposure. The product shall be free of flaws, rips, holes, or defects.

2.4 SOILS AND STONE AGGREGATES

- A. Stone aggregate shall be clean crushed granite or concrete meeting the gradation requirements of grade No. 57.
- B. Soils used for bedding, haunching, and initial backfill shall be as shown in the following table and shall meet requirements and classifications of ASTM D2321 and ASTM D2487.

Class	Type	Soil Group Symbol D 2487	Description	Percentage Passing Sieve Sizes		
				1-1/2 inch (40 mm)	No. 4 (4.75 mm)	No. 200 (0.075 mm)
IB	Manufactured, Processed Aggregates; dense-graded, clean.	None	Angular, crushed stone (or other Class 1A materials) and stone/sand mixtures with gradations selected to minimize migration of adjacent soils; contain little or no fines.	100%	≤50%	<5%
II	Coarse – Grained Soils, clean	GW	Well-graded gravels and gravel-sand mixtures; little or no fines.	100%	<50% of "Coarse Fraction "	<5%
		GP	Poorly-graded gravels and gravel-sand mixtures; little or no fines.			
		SW	Well-graded sands and gravelly sands; little or no fines.		>50% of "Coarse Fraction "	
		SP	Poorly-graded sands and gravelly sands; little or no fines.			
	Coarse-Grained Soils; borderline clean to w/fines.	Eg. GW–GC, SP–SM.	Sands and gravels that are borderline between clean and with fines.	100%	Varies	5% to 12%

III	Coarse-Grained Soils with Fines	GM	Silty gravels, gravel-sand-silt mixtures.	100%	<50% of "Coarse Fraction "	5%
		GC	Clayey gravels, gravel-sand-clay mixtures.			
		SM	Silty sands, sand-silt mixtures.		>50% of "Coarse Fraction "	
		SC	Clayey sands, sand-clay mixtures.			
IVA	Fine-grained soils (inorganic)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity.	100%	100%	>50%
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.			

2.5 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products by submittal of shop drawings before they are ordered.

PART 3 – EXECUTION

3.1 ON SITE OBSERVATIONS OF WORK

- A. The line, grade, deflection, and infiltration of storm sewers shall be tested by Contractor under direction of Engineer. Owner's Representative or Engineer will have the right to require any portion of work be completed in their presence and if work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if Contractor notifies Engineer such work is scheduled and the Engineer fails to appear within 48-hours, Contractor may proceed. All work completed and material furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed. All materials not conforming to requirements of specifications shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Project Engineer or Project Representative a minimum of 48-hours' notice for all required observations or tests. Storm sewers shall be dry for observation by the Engineer. Lines under water shall be pumped out by Contractor prior to observation, at no additional cost to the Owner.

It will also be required of Contractor to keep accurate, legible records of the location of all storm sewer lines and appurtenances. These records will be prepared in accordance with paragraph on "Record Data and Drawings" in the Special Conditions. Final payment to the Contractor will be withheld until all such information is received and accepted.

3.2 EXCAVATION FOR PIPE AND STRUCTURES

- A. Excavated material shall be piled a sufficient distance from the trench banks to avoid overloading to prevent slides or cave-ins.
- B. Remove from site all material not required or suitable for backfill.
- C. Grade as necessary to prevent water from flowing into excavations.
- D. Remove all water accumulating in the excavation, from surface flow, seepage, or otherwise, by pumping or other acceptable method.
- E. Sheet piling, bracing or shoring shall be used as necessary for protection of the work and safety of personnel.

3.3 TRENCHING FOR PIPE

- A. Trenching for Pipe – The width of trenches at any point below top of pipe shall be not greater than outside diameter of pipe plus 4 feet to permit satisfactory jointing and thorough bedding, haunching, backfilling and compacting under and around pipes. Sheet piling and bracing where required shall be placed within the trench width as specified. Care shall be taken not to over-excavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures shall be necessary. Cost of this re-design and increased cost of pipe or installation shall be borne by Contractor without additional cost to the Owner. When installing pipe in a positive projecting embankment installation, the embankment shall be installed to an elevation of at least 1 foot above top of pipe for a width of five pipe diameters on each side of pipe before installation of pipe.
- B. Removal of Unsuitable Material – Where wet or otherwise unstable soil, incapable of supporting the pipe is encountered in bottom of trench, such material shall be removed to depth required and replaced to proper grade with stone or sand foundation as determined by Engineer. This foundation shall be compacted to 95% modified proctor.

3.4 PROTECTION OF UTILITY LINES

- A. Existing utility lines shown on drawings or locations of which are made known to the Contractor prior to excavation, and are to be retained, as well as utility lines constructed during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired at Contractor's expense. If the Contractor damages any existing utility lines not shown on drawings or locations of which are not known to Contractor, report thereof shall be made immediately. If Engineer determines repairs shall be made by Contractor, such repairs will be ordered under the clause in GENERAL CONDITIONS of contract entitled "CHANGES." When utility lines to be removed are encountered within the area of operations, Contractor shall notify Engineer in ample time for necessary measures taken to prevent interruption of service.

3.5 FOUNDATION AND BEDDING

- A. Stone Foundation – Where the subgrade of pipe is unsuitable material, Contractor shall remove unsuitable material to a depth determined by Engineer or Geotechnical Consultant and furnish and place stone foundation in trench to stabilize subgrade.
- B. Sand Foundation – Where the character of soil is unsuitable, even though dewatered, additional excavation to a depth determined by Engineer or Geotechnical Consultant shall be made and replaced with clean sand furnished by Contractor.
- C. Bedding for pipe shall provide a firm surface of uniform density throughout the entire length of pipe. Before laying pipe, trench bottom shall be de-watered by the use of well points. Where well points will not remove the water, Contractor shall construct sumps and use pumps to remove all water from bedding surface. Pipe shall be carefully bedded in stone accurately shaped and rounded to conform to lowest 1/3 outside portion of circular pipe, or lower curved portion of arch pipe for the entire length of pipe. Bell holes and depressions for joints shall be only of such length, depth, and width as required for properly making the particular type joint.
- D. Concrete Pipe:
 - 1. Materials for bedding concrete pipe shall be either Class II, Class III, or Class IB if processed, to minimize migration of adjacent material.
 - 2. Depth of bedding shall be equal to 1/24 the outer diameter of pipe or 3 inches, whichever is greater.
 - 3. Bedding area under the center of pipe, for a width 1/3 outer diameter of pipe, known as middle bedding, shall be loosely placed. Remainder of bedding for full width of the trench shall be compacted to a minimum density of 85% for Class II bedding and 90% for Class III bedding as determined by ASTM D1557.
- E. Polyethylene Pipe
 - 1. Materials for bedding polyethylene, polypropylene and corrugated aluminum alloy pipe shall be either Class II, Class III, or Class IB if processed to minimize migration of adjacent materials.
 - 2. Depth of bedding shall be equal to 1/10 the outer diameter of pipe or a minimum of 6 inches, whichever is greater.
 - 3. Bedding area under the center of pipe, for a width 1/3 outer diameter of pipe, known as middle bedding, shall be loosely placed. Remainder of bedding for full width of the trench shall be compacted to a minimum density of 90% for Class II bedding and 95% for Class III bedding.

3.6 HAUNCHING, INITIAL BACKFILL, AND FINAL BACKFILL

- A. Haunching – After the bedding has been prepared and pipe is installed, Class II or Class III soil shall be placed along both sides of pipe, in layers not exceeding 6 inches in compacted depth. Care shall be taken to insure thorough compaction and fill under haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers and rammers. Haunching shall extend up to the spring line of pipe and be compacted to following densities:
 - 1. RCP: Minimum density shall be 90% as determined by ASTM D1557.
 - 2. PVC, HDPE, PP and Corrugated Aluminum Alloy Pipe: Minimum density shall be 95% as determined by ASTM D1557.
- B. Initial Backfill – PVC, HDPE, PP and corrugated aluminum alloy pipe require initial backfill material of either Class II or Class III soils to be placed from the spring line to a minimum of 6 inches above top of pipe in 6 inch lifts. This initial backfill shall be compacted to a minimum density of 95% as determined by ASTM D1557. Reinforced concrete pipe does not specifically require initial backfill. Initial backfill for reinforced concrete pipe can be the same as final backfill.
- C. Final Backfill – For all pipes, it should extend to the surface and shall be select materials compacted to a minimum of 98% as determined by ASTM D1557 if pipe is under pavement. If pipe is in grassed areas final backfill may be native materials compacted to a minimum density of 90% as determined by ASTM D1557.

3.7 PLACING PIPE

- A. Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Pipe lines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. All pipe in place shall have been checked before backfilling. When storm drain pipe terminates in a new ditch, headwall or end section, together with ditch pavement, if specified, shall be constructed immediately as called for on the plans. Ditch slopes and disturbed earth areas shall be grassed and mulched as required. Contractor will be responsible for maintaining these newly constructed ditches and take immediate action subject to acceptance, keeping erosion of the ditch bottom and slopes to a minimum during life of contract. No additional compensation will be given to Contractor for the required diversion of drainage and/or dewatering of trenches. Grassing the trench backfill shall conform to requirements of Section 32 92 00 – “Turf and Grasses.”
- B. Concrete Pipe: Laying shall proceed upgrade with spigot ends of bell and spigot pipe and tongue ends of tongue and groove pipe pointing in the direction of flow. Place pipe in trench with the invert conforming to required elevations, slopes and alignment. Provide bell holes in pipe bedding in order to insure uniform pipe support. Fill all voids under the pipe by working in backfill material.

- D. Polyethylene Pipe – Laying shall proceed upgrade with spigot ends of bell and spigot pipe pointing in the direction of flow. Place pipe in trench with the invert conforming to required elevations, slopes, and alignment. Provide bell holes in pipe bedding in order to ensure uniform pipe support. Fill all voids under the pipe by working in bedding material. Pipe shall be installed in accordance with ASTM D-2321.
- E. Subgrade Drain Tubing – Shall be laid as detailed on construction drawings with the invert conforming to required elevations and alignment.

3.8 JOINTS IN PIPES

- A. Concrete Pipe – Maintain pipe alignment and prevent infiltration of fill material at joints during installation. Manufacturer's recommendations and requirements shall be followed.

All joints shall receive one layer of filter fabric completely around exterior of the joint. Filter fabric shall be a minimum of 2 feet wide, centered on the joint, and overlapped a minimum of 1 foot.

- B. Polyethylene Pipe (HDPE) and PVC Pipe – Maintain pipe alignment and prevent infiltration of fill material at joints during installation
 - 1. Joints shall be gasketed soil-tight and water-tight bell and spigot meeting ASTM D3212. Gaskets shall meet the requirements of ASTM F477. A joint lubricant supplied by manufacturer shall be used on the gasket and bell during assembly. Spigot end of pipe shall be inserted into bell using methods recommended by the manufacturer. Pipe shall be kept true to line and grade during assembly.
 - 2. Installation of Filter Fabric at Joint – All HDPE and PP joints shall receive one layer of filter fabric completely around exterior of the joint. Filter fabric shall be a minimum of 2 feet wide, centered on the joint, and overlapped a minimum of 1 foot.
- D. Subgrade Drain Tubing – Joints shall be joined using snap couplings. When installing sock wrapped pipe, overlap sock ends over coupling and secure with polyethylene tape.

3.9 FIELD QUALITY CONTROL

- A. Soil and density tests shall be made by a testing laboratory acceptable to the Engineer. Laboratory tests of the soil shall be made in accordance with ASTM D 1557. In-place density tests shall be made in accordance with ASTM D 6938. Results of tests shall be furnished to the Engineer.

The minimum number of tests required shall be:

Rigid Pipe:

Haunching and Initial Backfill in all areas.... 1 per 100-linear feet of pipe, minimum of one per run of pipe for both the haunching and initial backfill zones.

Final Backfill over pipe in traffic areas..... 1 per 100-linear feet or less for each 4-feet of depth or portion thereof.

Final Backfill over pipe in non-traffic areas..... 1 per 500-linear feet or less for each 6-feet of depth or portion thereof.

Flexible Pipe:

Haunching and Initial Backfill in all areas.... 1 per 20-linear feet of pipe, minimum of one per run of pipe for both the haunching and initial backfill zones.

Final Backfill over pipe in traffic areas..... 1 per 20-linear feet or less for each 4-feet of depth or portion thereof.

Final Backfill over pipe in non-traffic areas..... 1 per 100-linear feet or less for each 4-feet of depth or portion thereof.

The minimum percent of compaction of the backfill material (in accordance to ASTM D1557) shall be the following:

In traffic Areas. 98% of maximum laboratory density.

In non-traffic Areas . . . 90% of maximum laboratory density, unless otherwise accepted by the Engineer.

- B. It is the Contractor's responsibility to assure backfill is sufficient to limit pipe deflection to no more than 5%. When flexible pipe is used, a deflection test shall be made by the Contractor on entire length of installed pipeline, not less than 30-days after completion of all backfill and placement of any fill. Deflection shall be determined by use of a deflection device per ASTM F3080 or a nine-fin deflection mandrel. Failure of the mandrel to pass freely through a pipe run shall be cause for rejection of a run. When a deflection device is used for the test such device per ASTM F3080 or nine fin deflection mandrel shall be given acceptance prior to use. Device shall be sensitive to 1.0% of pipe diameter being measured and shall be accurate to 1.0% of the indicated dimension. Installed pipe showing deflections greater than 5% of normal pipe diameter shall be replaced at no cost to Owner. Testing pull force shall not exceed 200 lbs.
- C. 100% of pipes under roadways and paved areas shall be televised and video recorded. The video observation shall include a complete pan view of each joint. If the video observation indicates problems, further televising may be required. Additional televising and video recording will be at no additional cost to the Owner.

3.10 DRAINAGE STRUCTURES

- A. Drainage structures shall be constructed of materials specified for each type and in accordance with details shown on the drawings.

3.11 REMOVE AND REPLACE PAVEMENT

- A. Pavement shall only be removed after prior written authorization by the Owner. Pavement removed and replaced shall be constructed in accordance with latest specifications of the State Department of Transportation. Traffic shall be maintained and controlled per State Department of Transportation regulations.

3.12 CONNECT PIPE TO EXISTING STRUCTURES

- A. Contractor shall connect pipe to the existing structure where indicated. For brick or precast structures, a hole not more than 4 inches larger than outside diameter of new pipe shall be cut or cored neatly in the structure, new pipe laid so it is flush with inside face of structure, and annular space around pipe filled with a damp, expanding mortar or grout to make a watertight seal. After mortaring, flexible pipe connections, including HDPE, PP and corrugated aluminum shall include a 12" filter fabric extending a minimum 12" up the pipe and structure adhered with a bituminous coating.

END OF SECTION

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SECTION 33 47 26.15**BIORETENTION FACILITIES****PART 1 – GENERAL****1.1 DESCRIPTION**

- A. The work covered in this section consists of piping, soil preparation, fine grading, protection, and maintenance of bioretention facilities until acceptance. Bioretention facilities are small, landscaped basins intended to provide water quality management by filtering stormwater runoff before release into storm drain systems. This work shall consist of installing bioretention facilities as specified in the Contract Documents, including all materials, equipment, labor, and services required to perform the work.

1.2 RELATED WORK

- A. Section 31 00 00 – Earthwork
- B. Section 32 90 00 – Planting
- C. Section 32 92 00 – Turf and Grasses
- D. Section 33 40 00 – Storm Drainage Utilities

1.3 QUALITY ASSURANCE

- A. Qualifications of Workmen: Contractor shall provide at least one person present at all times during execution of work that is thoroughly familiar with the type of materials being installed and proper equipment and methods for their installation and who shall direct all work performed under this section.

1.4 MEASUREMENT AND PAYMENT

- A. Bioretention Facility – Payment shall be included in the contract lump sum price. Any changes in quantities and costs necessitated through valid, executed change order will be pursuant to the itemized bid form cost for its respective unit of quantity. Payment will include all equipment, labor, materials, and all other incidentals to installation as complete.

PART 2 – PRODUCTS**2.1 MATERIALS**

- A. Contractor shall, at time of delivery, furnish Engineer and/or Landscape Architect invoices of all materials received, in order that the quality and source of materials may be determined.

2.2 BIORETENTION SOIL MIXTURE

- A. The Bioretention Soil Mixture (BSM) is a mixture of planting soil, mulch, and sand consisting of the following:

ITEM	COMPOSITION BY VOLUME	REFERENCE
Planting Soil	30%	See below
Shredded 2x Hardwood Mulch	20%	See below
Sand	50%	ASTM C33 Fine Aggregate

The USDA textural classification of the Planting Soil for the BSM shall be LOAMY SAND OR SANDY LOAM. The Planting Soil shall be salvaged or furnished. Additionally, the Planting Soil shall be tested and meet the following criteria:

ITEM	PERCENT BY WEIGHT	TEST METHOD
Sand (2.0 – 0.050 mm)	50 – 85%	AASHTO T88
Silt (0 – 0.050 – 0.002 mm)	0 – 50%	AASHTO T88
Clay (less than 0.002 mm)	10 – 20%	AASHTO T88
Organic Matter	1.5 – 10%	AASHTO T194

The textural analysis for the Planting Soil shall be as follows:

ASTM E11 SIEVE SIZE	MINIMUM PERCENT PASSING BY WEITHE
2 in.	100
No. 4	90
No. 10	80

At least 45 days prior to starting construction of bioretention facilities, Contractor shall submit source of Planting Soil for the BSM to Engineer for acceptance. No time extensions will be granted should the proposed Planting Soil fail to meet minimum requirements stated above. Once a stockpile of Planting Soil has been sampled, no material shall be added to the stockpile.

The Bioretention Soil Mixture (BSM) shall be a uniform mix, free of stones, stumps, roots, or other similar objects larger than two inches excluding mulch. No other materials or substances shall be mixed or dumped within the bioretention area that may be harmful to plant growth or prove a hindrance to planting or maintenance operations.

The Bioretention Soil Mixture shall be tested and meet the following criteria:

ITEM	CRITERIA	TEST METHOD
Corrected pH	5.5 – 7.5	ASTM D4972
Magnesium	Minimum 32 ppm	*
Phosphorus (Phosphate – P ₂ O ₅)	Not to exceed 69 ppm	*
Potassium (K ₂ O)	Minimum 78 ppm	*
Soluble Salts	Not to exceed 500 ppm	*

*Use authorized soil test procedures.

Should pH fall outside of the acceptable range, it may be modified with lime (to raise) or iron sulfate plus sulfur (to lower). The lime or iron sulfate must be mixed uniformly into the BSM prior to use in bioretention facilities.

Should the BSM not meet minimum requirements for magnesium, it may be modified with magnesium sulfate. Likewise, should the BSM not meet minimum requirement for potassium, it may be modified with potash. Magnesium sulfate and potash must be mixed uniformly into the BSM prior to use in bioretention facilities.

Planting soil and/or BSM failing to meet minimum requirements shall be replaced at no additional cost to the Owner. Mixing of corrective additives to the BSM is incidental and shall be at no additional cost to Owner.

Mixing the BSM to a homogeneous consistency shall be done to the satisfaction of the Engineer.

2.3 LIMESTONE

- A. Limestone shall contain not less than 85 percent calcium and magnesium carbonates. Dolomitic (magnesium) limestone shall contain at least 10 percent magnesium as magnesium oxide and 85 percent calcium and magnesium carbonates.

Limestone shall conform to the following gradation:

SIEVE SIZE	MINIMUM PERCENT PASSING BY WEIGHT
No. 10	100
No. 20	98
No. 100	50

2.4 IRON SULFATE

- A. Iron sulfate shall be a constituent of an acceptable horticultural product produced as a fertilizer for supplying iron and as a soil acidifier.

2.5 MAGNESIUM SULFATE

- A. Magnesium sulfate shall be a constituent of an acceptable horticultural product produced as a fertilizer.

2.6 POTASH

- A. Potash (potassium oxide) shall be a constituent of an acceptable horticultural product produced as a fertilizer.

2.7 MULCH

- A. Shredded hardwood bark shall consist of the bark from hardwood trees which has been milled and screened to a maximum 3-inch particle size and provide a uniform texture free from sawdust, foreign materials, and any artificially introduced chemical that would be detrimental to plant or animal life.

2.8 UNDERDRAIN

- A. Underdrains shall be heavy-duty corrugated polyethylene perforated sock pipe manufactured by Advanced Drainage Systems (ADS) or equivalent and shall conform to ASTM F405.

PART 3 – EXECUTION**3.1 CONSTRUCTION**

- A. Bioretention facilities shall not be constructed until all contributing drainage areas are stabilized as shown on Contract Plans and to the satisfaction of Engineer. Bioretention facilities shall not be used as sediment control facilities. No heavy equipment shall operate within the perimeter of a bioretention facility during excavation, underdrain placement, backfilling, planting, or mulching of the facility.

3.2 EXCAVATION

- A. The bioretention facility shall be excavated to dimensions, side slopes, and elevations shown on Contract Plans. Method of excavation shall minimize compaction of the bioretention facility bottom. Excavators and backhoes, operating adjacent to the bioretention facility, shall be used to excavate facility if possible. Low ground-contact pressure equipment may also be used for excavation. No heavy equipment shall be allowed on the bioretention facility bottom. Excavated materials shall be removed from the bioretention facility site.

Prior to placing the underdrain and BSM, bottom of excavation shall be roto-tilled to a minimum depth of 6-inches to alleviate any compaction of the facility bottom. Any substitute method for rototilling must be accepted by the Engineer prior to use.

Any ponded water shall be removed from bottom of facility and the soil shall be friable before rototilling.

3.3 UNDERDRAIN

- A. The underdrain system shall be placed on a bed of washed No. 57 aggregate. The minimum thickness of No. 57 aggregate shall be 12 inches. Underdrain shall be covered with 6 inches No. 57 aggregate. All aggregate shall be placed according to dimensions shown on the Contract Plans.

Observation wells/cleanouts of 6-inch non-perforated pipe shall be placed vertically in the bioretention facility as shown on Contract Plans. Wells/cleanouts shall be connected to the perforated underdrain with appropriate manufactured connections as shown on the Contract Plans. Wells/cleanouts shall extend 6 inches above top elevation of the bioretention facility mulch, and shall be capped with a screw cap. The ends of underdrain pipes not terminating in an observation well/cleanout shall be capped.

3.4 PLACEMENT AND COMPACTION OF THE BIORETENTION SOIL MIXTURE

- A. A Bioretention Soil Mixture (BSM) shall be placed and graded using low ground-contact pressure equipment or by excavators and/or backhoes operating on ground adjacent to the bioretention facility. No heavy equipment shall be used within perimeter of the bioretention facility before, during, or after placement of BSM. BSM shall be placed in horizontal layers not to exceed 12 inches for entire area of the bioretention facility. BSM shall be compacted by saturating entire area of the bioretention facility after each lift of BSM is placed until water flows from underdrain. Water for saturation shall be applied by spraying or sprinkling. An appropriate sediment control device shall be used to treat any sediment-laden water discharged from the underdrain. If the BSM becomes contaminated during construction of facility, contaminated material shall be removed and replaced with uncontaminated material at no additional cost to Owner. Final grading of the BSM shall be performed after a 24-hour settling period. Final elevations shall be within 2 inches of elevations shown on the Contract Plans.

3.5 MULCHING

- A. Once plants are in place, the entire bioretention facility shall be mulched to a uniform thickness of 3 inches. Well-aged (minimum age of 6 months) shredded hardwood bark mulch is the only acceptable mulch.

3.6 CLEAN UP

- A. Contractor is responsible for removing all trash, debris, rubbish and all other materials associated with the construction from site on a daily basis. All tags, flags, and labels will be removed from plants and trees. The site shall be left broom clean and tidy. Clean up of the site is a prerequisite to final acceptance by the Owner.

3.7 MAINTENANCE

- A. All Bioretention Facilities shall be protected and maintained by the Contractor immediately after installation.

- B. Maintenance shall include but is not limited to weeding, cultivating, mulch reapplication, removal of dead material, and other necessary operations.
- C. The Contractor shall repair immediately any areas damaged as a result of construction operations or erosion.
- D. The Contractor will be responsible for maintenance until time of Owner acceptance.

END OF SECTION