

**INVITATION TO BID
FOR
FC-7908, Annual Contract for the Construction of
Sidewalks, Driveways, Curbs, and Gutters**



City of Atlanta

**Richard Mendoza
Commissioner
Department of Public Works**

**Jo Ann J. Macrina, PE
Commissioner
Department of Watershed Management**

**Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
Department of Procurement**



CITY OF ATLANTA

Kasim Reed
Mayor

SUITE 1900
55 TRINITY AVENUE, SW
ATLANTA, GA 30303
(404) 330-6204 Fax: (404) 658-7705
Internet Home Page: www.atlantaga.gov

DEPARTMENT OF PROCUREMENT
Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
asmith@atlantaga.gov

April 8, 2015

ATTENTION INTERESTED BIDDERS:

Your firm is hereby invited to submit to the City of Atlanta (the "City"), Department of Procurement (the "DOP"), a Bid for **FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters**. This solicitation will require the successful Bidder to provide repairs to furnish all labor, materials, tools, equipment and incidentals needed to construct new sidewalks, driveways, curbs and gutters.

A **Pre-Bid Conference** will be held on **Monday, April 20, 2015, at 11:00 A.M. EDT**, at 55 Trinity Avenue, S.W., Suite 1900 (1st Floor), City Hall South, Atlanta, Georgia 30303. The purpose of the Pre-Bid Conference is to provide Bidders with detailed information regarding the Procurement process and to address questions and concerns. There will be representatives from the Department of Public Works, Risk Management, Office of Contract Compliance and the Ethics Office available at the conference to discuss this project and to answer any questions. Attendance at the Pre-Bid Conference is strongly encouraged.

Bidders will be allowed to ask questions during the Pre-Bid Conference. However, please note that oral answers to questions during the Pre-Bid Conference are not authoritative. Authoritative responses to all written questions will be published and made available to all proponents in the form of an addendum. The deadline to submit questions in writing is **Wednesday, April 22, 2015 at 2:00 P.M. EDT**.

Your response to this Invitation to Bid ("ITB") must be received by designated staff of the Department of Procurement at 55 Trinity Avenue, S.W., Suite 1900 (1st Floor), City Hall South, Atlanta, Georgia 30303, **no later than 2:00 P.M. EDT, on Wednesday, May 13, 2015**.

****ABSOLUTELY NO BIDS WILL BE ACCEPTED AFTER 2:00 P.M. EDT****

Bids will be publicly opened and read at 2:01 P.M. EDT on the respective due date at 55 Trinity Avenue, S.W., Suite 1900 (1st Floor), City Hall South, Atlanta, Georgia 30303.

This Bid is being made available by electronic means. If accepted by such means, then the Bidder acknowledges and accepts full responsibility to insure that no changes are made to the

Invitation to Bid
FC-7908, Annual Contract for the Construction of
Sidewalks, Driveways, Curbs, and Gutters

April 8, 2015

Page 2

Bid. In the event of conflict between a version of the Bid in the Bidder's possession and the version maintained by DOP, the version maintained by the DOP shall govern.

You are required to email and confirm receipt of your business name, contact person, address, phone number, fax number, email address and the project number to Lloyd A. Richardson, Contracting Officer, at larichardson@atlantaga.gov to be placed on the Plan Holders List. Failure to do so will prevent you from receiving any addenda that are issued and may deem you non-responsive.

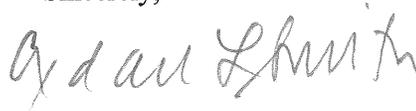
The bid document may also be obtained from the Department of Procurement, Plan Room, 55 Trinity Avenue, S.W., Suite 1900 (1st Floor), City Hall South, Atlanta, Georgia 30303, at a cost of \$200.00 per package, beginning on Wednesday, April 8, 2015. All purchased solicitation documents include a solicitation package; scope of work booklet and full size drawings (if applicable).

If you have any questions regarding this project, please contact Lloyd A. Richardson, Contracting Officer, at (404) 865-8504 or by email at larichardson@atlantaga.gov. Any questions regarding the procedure for purchasing a copy of the document or obtaining a copy of the Plan Holders List should be directed to the Plan Room at (404) 330-6204.

The City reserves the right to cancel any and all solicitations and to accept or reject, in whole or in part, any and all bids when it is for good cause and in the best interest of the City.

Thank you for your interest in doing business with the City.

Sincerely,



Adam L. Smith

ALS/lar

PART I

PART I

Section 1 – Instructions to Bidders

FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters

Table of Contents

<u>Section</u>	<u>Title</u>	<u>Page</u>
Invitation to Bid		
PART I:		
Section 1 - Instructions to Bidders		
1.	Solicitation/Not an Offer	1
2.	Receipt and Opening of Bids	1
3.	Preparation of Bids	2
4.	Georgia Utility Contractor's License	2
5.	How to Submit Bids	2
6.	Execution of Bidding Documents	3
7.	Failure to Bid	4
8.	Errors in Bids	4
9.	Disqualification of Bidders	4
10.	Rejection of Bids	5
11.	Failure to Perform	5
12.	Bid Schedule	5
13.	Bid Guarantee	5
14.	Statement of Bidders Qualifications	6
15.	Affidavit	6
16.	Equal Business Opportunity Program	6
17.	Authorization to Transact Business	7
18.	Business Non-Discrimination Policy	7
19.	Equal Employment Opportunity in Purchasing and Contracting	7
20.	Contract Employment Report	7
21.	First Source Jobs Policy Employment Agreement	7
22.	Bid Form; Bid Data; Checklist	7
23.	Wage Rates of City of Atlanta Funded Construction Projects	7
24.	Pre-Bid Inspection	8
25.	Addenda and Interpretations	8
26.	Prohibited Contacts	8
27.	Pre-Bid Conference	8
28.	Time for Receiving Bids	9
29.	Bid Modification and Withdrawal	9
30.	Bid Evaluation	9
31.	Award Criteria	10
32.	Surety Bonds	11
33.	Power of Attorney	12
34.	Insurance Requirements	13
35.	Laws and Regulations	13
36.	Agreement Terms	13

37.	Liquidated Damages	13
38.	Execution of Agreement	14
39.	Pre-Construction Conference	14
40.	Substitutions	14
41.	Illegal Immigration Reform and Enforcement Act	16
42.	Multiple Awards	16

Section 2 – Required Submittal Forms

- Form 1; Illegal Immigration Reform and Enforcement Act Forms
- Form 2; Contractor Disclosure Form
- Form 3; Bid Bond
- Form 4.1; Certification of Insurance Ability
- Form 4.2; Certification of Bonding Ability
- Form 5; Acknowledgment of Addenda
- Form 6; Bidder’s Contact Directory
- Form 7; Reference List
- Form 8; Required Submittal Checklist

PART II

Exhibit A – Draft Annual Construction Services Agreement

Exhibit B – General Conditions (N/A)

Exhibit C – Special Conditions (N/A)

Exhibit D – Bid Schedule and Pricing Information

**Exhibit E – Scope of Service
Technical Specifications**

Exhibit F – Drawings

**Exhibit G – Additional Required Submittals:
Experience Statement (Prime Contractor)
Lower Tier Experience Statement
Work in Progress
Safety and Health History Form**

Appendix A - Requirements of the Office of Contract Compliance

Appendix B – Insurance and Bonding Requirements

Appendix C - Local Bidder Preference Program

INSTRUCTIONS TO BIDDERS

1. SOLICITATION/NOT AN OFFER

This solicitation does not constitute an offer by the City of Atlanta (the “City”) to enter into an agreement and is not an offer that can be accepted by the Bidder to form an agreement. No language contained anywhere in this solicitation should be construed or interpreted to convey an offer to enter into agreement with the City. The terms of this solicitation are to be considered as a whole. However, no terms may be considered in whole or in part to constitute an offer to enter into an agreement with the City.

This solicitation is only an invitation for offers from interested Bidders and no offer shall bind the City.

This solicitation is an invitation for the Bidder to make an offer to the City in the form of a Bid. No offer made in response to the terms and conditions of this solicitation may include any terms and conditions which can bind the City to any contractual Agreement until such time as the Agreement has first been awarded by the City to the most responsible and responsive bidder whose bid meets the material requirements and criteria set forth in the solicitation and is accepted and fully executed and sealed by agents of the City designated on the signature page of the Agreement included in the solicitation. The term of your offer must conform to all applicable federal and local laws, including all ordinances of the City and all requirements of the solicitation.

YOUR OFFER IS A FIRM OFFER AND MAY NOT BE WITHDRAWN EXCEPT AS AUTHORIZED IN THE CODE OF ORDINANCES OF THE CITY OF ATLANTA.

Your response to this solicitation is a firm offer, which the City may accept or reject in whole or in part without any further action on your part. The acceptance of your offer by the City will form an Agreement, which is enforceable against you. **Your offer may not be withdrawn except under the terms and conditions specified in the Procurement and Real Estate Code of the City of Atlanta as codified in Part 5, Chapter 5 of the Code of Ordinances of the City of Atlanta or OCGA 36-91-52.**

2. RECEIPT AND OPENING OF BIDS

Sealed Bids for **FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters** will be received by designated staff of the Department of Procurement, Suite 1900, City Hall South, 55 Trinity Avenue, S.W., Atlanta, Georgia 30303, **no later than 2:00 P.M., EDT**, (as verified by the Bureau of National Standards), on **Wednesday, May 13, 2015**.

ABSOLUTELY NO BID WILL BE ACCEPTED AFTER 2:00 P.M. EDT

All Bids received by the time and date established above will be opened and publicly read.

3. PREPARATION OF BIDS

All Bids must be submitted on bid document forms supplied by the City and shall be subject to all requirements of the Agreement Documents. All Bids must be regular in every respect and no interlineations, excisions, or special conditions shall be made or included in the Bid by the Bidder.

Lump sum, unit price, and extensions of unit prices must be entered in the appropriate spaces provided on the Bid Schedule/Bid Form. Unit prices shall include an appropriate allocation of overhead and other indirect costs so that the summation of unit price extensions and lump sum items represents the total bid amount. In the case of any Bid item for which a fixed amount predetermined by the City has already been entered on the Bid Schedule, the amount so entered shall be conclusive of all Bidders as the price for such item, and shall not be revised unless the City directs a change in the Scope of Work affecting the item to which such amount relates.

The City may consider as irregular any conditional bid or any Bid on which there is an alteration of, or departure from, the Bid Schedule hereto attached and at its option may reject the same.

Erasures or other changes in the Bids must be explained or noted over the signature of the Bidder. Failure to do so shall render the Bidder as non-responsive and cause rejection of the Bid.

Failure to execute the Bid Schedule/Bid Form documents may render the Bidder as non-responsive and cause rejection of the Bid.

4. GEORGIA UTILITY CONTRACTOR'S LICENSE (REQUIRED SUBMITTAL)

The Bidder shall provide a Bidder's Georgia Utility Contractor's License Number on the outside of the Sealed Envelope. A utility Contractor's license number held by a Subcontractor or issued by another state does **NOT** fulfill this requirement in lieu of the Bidder's Georgia Utility Contractor's License. Failure to provide the Bidder's Georgia Utility Contractor License Number on the outside of the sealed envelope will result in a rejection of the Bid at the Opening. The Bidder is required to submit the certificate included in Exhibit G.

5. HOW TO SUBMIT BIDS

The Bid and required submittals, including the Bid Schedule, the Bid Documentation, the Bid Form, the acknowledgment of each Addendum, the Bid Bond Guarantee, the Power of Attorney for the attorney-in-fact signing the Bid Guarantee, the Affidavit, Office of Contract Compliance forms/certificates, and other documents as required in these Agreement documents may be photocopied for submission of Bids. **Submit (1) original and nine (9) copies of the Bid and required attachments.** In addition to the hard copy submittals, each Bidder shall submit two (2) digital versions of its Bid in Adobe Portable

Document Format (PDF) on Compact Discs (CDs). CD One (1) version should be a duplicate of the hard copy of the Bid with no deviations in order or layout of the hard copy Bid. CD Two (2) should be a redacted version of your hard copy Bid. Please refer to the Georgia Open Records Act (O.C.G.A. Section 50-18-72) for those items of documents that can be redacted.

The City assumes no liability for differences in information contained in a Bidder's printed Bid and that contained on the CDs. In the event of a discrepancy, the City will rely upon the information contained in the Bidder's printed material (Hard Copy). Each CD should be labeled with the Project Number, Project Name and the CD Number.

The complete package of Bid documents shall be enclosed in envelopes (outer and inner), both of which shall be sealed and clearly labeled with the project name and numbers, name of Bidder and date and time of bid opening in order to guard against premature opening of the Bid.

Bids must be addressed to:

Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
Department of Procurement
55 Trinity Avenue, Suite 1900
Atlanta, GA 30303-0307

6. EXECUTION OF BIDDING DOCUMENTS

Bidders shall submit their Bids, together with the bid guarantee and all forms which the Bidder is required to sign, executed in the appropriate manner as set forth below:

- a. If the Bidder is a corporation, all documents requiring execution by the Bidder shall be signed by the president or vice-president of the corporation, whose signature shall be attested by the secretary or assistant secretary of the corporation and the corporate seal affixed.
- b. If the Bidder is an individual, he or she shall sign the documents and his or her signature shall be notarized by a notary public.
- c. If the Bidder is an individual doing business under a trade name, all documents shall be signed by the Bidder whose signature shall be followed by either, "doing business as," or "trading as," followed by the trade name of the Bidder's business, and notarized by a notary public.
- d. If the Bidder is a partnership, all forms shall be executed by placing the name of the partnership followed by "By: (the name of the partner executing)" followed by the word "Partner," and notarized by a notary public.

- e. If the Bidder is a joint venture, each party to the joint venture shall execute the Bidding Documents in the manner set forth in items a, b, c, or d of this article of the Instructions to Bidders as appropriate for this type of organization.

If the Bidder is a Joint Venture, all other documents in the Bidding Documents shall be executed by one of the parties to the joint venture, as provided by Article 4 of the Joint Venture Statement, in the same manner as the executed said Joint Venture Statement.

7. FAILURE TO BID

Your failure to respond to this Invitation to Bid may result in the removal of your company from the City's Bid list.

8. ERRORS IN BIDS

Bidders and their authorized representatives are expected to fully familiarize themselves with the conditions, requirements, and Specifications before submitting Bid. Failure to do so will be at the Bidder's own risk. In case of error in extension or prices in the Bid, the unit prices(s) shall govern.

9. DISQUALIFICATION OF BIDDERS

Any of the following may be considered as sufficient for disqualification of a Bidder and the rejection of the Bid:

- a. Submission of more than one Bid for the same work by an individual, firm, partnership or Corporation under the same or different name(s);
- b. Evidence of collusion among Bidders;
- c. Previous participation in collusive bidding on Work for the City;
- d. Submission of an unbalanced Bid, in which the prices quoted for same items are out of proportion to the prices for other items;
- e. Lack of competency of Bidder (the Agreement will be awarded only to a Bidder(s) rated as capable of performing the Work; the City may declare any Bidder ineligible at any time during the process of receiving Bids or awarding the Agreement where developments arise which, in the opinion, the City adversely affect the Bidder's responsibility; however, the Bidder will be given an opportunity by the City to present additional evidence before final action is taken;
- f. Lack of responsibility as shown by past Work judged from the standpoint of workmanship and progress; financial irresponsibility, including but not limited to, leaving retainage in City account;

- g. Uncompleted Work for which the Bidder is committed by Agreement, which in the judgment of the City, might hinder or prevent the prompt completion of Work under this Agreement if awarded to such Bidder; and
- h. Being in arrears on any existing or prior contracts with the City or in litigation with the City thereon or having defaulted on a previous contract with the City.

10. REJECTION OF BIDS

Bids may be considered irregular and may be rejected if they show omissions, alterations of forms, addition not called for, conditions limitations, unauthorized alternate Bids or other irregularities of any kind. The City reserves the right to waive any informalities or irregularities of Bids.

11. FAILURE TO PERFORM

If for any reason the Contractor fails to perform any of the Work required by the Specifications, or if the Work performed is not as specified, the City reserves the absolute right to have such Work performed by other persons and deduct the cost thereof from the Bid price of the company under Agreement.

12. BID SCHEDULE (REQUIRED SUBMITTAL)

Unit prices shall include an appropriate allocation of overhead, other indirect costs and profits so that the summation of unit price extensions and lump sum items represents the total Bid amount. In the case of any Bid item for which a fixed amount predetermined by the City has already been entered on the Bid Schedule, the amount so entered shall be conclusive of all Bidders as the price for such item, and shall not be revised unless the City directs a change in the Scope of the Work affecting the item to which such amounts relates. Award will be based on the total fixed unit cost for all items aggregated.

13. BID GUARANTEE (REQUIRED SUBMITTAL)

Bidders are required to furnish a Bid Guarantee in the amount of One Hundred Thousand Dollars and Zero Cents (\$100,000.00). Bidders offering alternative Bids shall provide a guaranty for the largest total Bid amount. At the option of the Bidder, the guaranty may be a certified check payable to the order of the City or a bid bond in the form attached. The bid bond shall be secured by a guaranty or a surety company listed in the latest issue of U.S. Treasury Circular 570. The amount of such bid bond shall be within the maximum amount specified for such company in Circular 570. No Bid shall be considered unless it is accompanied by the required guaranty. Bid Guarantee shall insure the execution of the Agreement and the furnishing of the performance and payment bonds and insurance by the successful Bidder as required by the Agreement Documents. The Bid Guarantee of the Bidders submitting the five (5) lowest total Bid amounts for the Agreement will be retained either until the successful Bidder has signed the Agreement and furnished performance and payment bonds and certificates of insurance, or until the ninetieth (90th) calendar day after the Bid opening date, whichever is sooner. Other Bid Guarantees will be returned within ten

(10) calendar days after the Bid opening date. Bid Guarantees being held pending the signing of the Agreement and furnishing other documents will be returned within three (3) calendar days thereafter. Each Bidder agrees that if it is awarded the Agreement and fails within the time stipulated to execute the Agreement and to furnish the other documents required, the City will retain the Bid Guarantee as liquidated damages and not as a penalty.

Attorneys-in-fact who sign bid bonds must file with the bond a certified and effectively dated copy of their power of attorney.

14. STATEMENT OF BIDDER'S QUALIFICATIONS (REQUIRED SUBMITTAL)

The statement of Bidder's Qualifications must be filled out completely, signed by the Bidder, and notarized.

The City shall have the right to require such additional information, as it deems necessary to evaluate the ability of the Bidder to successfully perform the Work.

The City reserves the right to reject any Bidder who does not satisfy the City as to his ability to successfully perform the Work, previous pre-qualification notwithstanding.

The cause for rejection shall include:

- a. Non-compliance of the Bidder with the requirements of an equal employment opportunity in contracting program as may be prescribed by ordinance;
- b. Non-compliance by the Bidder with the requirements of a minority and female business enterprise participation program as may be prescribed;
- c. Inadequate quality, availability and adaptability of the supplies or services to the particular use required; or
- d. Unacceptable number and scope of conditions attached to the Bid by the Bidder, if any.

15. AFFIDAVIT (REQUIRED SUBMITTAL)

Affidavits must be filled in completely, signed by the Bidder, and notarized. Violation of the statements set forth in this affidavit may be grounds for rejection of Bid, or termination of Agreement by the City, as appropriate, as well as other appropriate remedies as provided by local, state, and federal statutes.

16. EQUAL BUSINESS OPPORTUNITY PROGRAM (REQUIRED SUBMITTAL)

The Bidder shall complete the Equal Business Opportunity (“**EBO**”) Program documents in accordance with the instructions included in Appendix A, Requirements of the Office of Contract Compliance and shall properly execute the documents.

A determination by the City that misstatements have been made by the Bidder in this document shall cause rejection of Bid or termination of Agreement, as appropriate and shall be grounds for other remedies available under City ordinances, and state or federal statutes.

17. AUTHORIZATION TO TRANSACT BUSINESS (REQUIRED SUBMITTAL)

Each Bidder must submit with its Bid documentation that demonstrates it is duly authorized to conduct business in the State of Georgia. If the Contractor is a corporation or corporations combined to form a joint venture, the corporation or members of the joint venture team, prior to Agreement execution, must submit documentary evidence from the Secretary of State that the corporation is in good standing and that the corporation is authorized to transact business in the State of Georgia.

18. BUSINESS NON-DISCRIMINATION POLICY

The City prefers to do business with firms or institutions that include representation of minorities and women at all levels.

19. EQUAL EMPLOYMENT OPPORTUNITY (“EEO”) IN PURCHASING AND CONTRACTING

To be eligible for award of this Agreement, the Bidder(s) must certify and fully comply with the requirements, terms, and conditions of the section on EEO.

20. CONTRACT EMPLOYMENT REPORT

Upon award of an Agreement with the City, the successful Bidder must submit a Contract Employment Report (“**CER**”) and supplemental information as required to comply with the paragraph, “Monitoring of EEO Policy, Requirements of the Office of Contract Compliance”.

21. FIRST SOURCE JOBS POLICY EMPLOYMENT AGREEMENT (REQUIRED SUBMITTAL LOCATED IN APPENDIX A)

The Bidder shall acknowledge and implement the First Source Jobs Policy.

22. BID FORM; BID DATA; CHECKLIST (REQUIRED SUBMITTALS)

The Bidder must complete and execute these sections of the Bidding documents.

23. WAGE RATES OF CITY OF ATLANTA FUNDED CONSTRUCTION PROJECTS

Contractor is Responsible for all Federal and State government wage requirements.

24. PRE-BID INSPECTION

Prior to submission of a Bid, the Bidder shall have made a thorough examination of the Work Site. The Bidder shall become informed as to the nature of the proposed construction, the kind of facilities required to carry out the construction, labor conditions, and all other matters that may affect the cost and time of completion of the Work upon which it bids.

The Bidder shall make itself familiar with all of the Agreement documents and other instructions before submitting its Bid, in order that no misunderstanding shall exist in regard to the nature and character of the Work to be done. No allowance shall be made for any claims that the Bid is based on incomplete information as to the nature and character of the site or the Work involved.

The Contractor, by execution of the Agreement, shall in no way be relieved of any obligation under it due to its failure to receive or examine any form or legal instrument or to visit the site and acquaint itself with the conditions there existing, and the City shall be justified in rejecting any claims based on facts regarding that which the Contractor should have known as a result thereof.

25. ADDENDA AND INTERPRETATIONS

All questions by prospective Bidders as to the interpretations of the Bidding Documents must be submitted in writing to: Lloyd A. Richardson, Contracting Officer, City of Atlanta, Department of Procurement, 55 Trinity Avenue, S.W. Suite 1900, Atlanta, Georgia 30303, or faxed to (404) 865-8504 or emailed to LARichardson@atlantaga.gov, and must be received by **Wednesday, April 22, 2015 at 2:00 P.M. EDT**. Every interpretation made to a Bidder will be in the form of an addendum to the Bidding Documents, and when issued, will be on file in the Department of Procurement. In addition, all addenda will be mailed to each person holding Bidding Documents, but it shall be the Bidder's responsibility to make inquiry as to the addenda issued. All such addenda shall become part of the Agreement and all Bidders shall be bound by such addenda, whether or not received by the Bidders.

The City shall not be bound by any information, explanation, clarification, or any interpretation, oral or written, by whosoever made, that is not incorporated into an addendum to the Bidding Documents. No response shall be made to inquiries received later than **2:00 P.M. EDT on Wednesday, April 22, 2015**.

26. PROHIBITED CONTACTS

Any questions regarding this ITB should be submitted in writing to City's contact person, **Lloyd A. Richardson**, Contracting Officer, Department of Procurement, 55 Trinity Avenue, SW, Suite 1900, Atlanta, Georgia 30303-0307 or e-mail larichardson@atlantaga.gov. All Bidders and representatives of any Bidder are strictly prohibited from contacting any other City employees or any third-party representatives of City on any matter having to do with this ITB. All communications by any Bidder concerning this ITB must be made to the City's

contact person, or any other City representatives designated by the Chief Procurement Officer in writing.

27. PRE-BID CONFERENCE

A Pre-bid Conference will be held on **Monday, April 20, 2015, at 11:00 A.M. EDT**, in Suite 1900, Department of Procurement, 55 Trinity Avenue, S.W., Atlanta, Georgia 30303. At that time, the general requirements of the project will be discussed. Any additional questions raised by Bidders will be discussed. Any additional questions raised by Bidders will be discussed. It is **strongly** encouraged that all Bidders attend the Pre-bid Conference.

General requirements of the project will be discussed at the Pre-bid Conference. Also discussed will be questions regarding preparation and submission of Bids and general contractual requirements. Bidders will be allowed to ask questions. **Oral answers to questions during the Pre-bid Conference will not be authoritative.**

It should be emphasized that nothing stated or discussed during the course of this Conference or the Site Visit shall be considered to modify, alter or change the requirements of the Bidding Documents, unless it shall be subsequently incorporated into an addendum to the Bidding Documents.

28. TIME FOR RECEIVING BIDS

Sealed Bids for this project will be received by designated staff of the Department of Procurement, Suite 1900, City Hall South, 55 Trinity Avenue, S.W., Atlanta, GA 30303, no later than 2:00 P.M. EDT, (as verified by the Bureau of National Standards) on **Wednesday, May 13, 2015. ABSOLUTELY NO BIDS WILL BE RECEIVED AFTER 2:00 P.M. EDT ON THE RESPECTIVE DATE.** All Bids received by the time and date set forth will be opened publicly and read at **2:01 P.M. EDT** in the Department of Procurement Bid Conference Room, Suite 1900, at the aforementioned address.

Bids received prior to the advertised hour of opening will be kept secured and sealed. The contracting officer whose duty it is to open them will decide when the specified time has arrived, and no Bid received thereafter will be considered, except that when a Bid arrives by mail after the time fixed for opening, but before the reading of all other Bids is completed, and it is shown to the satisfaction of the City that the non-arrival on time was due solely to delay in the mail for which the Bidder was not responsible, such Bid will be received and considered.

29. BID MODIFICATION AND WITHDRAWAL

Bids may be modified after they have been submitted, but only before the Bid opening date and time. Modifications must be signed by the Bidder and must be received by the City no later than the Bid opening time and date. Modifications should not reveal the total Bid amount, but should identify the addition and subtraction or other modification in a manner in which the prices will not be known by the City until the sealed Bid is opened.

Bids may be withdrawn after they have been submitted, but only before the Bid opening date and time. Withdrawn bids may be resubmitted, but only in the manner in which the Bid was originally submitted. Withdrawals must be signed as stipulated above for modification. Bids may not be withdrawn between the Bid opening time and one hundred and eighty (180) calendar days thereafter, except as may be agreed upon by a written agreement between the Bidder and the City.

30. BID EVALUATION

- a. Each Bid timely received and in the City's hands at the time set forth for the Bid opening shall constitute an offer to perform the Agreement on the terms and conditions thereof, in strict accordance with the Agreement documents, and all other requirements, all for the Bid total. For good cause and valuable consideration, the sufficiency of which is acknowledged by submittal of a Bid, each Bidder promises and agrees that its Bid shall be irrevocable for a period of *one hundred eighty (180) calendar days* after the Bid opening and will not be withdrawn or modified during that time. The City may accept any Bid by giving the Bidder Written Notice of acceptance during that time. If necessary, the period of time specified may be extended by written agreement between the City and the Bidder or Bidders concerned.
- b. After the Bids have been opened and before any award is made, the City will evaluate the Bid process, the Bid total, the supplements to the Bid form, Bidder's experience, financial data, Local Preference Program, proposed Subcontractors and equipment manufacturers and other data relating to Bidders' responsibility and qualifications to perform the Agreement satisfactorily.
- c. All extension of the unit prices shown and the subsequent addition of extended amounts may be verified by the City. In the event of a discrepancy between the unit price bid and the extension, the unit price will be deemed intended by the Bidder and the extension shall be adjusted. In the event of a discrepancy between the sum of the extended amounts and the bid total, the sum of the extended amounts shall govern.
- d. Bidder may be required to submit, in writing, the addresses of any proposed Subcontractors or equipment manufacturers listed on the Bid, and to submit other material information relative to proposed Subcontractors or Equipment manufacturers. The City reserves the right to disapprove any proposed Subcontractor or equipment manufacturers whose technical or financial ability or resources or whose experience are deemed inadequate.
- e. The City reserves the right to reject any Bid the prices of which appear to be unbalanced, and to reject any or all Bids, or parts thereof, if it determines, in its sole discretion, that such rejection is in the best interest of the City. Where only a single responsible and responsive Bid is received, the City may in its sole discretion, elect to conduct a price or cost analysis of the Bid. Such Bidder shall cooperate with such analysis and provide such supplemental information as may be required. The determination whether to enter into an Agreement with such sole Bidder shall be solely within the City's discretion and not dependent upon performance of a price or cost analysis.

- f. Bids will be evaluated on the basis of determining the lowest Bid total of a Bidder, not including alternates, whose Bid is responsive to the Invitation to Bid and who is determined to be technically, financially and otherwise responsible to perform the Agreement satisfactorily, and to meet all other requirements of the Bidding Documents relating thereto. Any Bid may be rejected if it is determined by the City to be non-responsive, provided, however, that the City reserves the right to waive any irregularities or technicalities which it determines, within its sole discretion, to be minor in nature and in the interest of the public. Furthermore, any Bid may be rejected if it is determined by the City, in its sole discretion, that the bidder is not capable of performing the Agreement satisfactorily based upon review of its experience and technical and financial capabilities, or the failure of such bidder to provide information requested relating to such determination. Additionally, the City reserves the right to disqualify Bids, before and after the bid opening, upon evidence of collusion with intent to defraud or other illegal practices upon the part of any Bidder(s).
- g. The City intends to award the Agreement at the earliest practicable date to the lowest responsive, responsible Bidder(s), provided that the Bid is within the funds available for the project. The City reserves the right to award the Agreement to multiple Bidders. In addition, the City reserves the right to reject any and/or all Bids if it determines, in its sole discretion, that the public interest will be best served by doing so.
- h. A Pre-award Conference may be conducted with the apparent low Bidder(s) to review general requirements of the Bidding Documents.

31. AWARD CRITERIA

Award will be made after evaluating the prices, responsiveness and responsibility of each Bidder.

- a. The **responsiveness** of a Bidder is determined by the following:
 - 1. A timely and effective delivery of all services, materials, documents, and/or other information required by the City;
 - 2. The completeness of all material, documents and/or information required by the City; and
 - 3. The notification of the City of methods, services, supplies and/or equipment that could reduce cost or increase quality.
- b. The **responsibility** of a Bidder is determined by the following:
 - 1. The ability, capacity and skill of the Bidder to perform the Agreement or provide the Work required;
 - 2. The capability of the Bidder to perform the Agreement or provide the Work promptly, or within the time specified without delay or interference;

3. The character, integrity, reputation, judgment, experience and efficiency of the Bidders;
4. The quality of performance of previous contracts or work;
5. The previous existing compliance by the Bidder with laws and ordinances relating to the Agreement or Work;
6. The sufficiency of the financial resources and ability of the Bidder to perform Agreement or provide the Work;
7. The compliance of the Bidder with the requirements of Division II, Equal Employment Opportunity (EEO), and Division 12, Minority and Female Business Enterprises, of the City's Department of Procurement;
8. The quality, availability and adaptability of the supplies or contractual Work to the particular use required; and
9. The successful Bidder shall assume full responsibility for the conduct of his agents and/or employees during the time such agents or employees are on the premises for the purpose of performing the Work herein specified.

32. SURETY BONDS

Regarding submission of surety bonds prior to or subsequent to the Bid submission, the following requirements pertain:

- a. Any surety bond submitted in accordance with the Bid or Agreement requirements must be issued by a corporate surety company satisfactory to the City and authorized to act as such in the State of Georgia;
- b. Such bonds shall conform to the forms provided with the Bid Documents and be completed in accordance with the instructions thereon; and
- c. In accordance with Georgia law, and upon award of the Agreement, separate performance and payment bonds shall be required of the successful Bidder, each in an amount not less than the total amount payable under the Agreement.

The performance bond shall remain in effect for one (1) year after final acceptance of the Work or the guaranty period under the Agreement, whichever is the larger.

The payment bond shall remain in effect for the period required under Georgia law for the payment bonds on public construction agreements. Reference is made to the bond forms and the Agreement Documents for additional particulars of the terms required in the bonds. In the case of any inconsistency between the Bond Forms and Georgia law, the law shall control. Finally, alterations, extension of the time allowed for performance, extra and

additional Work, and other changes authorized under the Agreement may be made without notice to or consent of the surety or sureties.

33. POWER OF ATTORNEY

Attorneys-in-fact who sign agreement bonds must file with each bond a certified copy of their power of attorney with the appropriate effective date.

34. INSURANCE REQUIREMENTS

Bidders must provide a copy of a current certificate of insurance evidencing any existing commercial general liability policies issued for Bidder, if any. For purposes of this section, "Bidder" shall mean an individual, corporation or other corporate entity submitting a bid in connection with this solicitation, including each joint venture partner if Bidder is a joint venture.

The Contractor shall procure and maintain during the life of this Agreement, Workmen's Compensation, Public Liability, Property Damage, Automobile Liability insurance and any other insurance necessary to satisfy the requirements of the Agreement Documents.

35. LAWS AND REGULATIONS

The Bidder's attention is directed to the fact that 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 Agreement throughout, to the extent that such requirements do not conflict with federal laws or regulations, and they will be deemed to be included in the Agreement the same as though therein written out in full.

Bidder's attention is directed to the following laws and regulations:

- a. Wages under this Agreement must not be less than the minimum wage rates specified for Atlanta-funded projects as set forth in these documents;
- b. Applicable provisions of the Occupational Safety and Health Act ("OSHA") must be observed during Work under this Agreement; and
- c. Appendix A – Requirements of the Office of Contract Compliance.

36. AGREEMENT TERMS

The terms of this Agreement shall be for a period of two (2) years with the option to renew for three (3) additional one (1) year periods.

37. LIQUIDATED DAMAGES

The performance of the Work under Agreement within the specified time is essential to the City's economic interests. The attention of potential Bidders is directed to the provisions of

the Agreement Documents, which establish the basis for liquidated damages to be paid to the City in the event that the Work is not completed on schedule.

38. EXECUTION OF AGREEMENT

Subsequent to the award and within five (5) days after the prescribed forms are presented for signature, the successful Bidder shall execute and deliver to the City **seven (7) copies** of the City-Contractor Agreement as included in the Agreement Documents and provide performance and payment bonds and insurance certificates. The failure of the successful Bidder to execute the City-Contractor Agreement and to supply the required bonds within five (5) days after the prescribed forms are presented for signature, or within such extended period as the City may grant, based upon reasons determined sufficient by the City, shall constitute a default, and the Bidder shall forfeit the Bid Guarantee and the City may either award the Agreement to the next lowest responsive Bidder or re-advertise for Bids, and may proceed against the bid bond of the defaulted Bidder. If a more favorable Bid is received by re-advertising, the defaulting Bidder shall have no claim against the City for a refund.

39. PRE-CONSTRUCTION CONFERENCE

A pre-construction conference may be held with the successful Bidder(s) and all known Subcontractors at a time and place set by the City.

40. SUBSTITUTIONS

Whenever a material, article, or piece of equipment is identified on the Plans or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers, etc., it is intended to establish a standard, and any material, article, or equipment of other manufacturers and vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable, provided the material, or equipment so proposed is, in the opinion of the Engineer, of equal substance and function. It shall not be purchased or installed by the Contractor without the Engineer's written approval.

Whenever the design is based on a specific product of a particular manufacturer or manufacturers, the manufacturer(s) will be shown on the Drawings and/or listed in the Specifications. Any item other than those so designated shall be considered a substitution.

If the manufacturer is named in the Drawings and/or detailed specifications as an approved manufacturer, products of that manufacturer meeting all Specification requirements are acceptable.

Approval of any substitution will be made under the following provisions:

- a. If the term "OR EQUAL" follows the names of approved manufacturers, then other manufacturers desiring approval may submit the product to the Engineer for approval during the bidding phase. The manufacturer should include the following items in this pre-submittal:

1. Descriptive literature, including information on materials used, minimum design standards features, manufacturing processes and facilities, and similar information, which will indicate experience and expertise in the manufacture of the product being evaluated;
2. Performance specifications applicable to the manufacturer's standard design, which indicate the level of performance to be expected from the product;
3. A complete set of submittal Drawings of similar equipment that has been completed and placed into operation;
4. A list of existing installations of equipment similar in type and size;
5. Evidence of technical ability of the manufacturer to design and manufacture Equipment and systems meeting project requirements. Evidence submitted shall include, at a minimum, descriptions of engineering and manufacturing staff capabilities;
6. Information required to satisfy specified experience requirements or a copy of the bond to be submitted in lieu of experience;
7. A complete description of field service capabilities, including the location of field service facilities which would serve the proposed facility and the number and qualifications of personnel working from that location;
8. A complete list of all requirements of the Drawings and Specifications with which the manufacturer cannot conform, including reasons why alternate features are considered equivalent; and
9. All other information necessary to fully evaluate the product for consideration.

- b. This pre-submittal shall reach the Engineer no later than three (3) weeks prior to the Bid date. Manufacturers will be advised of approval or rejection in writing no later than fourteen (14) days prior to the Bid date. Rejected submittals may be supplemented with additional information and resubmitted no later than one (1) week prior to the bid date. Manufacturers making supplementary submittals will be advised of approval or rejection in writing no later than three (3) days prior to the bid date.

NOTE: Bids based on equipment, which has not received the approval of the Engineer, will render the Bidder as non-responsive and cause rejection of the Bid.

- c. If the term "EQUAL TO" precedes the names of approved manufacturers in the Specifications, the Contractor may, after receiving the Notice to Proceed, submit Shop Drawings on the substitute product for the approval of the Engineer in accordance with General Condition 28.

Any Bidder intending to furnish substitute products is cautioned to verify that the item being furnished will perform the same functions and have the same capabilities as the item specified. The Bidder shall include in his bid the cost of accessory items, which may be required by the substitute product and any architectural, structural, mechanical, piping, electrical or other modifications required to accommodate the substitution.

Approval of the Engineer is dependent on his determination that the product offered is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based, and will require no major modifications to structures, electrical systems, control systems, or piping systems.

41. ILLEGAL IMMIGRATION REFORM AND ENFORCEMENT ACT

Each Bidder must complete and submit a Contractor's Affidavit attached hereto as Exhibit B; Illegal Immigration Reform and Enforcement Act Forms with its bid. This ITB is subject to the Illegal Immigration Reform and Enforcement Act of 2011 (the "ACT"). Pursuant to the Act, the Bidder must provide with its proposal proof of its registration with and continuing and future participation in the E-Verify Program established by the United States Department of Homeland Security. Under state law, the City cannot consider any proposal which does not include a complete Contractor's Affidavit. It is not the intent of this notice to provide detailed information or legal advice concerning the Illegal Immigration Reform and Enforcement Act. All bidders/proponents intending to do business with the City are responsible for independently apprising themselves and complying with the requirements of that law and its effect on City procurements and their participation in those procurements. For additional information on the E-Verify program or to enroll in the program, go to: <https://e-verify.uscis.gov/enroll>.

42. MULTIPLE AWARDS

The City reserves, at its sole discretion, the option to award to multiple Bidders. The award(s) will be based on the Scope of Work in its entirety or by components. Multiple awards may be made on the total Scope of Work or to components of the Scope of Work.

+++ END OF INSTRUCTIONS TO BIDDERS +++

PART I

Section 2 – Required Submittals

Required Submittal (FORM 1)

Illegal Immigration Reform and Enforcement Act Forms (Page 1 of 3)

INSTRUCTIONS TO BIDDERS:

All Bidders must comply with the Illegal Immigration Reform and Enforcement Act of 2011, O.G.G.A § 13-10-90, et seq. (IIREA). IIREA was formerly known as the Georgia Security and Immigration Compliance Act or GSICA. Bidders must familiarize themselves with IIREA and are solely responsible for ensuring compliance. Bidders must not rely on these instructions for that purpose. They are offered only as a convenience to assist Bidders in complying with the requirements of the City's procurement process and the terms of this ITB.

1. The attached Contractor Affidavit must be filled out COMPLETELY and submitted with the Bid prior to Bid due date.
2. The Contractor Affidavit must contain an active Federal Work Authorization Program (E-Verify) User ID Number and Date of Registration.
3. Where the business structure of a Bidder is such that Bidder is required to obtain an Employer Identification Number (EIN) from the Internal Revenue Service, Bidder must complete the Contractor Affidavit on behalf of, and provide a Federal Work Authorization User ID Number issued to, the Bidder itself. Where the business structure of a Bidder does not require it to obtain an EIN, each entity comprising Bidder must submit a separate Contractor Affidavit.

Example 1, ABC, Inc. and XYZ, Inc. form and submit a Bid as Happy Day, LLC. Happy Day, LLC must enroll in the E-verify program and submit a single Contractor Affidavit in the name of Happy Day, LLC which includes the Federal Work Authorization User ID Number issued to Happy Day, LLC.

Example 2, ABC, Inc. and XYZ, Inc. execute a joint venture agreement and submit a Bid under the name Happy Day, JV. If, based on the nature of the JV agreement, Happy Day, JV. is not required to obtain an Employer Identification Number from the IRS, the Bid submitted by Happy Day, JV must include both a Contractor Affidavit for ABC, Inc. and a Contractor Affidavit for XYZ, Inc.

4. All Contractor Affidavits must be executed by an authorized representative of the entity named in the Affidavit.
5. All Contractor Affidavits must be duly notarized.
6. All Contractor Affidavits must be submitted with the Bidder's Response to the ITB.
7. Subcontractor and sub-subcontractor affidavits are not required at the time of Bid submission, but will be required at contract execution or in accordance with the timelines set forth in IIREA.

Required Submittal (FORM 1)

Illegal Immigration Reform and Enforcement Act Forms (Page 2 of 3)

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of the City of Atlanta has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Contractor: _____

Name of Project: **FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters**

Name of Public Employer: City of Atlanta

I hereby declare under penalty of perjury that the forgoing is true and correct.

Executed on _____, ____, 20__ in _____ (city), _____ (state)

Signature of Authorized Officer or Agent

Printed name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE
ME ON THIS THE ____, DAY OF _____, 20____

NOTARY PUBLIC
My Commission Expires: _____

Required Submittal (FORM 1)

Illegal Immigration Reform and Enforcement Act Forms (Page 3 of 3)

Subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(3)

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with (_____ (name of contractor)) on behalf of the City of Atlanta has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the subcontractor with the information required by O.C.G.A. § 13-10-91(b). Additionally, the undersigned subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the contractor within five business days of receipt. If the undersigned subcontractor receives notice of receipt of an affidavit from any sub-subcontractor that has contracted with a sub-subcontractor to forward, within five business days of receipt, a copy of such notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Subcontractor: _____

Name of Project: **FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters**

Name of Public Employer: City of Atlanta

I hereby declare under penalty of perjury that the forgoing is true and correct.

Executed on _____, _____, 20__ in _____ (city), _____ (state)

Signature of Authorized Officer or Agent

Printed name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE
ME ON THIS THE ____, DAY OF _____, 20____

NOTARY PUBLIC
My Commission Expires: _____

Required Submittal (FORM 2)
Contractor Disclosure Form (Page 1 of 7)

DEFINITIONS FOR THE PURPOSES OF THIS DISCLOSURE AFFIDAVIT

“Affiliate”	Any legal entity that, directly or indirectly through one of more intermediate legal entities, controls, is controlled by or is under common control with the Respondent or a member of Respondent.
“Contractor”	Any person or entity having a contract with the city.
“Control”	The controlling entity: (i) possesses, directly or indirectly, the power to direct or cause the direction of the management and policies of the controlled entity, whether through the ownership of voting securities or by contract or otherwise; or (ii) has direct or indirect ownership in the aggregate of fifty one (51%) or more of any class of voting or equity interests in the controlled entity.
“Respondent”	Any individual or entity that submits a Bid in response to a solicitation. If the Respondent is an individual, then that individual must complete and sign this Disclosure Affidavit where indicated. If the Respondent is an entity, then an authorized representative of that entity must complete and sign this Disclosure Affidavit where indicated. If the Respondent is a newly formed entity (formed within the last three years), then an authorized representative of that entity must complete and sign this Disclosure Affidavit where indicated, and each of the members or owners of the entity must also complete and sign separate Disclosure Affidavits where indicated.

Instructions: Provide the following information for the entity or individual completing this Statement (the “Individual/Entity”).

A. Basic Information:

1. Name of Individual/Entity responding to this solicitation:

2. Name of the authorized representative for the responding Entity:

B. Individual/Entity Information:

1. Principal Office Address:
2. Telephone and Facsimile Numbers:
3. E-Mail Address:
4. Name and title of Contact Person for the Individual/Entity:
5. Is the individual/Entity authorized to transact business in the state of Georgia?

Yes (Attach Certificate of Authority to transact business in Georgia from Georgia Secretary of State.)

No

Required Submittal (FORM 2)
Contractor Disclosure Form (Page 2 of 7)

C. Questionnaire

If you answer "YES" to any of the questions below, please indicate the name(s) of the person(s), the nature, and the status and/or outcome of the information, indictment, conviction, termination, claim or litigation, the name of the court and the file or reference number of the case, as applicable. Any such information should be provided on a separate page, attached to this form and submitted with your Bid.

1. Please describe the general development of the Respondent's business during the past ten (10) years, or such shorter period of time that the Respondent has been in business.

2. Are there any lawsuits, administrative actions or litigation to which Respondent is currently a party or has been a party (either as a plaintiff or defendant) during the past ten (10) years based upon fraud, theft, breach of contract, misrepresentation, safety, wrongful death or other similar conduct? **YES** **NO**

3. If "yes" to question number 2, were any of the parties to the suit a bonding company, insurance company, an owner, or otherwise? If so, attach a sheet listing all parties and indicate the type of company involved. **YES** **NO**

4. Has the Respondent been charged with a criminal offense within the last ten (10) years? **YES** **NO**

5. Has the Respondent received any citations or notices of violation from any government agency in connection with any of Respondent's work during the past ten (10) years (including OSHA violations)? Describe any citation or notices of violation which Respondent received. **YES** **NO**

6. Please state whether any of the following events have occurred in the last ten (10) years with respect to the Respondent. If any answer is yes, explain fully the circumstances surrounding the subject matter of the affirmative answer:
 - (a) Whether Respondent, or Affiliate currently or previously associated with Respondent, has ever filed a petition in bankruptcy, taken any actions with respect to insolvency, reorganization, receivership, moratorium or assignment for the benefit of creditors, or otherwise sought relief from creditors? **YES** **NO**

 - (b) Whether Respondent was subject of any order, judgment or decree not subsequently reversed, suspended or vacated by any court permanently enjoining Respondent from engaging in any type of business practice? **YES** **NO**

 - (c) Whether Respondent was the subject of any civil or criminal proceeding in which there was a final adjudication adverse to Respondent which directly arose from activities conducted by Respondent. **YES** **NO**

Required Submittal (FORM 2)
Contractor Disclosure Form (Page 3 of 7)

7. Has any employee, agent or representative of Respondent who is or will be directly involved in the project, in the last ten (10) years:

(a) directly or indirectly, had a business relationship with the City?

YES **NO**

(b) directly or indirectly, received revenues from the City?

YES **NO**

(c) directly or indirectly, received revenues from conducting business on City property or pursuant to any contract with the City?

YES **NO**

8. Whether any employee, agent, or representative of Respondent who is or will be directly involved in the project has or had within the last ten (10) years a direct or indirect business relationship with any elected or appointed City official or with any City employee?

YES **NO**

9. Whether Respondent has provided employment or compensation to any third party intermediary, agent, or lobbyist to directly or indirectly communicate with any City official or employee, or municipal official or employee in connection with any transaction or investment involving your firm and the City?

YES **NO**

10. Whether Respondent, or any agent, officer, director, or employee of your organization has solicited or made a contribution to any City official or member, or to the political party or political action committee within the previous five (5) years?

YES **NO**

11. Has the Respondent or any agent, officer, director, or employee been terminated, suspended, or debarred (for cause or otherwise) from any work being performed for the City or any other Federal, State or Local Government?

YES **NO**

12. Has the Respondent, member of Respondent's team or officer of any of them (with respect to any matter involving the business practice or activities of his or her employer been notified within the five (5) years preceding the date of this offer that any of them are the target of a criminal investigation, grand jury investigation, or civil enforcement proceeding?

YES **NO**

13. Please identify any Personal or Financial Relationships that may give rise to a conflict of interest as defined below [*Please be advised that you may be ineligible for award of contract if you have a personal or financial relationship that constitutes a conflict of interest that cannot be avoided*]:

(a) Personal relationships: executives, board members and partners in firms submitting offers must disclose familial relationships with employees, officers and elected officials of the City of Atlanta. Familial relationships shall include spouse, domestic partner registered under section 94-133, mother, father, sister, brother, and natural or adopted children of an official or employee.

YES **NO**

(b) Financial relationships: Respondent must disclose any interest held with a City employee or official, or family members of a City employee or official, which may yield, directly or indirectly, a monetary or other material benefit to the Respondent or the Respondent's family members. Please describe:

YES **NO**

Required Submittal (FORM 2)
Contractor Disclosure Form (Page 4 of 7)

D. REPRESENTATIONS

Anti-Lobbying Provision. All respondents, including agents, employees, representatives, lobbyists, attorneys and proposed partner(s), subcontractor(s) or joint venturer(s), will refrain, under penalty of the respondent's disqualification, from direct or indirect contact for the purpose of influencing the selection or creating bias in the selection process with any person who may play a part in the selection process.

Certification of Independent Price Determination/Non-Collusion. Collusion and other anticompetitive practices among offerors are prohibited by city, state and federal laws. All Respondents shall identify a person having authority to sign for the Respondent who shall certify, in writing, as follows:

"I certify that this Bid is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting an bid or offer for the same supplies, labor, services, construction, materials or equipment to be furnished or professional or consultant services, and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of city, state and federal law and can result in fines, prison sentences, and civil damages awards. By signing this document, I agree to abide by all conditions of this solicitation and offer and certify that I am authorized to sign for this Respondent/Offeror."

Certify Satisfaction of all Underlying Obligations. (If Applicable) If a Contract is awarded through this solicitation, then such Contractor should know that before final payment is made to a Contractor by the City, the Contractor shall certify to the City in writing, in a form satisfactory to the City, that all subcontractors, materialmen suppliers and similar firms or persons involved in the City contract have been paid in full at the time of final payment to the Contractor by the City or will be paid in full utilizing the monies constituting final payment to the Contractor.

Confidentiality . Details of the Bids will not be discussed with other respondents during the selection process. Respondent should be aware, however, that all Bids and information submitted therein may become subject to public inspection following award of the contract. Each respondent should consider this possibility and, where trade secrets or other proprietary information may be involved, may choose to provide in lieu of such proprietary information, an explanation as to why such information is not provided in its Bid. However, the respondent may be required to submit such required information before further consideration.

Equal Employment Opportunity (EEO) Provision. All bidders will be required to comply with sections 2-1200 and 2-1414 of the City of Atlanta Code of Ordinances, as follows: During the performance of the agreement, the Contractor agrees as follows:

- a. The Contractor shall not discriminate against any employee, or applicant for employment, because of race, color, creed, religion, sex, domestic relationship status, parental status, familial status, sexual orientation, national origin, gender identity, age, disability, or political affiliation. As used here, the words "shall not discriminate" shall mean and include without limitation the following:

Required Submittal (FORM 2)
Contractor Disclosure Form (Page 5 of 7)

Recruited, whether by advertising or other means; compensated, whether in the form of rates of pay, or other forms of compensation; selected for training, including apprenticeship; promoted; upgraded; demoted; downgraded; transferred; laid off; and terminated.

The Contractor agrees to and shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officers setting forth the provisions of the EEO clause.

- b. The Contractor shall, in all solicitations or advertisements for employees, placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, creed, religion, sex, domestic relationship status, parental status, familial status, sexual orientation, national origin, gender identity, age, disability, or political affiliation.
- c. The Contractor shall send to each labor union or representative of workers with which the Contractor may have a collective bargaining agreement or other contract or understanding a notice advising the labor union or workers' representative of the Contractor's commitments under the equal employment opportunity program of the City of Atlanta and under the Code of Ordinances and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The Contractor shall register all workers in the skilled trades who are below the journeyman level with the U.S. Bureau of Apprenticeship and Training.
- d. The Contractor shall furnish all information and reports required by the contract compliance officer pursuant to the Code of Ordinances, and shall permit access to the books, records, and accounts of the Contractor during normal business hours by the contract compliance officer for the purpose of investigation so as to ascertain compliance with the program.
- e. The Contractor shall take such action with respect to any subcontractor as the city may direct as a means of enforcing the provisions of paragraphs (a) through (h) herein, including penalties and sanctions for noncompliance; provided, however, that in the event the Contractor becomes involved in or is threatened with litigation as a result of such direction by the city, the city will enter into such litigation as is necessary to protect the interest of the city and to effectuate the equal employment opportunity program of the city; and, in the case of contracts receiving federal assistance, the Contractor or the city may request the United States to enter into such litigation to protect the interests of the United States.
- f. The Contractor and its subcontractors, if any, shall file compliance reports at reasonable times and intervals with the city in the form and to the extent prescribed by the contract compliance officer. Compliance reports filed at such times directed shall contain information as to employment practices, policies, programs and statistics of the Contractor and its subcontractors.

Required Submittal (FORM 2)
Contractor Disclosure Form (Page 6 of 7)

- g. The Contractor shall include the provisions of paragraphs (a) through (h) of this equal employment opportunity clause in every subcontract or purchase order so that such provisions will be binding upon each subcontractor or vendor.
- h. A finding, as hereinafter provided, that a refusal by the Contractor or subcontractor to comply with any portion of this program, as herein provided and described, may subject the offending party to any or all of the following penalties:
 - (1) Withholding from the Contractor in violation all future payments under the involved contract until it is determined that the Contractor or subcontractor is in compliance with the provisions of the contract;
 - (2) Refusal of all future bids for any contract with the City of Atlanta or any of its departments or divisions until such time as the Contractor or subcontractor demonstrates that there has been established and there shall be carried out all of the provisions of the program as provided in the Code of Ordinances;
 - (3) Cancellation of the public contract;
 - (4) In a case in which there is substantial or material violation of the compliance procedure herein set forth or as may be provided for by the contract, appropriate proceedings may be brought to enforce those provisions, including the enjoining, within applicable law, of Contractors, subcontractors or other organizations, individuals or groups who prevent or seek to prevent directly or indirectly compliance with the policy as herein provided.

Prohibition on Kickbacks or Gratuities/Non-Gratuity. The undersigned acknowledges the following prohibitions on kickbacks and gratuities:

- a. It is unethical for any person to offer, give or agree to give any employee or former employee a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy or other particular matter pertaining to any program requirement or a contract or subcontract or to any solicitation or Bid therefor.
- b. It is unethical for any employee or former employee to solicit, demand, accept or agree to accept from another person a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy or other particular matter pertaining to any program requirement or a contract or subcontract or to any solicitation or Bid therefor.
- c. It is also unethical for any payment, gratuity or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime Contractor or higher tier subcontractor or any person associated therewith as an inducement for the award of a subcontract or order.

Required Submittal (FORM 2)
Contractor Disclosure Form (Page 7 of 7)

Declaration

Under penalty of perjury, I declare that I have examined this Disclosure Form and Questionnaire and all attachments to it, if applicable, and, to the best of my knowledge and belief all statements contained herein and in any attachments, if applicable, are true, correct and complete.

I certify that this offer is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting an offer for the same supplies, services, construction, or professional or consultant services, and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of city, state and federal law and can result in fines, prison sentences, and civil damages awards. I agree to abide by all conditions of this solicitation and offer and certify that I am authorized to sign for this Respondent.

Sign here if you are an individual:

Printed _____ **Name:**

Signature: _____

Date: _____

Subscribed and sworn to or affirmed by _____ **(name) this** ___ **day of** _____, **20** ___.

Notary Public of _____(state)

My commission expires: _____

Sign here if you are an authorized representative of a responding entity or partnership:

Printed Name of Entity or Partnership: _____

Signature of authorized representative: _____

Title: _____

Date: _____, 20___

Subscribed and sworn to or affirmed by _____ **(name), as the**

(title) of _____ **(entity or partnership name) this**
___ **day of** _____, **20** ___.

Notary Public of _____(state)

My commission expires: _____

Required Submittal (FORM 3)

Required Submittal "Unless a Bidder Elects to Submit an Alternative Form of Payment"

Bid Bond (Page 1 of 2)

KNOW ALL MEN BY THESE PRESENTS, THAT WE _____

hereinafter called the PRINCIPAL, and _____

hereinafter called the SURETY, a corporation chartered and existing under the laws of the State of _____, and duly authorized to transact Surety business in the State of Georgia, are held and firmly bound unto the City of Atlanta, Georgia, in the penal sum of **One Hundred Thousand Dollars and Zero Cents (\$100,000.00)** for **PROJECT NUMBER FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters**, good and lawful money of the United States of America, to be paid upon demand of the City of Atlanta, Georgia, to which payment well and truly to be made we bind ourselves, our heirs, executors, administrators and assigns, jointly and severally and firmly by these presents.

WHEREAS the PRINCIPAL has submitted to the City of Atlanta, Georgia, for **PROJECT NUMBER FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters**, a Bid;

WHEREAS the PRINCIPAL desires to file this Bond in accordance with law, in lieu of a certified Bidder's check otherwise required to accompany this Bid;

NOW THEREFORE: The conditions of this obligation are such that if the Bid be accepted, the PRINCIPAL shall within ten (10) calendar days after receipt of written notification from the CITY of the award of the Contract execute a Contract in accordance with the Bid and upon the terms, conditions and prices set forth therein, in the form and manner required by the City of Atlanta, Georgia, and execute sufficient and satisfactory Performance and Payment Bonds payable to the City of Atlanta, Georgia, each in the amount of one hundred percent (100%) of the total Contract price in form and with security satisfactory to said City of Atlanta, Georgia, then this obligation to be void; otherwise, to be and remain in full force and virtue in law; and the SURETY shall upon failure of the PRINCIPAL to comply with any or all of the foregoing requirements within the time specified above immediately pay to the City of Atlanta, Georgia, upon demand the amount hereof in good and lawful money of the United States of America, not as a penalty but as liquidated damages.

In the event suit is brought upon this Bond by the CITY and judgment is recovered, the SURETY shall pay all costs incurred by the CITY in such suit, including attorney's fees to be fixed by the Court.

Required Submittal "Unless a Bidder Elects to Submit an Alternative Form of Payment"
(FORM 3)

Bid Bond (Page 2 of 2)

Enclosed is a Bid Bond in the approved form, in the amount of:

One Hundred Thousand Dollars and Zero Cents (\$100,000.00) for **PROJECT NUMBER FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters**. The money payable on this bond shall be paid to the City of Atlanta, Georgia, for the failure of the Bidder to execute a CONTRACT within ten (10) days after receipt of the Contract form and at the same time furnish a Payment Bond and Performance Bond.

IN TESTIMONY THEREOF, the PRINCIPAL and SURETY have caused these presents to be duly signed and sealed this _____ day of _____ 20__.

Corporate Bidder:

[Insert Corporate Name]

By: _____

Name: _____

Title: _____

**Corporate Secretary/Assistant
Secretary (Seal)**

Non-Corporate Bidder:

[Insert Bidder Name]

By: _____

Name: _____

Title: _____

Notary Public (Seal)

My Commission Expires: _____

Surety:

Name: _____

By: _____

Name: _____

Title: _____

Required Submittal (FORM 4.1)
Certification of Insurance Ability Instructions:

Offerors **MUST** submit a **completed copy of this form executed by their insurance company**. Failure to submit completed form will result in the Offeror being deemed non-responsive.

I, _____ [*insert an individual's name*], on behalf of _____ [*insert insurance company full name*], a _____ [*insert type of entity LLC, LLP, corporation, etc.*](“**Insurer**”), hereby represent and certify each of the following to the City of Atlanta, a municipal corporation of the State of Georgia (“**City**”) on this _____ day of _____, 20____ [*insert date*]:

- (a) Insurer is licensed by the Insurance and Safety Fire Commissioner of the State of Georgia to transact insurance business in the State of Georgia;
- (b) Insurer Surety has reviewed the Agreement attached to the solicitation for Project Number **FC-FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters** (“Project”) and its corresponding **Appendix for Insurance Requirements**;
- (c) Insurer certifies that if, as of the date written above, (“**Offeror**”) was selected as the successful Offeror for the Project, Insurer would provide insurance to Offeror for this Project in accordance with the terms set forth in the corresponding **Appendix for Insurance Requirements**; and

PLEASE NOTE: If this Form 4.1 is executed by an Attorney-in-Fact, then Insurer must attach a copy of a duly executed Power-of-Attorney evidencing such authority in addition to correctly completing this Form 4.1. If Offeror is unable to provide City with insurance that comply with the terms of the corresponding Appendix for Insurance Requirements within ten (10) days of receiving notice of intent to award the Project from the City, the City may, in its sole discretion, retain Offeror’s security submitted with its offer and/or disqualify Offeror from further consideration for the award of the Agreement.

By executing this certification, Insurer represents that all of the information provided by Insurer herein is true and correct as of the date set forth above.

Insurer: [*insert company name on line provided below*]

By: _____

Print Name: _____

Title: _____

Corporate Secretary/Assistant Secretary
(Seal)

Required Submittal (FORM 4.2)

Certification of Bonding Ability Instructions:

Offerors **MUST** submit a **completed copy of this form executed by their surety**. Failure to submit completed form from will result in the Offeror being deemed non-responsive.

I, _____ [*insert an individual's name*], on behalf of _____ [*insert surety company full name*], a _____ [*insert type of entity LLC, LLP, corporation, etc.*](“**Surety**”), hereby represent and certify each of the following to the City of Atlanta, a municipal corporation of the State of Georgia (“**City**”) on this _____ day of _____, 20____ [*insert date*]:

- (a) Surety is licensed by the Insurance and Safety Fire Commissioner of the State of Georgia to transact surety business in the State of Georgia;
- (b) Surety has reviewed the Agreement attached to the solicitation for Project Number **FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters** (“Project”) and its corresponding **Appendix for Insurance Requirements**;
- (c) Surety certifies that if, as of the date written above, _____ (“**Offeror**”) was selected as the successful Offeror for the Project, Surety would provide bonding to Offeror for this Project in accordance with the corresponding **Appendix for Insurance Requirements**; and
- (d) **Surety only**: The Surety states that Offeror’s uncommitted bonding capacity (not taking into account this Project) is approximately \$ _____ (U.S.). Surety’s statement set forth in this Section (d) does not represent a limitation of the bonding capacity of Offeror or that Offeror will have the bonding capacity noted above at the time of contract execution for this Project.

PLEASE NOTE: If this Form 4.2 is executed by an Attorney-in-Fact, then Surety must attach a copy of a duly executed Power-of-Attorney evidencing such authority in addition to correctly completing this Form 4.2. If Offeror is unable to provide City with bonds that comply with the terms of the corresponding Appendix for Insurance Requirements within ten (10) days of receiving notice of intent to award the Project from the City, the City may, in its sole discretion, retain Offeror’s security submitted with its offer and/or disqualify Offeror from further consideration for the award of the Agreement.

By executing this certification, Surety represents that all of the information provided by Surety herein is true and correct as of the date set forth above.

Surety: [*insert company name on line provided below*]

By: _____

Print Name: _____

Title: _____

Corporate Secretary/Assistant Secretary
(Seal)

Required Submittal (FORM 5)

Acknowledgment of Addenda

Bidders should sign below and return this form with their Bid(s) to the Department of Procurement, 55 Trinity Avenue, City Hall South, Suite 1900, Atlanta, Georgia 30303, as acknowledgment of receipt of certain Addenda.

This is to acknowledge receipt of the following **Addenda** for **FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters:**

1. _____;
2. _____;
3. _____; and
4. _____.

Dated the _____ day of _____, 20__.

Corporate Bidder:

[Insert Corporate Name]

By: _____

Print Name: _____

Title: _____

Corporate Secretary/Assistant
Secretary (Seal)

Non-Corporate Bidder:

[Insert Bidder Name]

By: _____

Print Name: _____

Title: _____

Notary Public (Seal)
My Commission Expires: _____

Required Submittal (FORM 6)

Bidder Contact Directory¹

NAME	POSITION/TITLE	MAILING ADDRESS	OFFICE PHONE	CELL PHONE	EMAIL ADDRESS AND FAX NUMBER

¹ The purpose of the Bidder Contact Directory is to provide the City with a centralized, easily identified source of important contacts and other information regarding each of the business entities constituting a Bidder. This Bidder Contact Directory should include the names, positions/titles, firms, mailing addresses, phone and fax numbers and e-mail addresses for each of the following as it pertains to each of the firms in a Bidder's team:

1. At least two individuals, one primary the other(s) secondary, authorized to represent the firm for purposes of this ITB; and
2. Bidder Service Provider Key Personnel (as appropriate) listed in the Services Agreement included in this ITB at Part 5.

Required Submittal (FORM 7)

Reference List

Each Bidder must provide a list of at least three (3) references using the below-referenced format. The City is interested in reviewing references that are able to attest to a Bidder's performance ability and credibility in a particular industry or trade.

Bidder's Name: _____

Reference: Name
 Address
 City, State, Zip
 Phone
 Fax

Project Title:

Contact Person: _____
Direct Telephone: _____
Email Address: _____

Date(s) of Project: _____

Description of Services:

Total Amount of Contract Including Change Orders:

Bidder's Role and Responsibilities:

Current Completion Status:

(Use the Same Format to Provide the Additional References)

Required Submittal (FORM 8)

Required Submittal Checklist

The following submittals shall be completed and submitted with each Bid see table below “Required Bid Submittal Check Sheet.” Please verify that these submittals are in the envelope before it is sealed. *Disclaimer:* It is each Bidders sole responsibility to ensure that their Bid to the City is inclusive of all required submittal documents outlined on the below-referenced checklist; as well as within other parts of the solicitation document.

Submit one (1) Original Bid, signed and dated, and nine (9) complete copies of the Original Bid including all required attachments.

In addition to the hard copy submissions, each Bidder shall submit two (2) digital versions of its Bid Submission in Adobe Portable Document Format (“PDF”) on compact disk (CDs). CD One (1) version should be a duplicate of the hard copy of the Bid with no deviations in order or layout of the hard copy Bid. CD Two (2) version should be a redacted version of the hard copy Bid Submission. Please refer to the Georgia Open Records Acts (O.C.G.A. § 50-18-72) for information not subject to public disclosure.

The City assumes no liability for differences in information contained in the Bidder’s printed Bid Submission and that contained on the CDs. In the event of a discrepancy, the City will rely upon the information contained in the Bidder’s printed material (Hard Copy). Each CD should be labeled with the Project Number, Project Name, and the CD Number.

Required Submittal (FORM 8)

	Required Bid Submittal Check Sheet	Check (√)
1	Part I – Instruction to Bidders (Bid Guarantee Included)	()
2	Appendix A - Office of Contract Compliance (Required Submittals Included)	()
3	<p>Part I, Section 2 – All Required Submittal Forms (if any of the required submittal documents are not submitted or incomplete within your Bid submittal package, your firm may be deemed non-responsive). Required Submittals include but are not limited to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Form 1; Illegal Immigration Reform and Enforcement Act Forms <input type="checkbox"/> Form 2; Contractor Disclosure Form <input type="checkbox"/> Form 3; Bid Bond <input type="checkbox"/> Form 4.1; Certification of Insurance Ability <input type="checkbox"/> Form 4.2; Certification of Bonding Ability <input type="checkbox"/> Form 5; Acknowledgment of Addenda <input type="checkbox"/> Form 6; Proponent Contact Directory <input type="checkbox"/> Form 7; Reference List <input type="checkbox"/> Form 8; Required Submittal Checklist <input type="checkbox"/> Authority to Transact Business in the State of Georgia <input type="checkbox"/> Exhibit G.1 – Experience Statement <input type="checkbox"/> Exhibit G.2 – Lower Tier Experience Statement <input type="checkbox"/> Exhibit G.3 – Work in Progress <input type="checkbox"/> Exhibit G.4 – Safety and Health History Form 	()
4	<p>Bidder’s Official Company Name: Company Physical Address:</p>	
5	<p>President/Vice President/Owner Name: _____ Title: _____ Office Telephone Number: _____ Direct Cell Telephone Number: _____ Email Address: _____</p>	
6	<p>Primary Point-of-Contact Concerning ITB: _____ Title: _____ Office Telephone Number: _____ Direct Cell Telephone Number: _____ Email Address: _____</p>	

PART II

EXHIBIT A

**DRAFT ANNUAL CONSTRUCTION SERVICES
AGREEMENT**

ANNUAL CONSTRUCTION SERVICES AGREEMENT

THIS CONSTRUCTION SERVICES AGREEMENT ("Agreement") is entered into effective this _____ day of _____, 2015, (the "Effective Date") by and between THE CITY OF ATLANTA ("Owner" or the "City"), and _____ ("Contractor").

The City and Contractor agree as follows:

1. DEFINITIONS

The following terms have the meaning assigned:

"Agreement Documents" means this Agreement and its Exhibits, Appendices, Task Orders, Change Orders, Documentation, Drawings, and Specifications, including

Construction Services Agreement
Exhibit A- General Scope of Services
Exhibit A.1- Compensation and Fee Schedule
Exhibit A.2- Task Orders
Exhibit B- Legislation
Exhibit C- Supplement Conditions and Technical Specifications
Exhibit D- Additional Contract Documents
Appendix A- Office of Contract Compliance
Appendix B- Insurance and Bonding Requirements

"Agreement Term" has the meaning set forth in Article 2, unless otherwise expressly amended or changed, pursuant to the City's authorized approval in conformance with the City of Atlanta Code of Ordinances and applicable law.

"Changes" has the meaning set forth in Article 8.

"Change Order" has the meaning set forth in Article 8.

"City Representative" has the meaning set forth in Article 6.

"Claim" means any demand, contention, or assertion seeking additional time or money under the terms of this Agreement. Claims by the Contractor must be made in writing and contain all of the following or such Claims are released: (a) a narrative statement describing the amount and bases of the Claim; (b) the precise number of days claimed as a result of any delay; and (c) a detailed calculation of the precise amount of additional compensation claimed with all required supporting Documentation.

"Documentation" has the meaning set forth in Article 4.

"Drawings" include, without limitation: all renderings, technical and design drawings, specifications, plans, layouts, diagrams, illustrations, descriptions, calculations, schedules, graphs, performance charts, shop drawings; as-built drawings; all graphic or pictorial material needed to show locations, dimensions, elevations, sections, and details; all documents necessary to fix and describe the size, quality and composition of the Project (or parts thereof); supplier operating and maintenance manuals, recommended spare parts lists, documents required to support permitting and licensing, and any other data pertinent to operation of the Project.

"Emergency Work" has the meaning set forth in Article 2.

“Final Completion” means that point in time where the City has confirmed to the Contractor in writing that the Services required by a Task Order have achieved Substantial Completion, Contractor has completed all punch-list items associated with a Task Order, and Contractor has provided all Documentation required by the Agreement Documents and Task Orders for Final Completion.

“Final Payment” means the final amount of compensation due under a Task Order or this Agreement (as applicable) and shall not become due until Contractor satisfies all of the requirements of Article 9.

“Minimum Quantity” means one dollar (\$1.00) in United States Currency, which is the minimum amount of Services that shall be ordered by the City pursuant to this Agreement.

“Project” means or refers to the Project(s) specifically identified in Task Orders issued pursuant to this Agreement.

“Services” means the specific tasks and activities to be performed by Contractor as identified in a Task Order issued pursuant to this Agreement, as well as all ancillary and incidental tasks and activities not expressly identified in a Task Order but which are reasonably necessary to be performed in order to complete the tasks and activities expressly identified in a Task Order.

“Standard” has the meaning set forth in Article 6.

“Substantial Completion” as applicable to a Task Order, means that point in time in which the Services that are the subject of a Task Order are capable of being used for their intended purpose and comply with all of the requirements of Article 9, the Specifications, and the other Agreement Documents.

“Total Sum” means the total maximum amount of compensation for which all Task Orders may potentially be issued pursuant to this Agreement. Contractor’s entitlement to payment under this Agreement shall not exceed the Total Sum.

“Work” means all the Services specified, indicated, shown, or contemplated by the Agreement Documents and applicable Task Orders, as well as the furnishing by Contractor of all materials, equipment, labor, methods, processes, construction, manufacturing, tools, plants, design, supplies, power, water, transportation and any other things necessary or incidental to complete such Services in accordance with the Agreement Documents and applicable Task Orders that will ensure a functional and complete Project(s).

“Task Order” means an order executed by the City, substantially in the form and substance provided in **Exhibit A** to this Agreement that specifies the Services to be provided by Contractor to the City, the agreed amount of payment for such Services, and the time limitations for completing the Services.

“Task Order Commencement Date” means the date identified in a notice to proceed and/or a Task Order issued by the City, which instructs the Contractor to start the performance of Services required by a Task Order. The times for Substantial Completion and Final Completion will be measured from the Task Order Commencement Date.

“Work Product” has the meaning set forth in Article 6.

2. SERVICES.

2.1 In General. The City desires to obtain from Contractor the Services described generally on **Exhibit A** attached and as further described on Task Orders (individually, a “Task Order” and, collectively, the “Task Orders”) that may be executed from time to time between the Parties, pursuant to this Agreement.

The Services to be provided by Contractor are those ordered by the City that are reflected in a Task Order executed by the City. Contractor agrees to provide to City the Services per the Agreement Documents and each Task Order issued by the City. Each Task Order will include at least the following:

- a reference to this Agreement;
- the Task Order Commencement Date;
- the required dates of Substantial and/or Final Completion of the Services, as applicable;
- the Services to be provided by the Contractor;
- required deliverables and submittals;
- the amounts payable and payment schedule for the Services; and
- any additional provisions applicable to the Services.

Except as provided for Emergency Work, no Task Order will become effective until it has been executed by an authorized representative of the City. A Task Order issued pursuant to this Agreement will be substantially in the form of **Exhibit A.2** hereto. All approved Task Orders shall be incorporated by reference into this Agreement.

2.1.1 Emergency Work. In some cases, the City may require emergency Services to be performed by the Contractor, which pose an imminent threat to the public health, safety, general welfare ("Emergency Work"). In such cases, the City's Authorized Representative shall notify the Contractor by email or other written communication the type and scope of work needed under the circumstances. Once notified, Contractor shall immediately mobilize and begin Services, as is necessary to remediate the emergency conditions. Payment for such Services shall be in accordance with Option 1, pursuant to Section 4.1.1.

2.1.2 Authorization. If applicable, this Agreement is authorized by legislation adopted by the City, which is attached as **Exhibit B**.

2.2. The sum of payments by City under each Task Order shall be specified by a Maximum Payment Amount (the Task Order Maximum Payment Amount) applicable to the services to be performed under such task order.

2.3 Task Orders under this Agreement may be issued by City without further legislative approval under Code section 2-1111, if the legislation authorizing this Agreement provides for such issuance. In such circumstances, the Task Order may be executed by the City's Chief Procurement Officer, head of the affected using agency or other appropriate designee on behalf of City. City, at its sole discretion, may unilaterally issue Task Orders for Services for which charges are established in this Agreement. Contractor shall promptly proceed with the Services set forth in any such Task Order. If City solicits a proposal from Contractor for a Task Order, Contractor shall submit its proposal with a Task Order containing all the necessary terms and executed by Contractor. Task Orders may be issued or executed during the term of this Agreement that contain a service performance period that extends beyond the term; provided, however, that no Task Order may be issued or executed under this Agreement subsequent to the expiration or termination of the term.

2.4 City makes no representations or warranties about the quantity of services that will be requested or charges that will be paid under this Agreement. Any quantity of Services or amount of charges set forth in this Agreement are estimates only.

2.5 Initial Term. The initial term of this Agreement will be 2 years. This Agreement shall commence on the Effective Date and end on [_____]. The initial term of the Agreement and any renewal term(s) are collectively referred to as the "Term".

2.6 Renewal Terms. City shall have the right in its sole discretion to renew this Agreement for [3] additional one-year terms. If City desires to exercise an option to renew, it will submit legislation authorizing such renewal for

consideration by City's Council and Mayor prior to the expiration of the prior term. The legislation will establish that the date of such renewal will be the day immediately following the expiration day of the prior term.

If such legislation is enacted, City will notify service provider of such renewal, at which time service provider shall be bound to provide Services during such renewal term, without the need for the parties to execute any further documents evidencing such renewal, it being acknowledged by service provider that its initial execution of this Agreement is deemed its agreement to continue to provide Services during any renewal term.

3. COMPENSATION

3.1 Compensation for Services will be based upon agreed unit prices as set forth in the fee schedule attached as **Exhibit A.1**. No payment to Contractor shall exceed Annual Maximum Payment Amount; Task Order Maximum Payment Amount; the Total Sum; or the hourly rates, materials, reimbursable expenses and other payment terms identified in Exhibit A.1. All costs of items associated with the Work and incidentals necessary for the proper and timely completion of the Work shall be considered as included in the unit prices attached as **Exhibit A.1**. Payment for all Work in accordance with the unit prices identified in **Exhibit A.1** shall be full compensation for all labor, materials, equipment, methods, processes, construction manufacturing, tools, plants, designs, supplies, power, water transportation and any other things necessary or incidental to furnish, install, construct, and test the Work covered under the applicable unit price. The unit prices set forth in Exhibit A.1 are inclusive of all taxes, levies, duties and assessments of every nature in connection with the Services ("Taxes"). Services for which there is no price schedule set forth in **Exhibit A.1** shall be considered incidental to the Work and no compensation shall be allowed.

3.2 Contractor acknowledges and agrees that if the quantities originally contemplated under the Agreement Documents are materially changed so that application of such unit prices to quantities of the Work performed will cause substantial inequity to the City, the applicable unit prices shall be equitably adjusted pursuant to Article 8. For purposes of this Article 3.2, a change in quantities may be considered material if such change is greater than or equal to forty percent (40%) more than the quantities set forth in the Agreement Documents.

3.3 No money shall be paid by the City upon any claim, debt, demand or account whatsoever, to any person, firm, or corporation who is in arrears to the City for taxes, or any other debt or claim, and the City shall be entitled to counterclaim and/or offset any such debt, claim, demand or account in the amount of taxes so in arrears or other debts or claims of the City, and no assignment or transfer of such debt, claim, demand, or account after the said taxes are due or after any such debt or claim is asserted by the City, shall affect the right of the City to so offset the said taxes, debts, or other obligations against the same. Contractor agrees that the City shall be allowed to setoff and recoup any claim or demand that it may have against Contractor (or any of its constituent members if Contractor is a joint venture) whether such claim or demand is liquidated or unliquidated. Contractor further agrees that in the event it assigns or sells any amounts due or to become due under this Agreement, notice to the City of such assignment or sale shall not affect the City's rights of setoff or recoupment against Contractor for claims subsequently arising from this Agreement or any other contract with the City. Any assignee or purchaser of any amounts due Contractor under this Agreement shall be bound to these provisions and shall assume the risk of subsequently arising claims of setoff or recoupment.

4. TERMS OF PAYMENT

4.1 Payment to the Contractor will be made according to one of the following methods identified in this Article 4. Task Orders issued pursuant to this Agreement will identify the method of payment selected by the City. Selection of the applicable payment options identified in Articles 4.1.1 and 4.1.2 is in the City's sole discretion. In the event that a Task Order does not expressly state the procedure for payment selected by the City, then Contractor will be entitled to payment in accordance with Article 4.1.1. Contractor shall prepare and submit to City invoices for payment for all Services in accordance with the Task Order, which shall include such detail and format as the City may reasonably require.

Payment Methods

4.1.1 Option 1, Payment Upon Final Completion: Subject to the City's right to offset payment and its rights to withhold payment set forth in Article 4.4, Contractor shall be entitled to full payment for a Task Order sixty (60) days after achieving Final Completion of the Services required by a Task Order based upon a lump sum, based upon time and materials and calculated from the labor and materials categories set forth in **Exhibit A**. Contractor agrees to execute such payment application forms and release of claim forms as the City may require as a condition precedent to the City's obligation to make any payment to Contractor.

4.1.2 Option 2, Progress Payments: If the City elects to pay Contractor in accord with this Article 4.1.2, then upon issuance of a Task Order, Contractor shall submit to the City monthly invoices for Services performed. Each invoice shall be accompanied by a payment application identifying the applicable Task Order, such time sheets, daily reports, receipted invoices, invoices with check vouchers attached, Contractor's interim and final releases of lien and bond rights (as applicable), Contractor's sub-tier contractor interim and final releases of lien and bond rights (as applicable), Contractor's verification of quantities delivered pursuant to Task Order(s), all Drawings required by a Task Order, all documents, work product, and information required by the Specifications, and such other records as the City may reasonably request for the purpose of verifying the accuracy of the invoice (collectively "Documentation"). Subject to the City's right to offset payment and its rights to withhold payment set forth in Article 4.4, payment to Contractor will be made less applicable retention within thirty (30) days of receipt of all supporting Documentation required by the Agreement Documents. Contractor agrees to execute such payment application forms and release of claim forms as the City may require as a condition precedent to the City's obligation to make any payment.

4.2 This Article 4 completely supersedes the Georgia Prompt Pay Act as it relates to Owner payments and any modifications or successors to the Georgia Prompt Pay Act to the fullest extent allowed by law. Contractor acknowledges and agrees that payment shall be in accordance with the provisions of this Agreement and expressly waives its right to assert entitlement under O.C.G.A. § 13-1-11, *et. seq.* to the full extent permitted by law. Should the City fail to issue payment for undisputed amounts within ninety (90) days of approval, annual interest on the payment amount may accrue at the Prime Rate, plus one percent (1%). The Prime Rate shall be based on that published in the Wall Street Journal on the first business day of January or June, whichever has most recently passed, of the current year.

4.3 The City may decline to approve payment and may withhold any payment, in whole or in part because of: (a) defective work not remedied; (b) third party claims filed or reasonable evidence indicating probable filing of such claims; (c) failure of the contractor to promptly make payments to sub-tier contractors; (d) reasonable evidence that the Work cannot be completed for the Total Sum; (e) reasonable evidence that the Services will not be completed within the time required by a Task Order; (f) failure to carry out the Services in accordance with the requirements of the Agreement documents; (g) failure to comply with the insurance and bonding requirements of the Agreement Documents; (h) Contractor's insolvency or reasonable evidence that contractor fails to pay its debts as they come due; (i) liquidated damages due in accordance with article 9; or (j) a material failure of the contractor to comply with any of the requirements of the agreement documents. No full or partial payment of any invoice or any use of Services constitutes acceptance of any Services.

4.4 Any Disputes concerning payment shall be resolved in accordance with Article 16.

5. CONTRACTOR'S ACCOUNTING RECORDS AND THE CITY'S RIGHT OF AUDIT

Contractor shall keep full and detailed accounts and exercise such controls as may be necessary for proper financial management under this Agreement. The City shall be afforded reasonable access to Contractor's records, books, correspondence, instructions, drawings, receipts, subcontracts, purchase orders, memoranda, records of delivered quantities, daily reports, job cost reports, and such other data relating to this Agreement during normal

business hours at the location where such documents are stored by Contractor. The Contractor shall preserve all such related documentation for a period of two (2) years after the expiration of the Agreement Term. The City shall have the right to audit the books and records related to this Agreement at any time. Contractor shall provide access to its books and records associated with this Agreement within 72 hours of the City's provision of written notice to Contractor.

6. OBLIGATIONS OF THE CONTRACTOR

6.1 Contractor will perform all Services in a timely and professional manner, consistent with the Standard. Contractor shall not be deemed to be an agent of the City for any purpose but shall in all events be an independent contractor exercising control over its Services and the manner in which they are performed.

6.2 Contractor will not perform any Services until the City directs Contractor in writing to proceed. Unless otherwise specified in a Task Order, the execution of a Task Order by the City shall constitute notice and authorization to Contractor to proceed in strict accordance with the Agreement Documents.

6.3 Contractor will perform Services under this Agreement with the highest degree of skill and diligence normally practiced by contractors performing the same or similar services as are being performed by Contractor under this Agreement and under any Task Order in accordance with all applicable federal, state, local laws, ordinances, rules, regulations, and lawful orders ("Standard"). Contractor shall be solely responsible for all construction means, methods, techniques, sequences, and procedures and shall coordinate all portions of the Work under the Agreement Documents.

6.4 Contractor shall enforce strict discipline, professionalism, and good order among Contractor's employees and sub-tier contractors. The City may, after provision of written notice to Contractor, require Contractor to remove from the Work any employee the City deems incompetent, unprofessional, or otherwise objectionable, including any employee of Contractor's sub-tier contractors.

6.5 Unless otherwise provided in the Agreement Documents, Contractor shall secure and will provide all permits, licenses, and other applicable legal documents required for Contractor's performance of the Work required by the Agreement Documents. In no event will Contractor's failure to timely secure permits, licenses, and/or other applicable legal documents serve as a basis for a Claim under this Agreement.

6.6 Key Personnel and Key Subcontractors. The following persons are identified by the Contractor as its key personnel that will provide the Work and Services required by the Agreement Documents:

6.6.1 Key Personnel:

(a) _____;

(b) _____; and

(c) _____.

6.6.2 Key Subcontractors:

(a) _____;

(b) _____; and

(c) _____.

6.6.3 Contractor shall not transfer, reassign or replace Key Personnel and/or Key Subcontractors identified in Articles 6.6.1 and 6.6.2, except as the result of retirement, voluntary resignation, involuntary termination for cause in Contractor's sole discretion, illness, disability, or death, during the term of this Agreement without the prior written approval from the City.

6.7 Suspension of the Work. The City may, by written notice to Contractor, suspend at any time the performance of any or all of the Work to be performed under this Agreement. Contractor shall be entitled to request an extension of time pursuant to Article 8 in the event the City issues a suspension notice per this Article 6.7. Unless the suspension notice directs otherwise, upon receipt of a suspension notice Contractor must:

6.7.1 immediately discontinue suspended Work on the date and to the extent specified in the notice;

6.7.2 place no further orders or subcontracts for materials, services or facilities with respect to suspended Work, other than to the extent required in the notice; and

6.7.3 take any other reasonable steps to minimize costs associated with the suspension.

6.8 The City shall designate to the Contractor in writing a representative(s) (the "City Representative") who shall serve as primary interface and the single-point of communication for the provision of Services; have day-to-day interaction with Contractor to address issues relating to this Agreement; and to the extent provided under applicable laws and the City's Code of Ordinances, have the authority to execute any additional documents or Change Orders on behalf of City. Any Work, document, or item to be submitted or prepared by Contractor hereunder shall be subject to the review of the City Representative. The City Representative may disapprove, if in the City Representative's sole opinion the Service, Documentation, Drawing or item is not in accordance with the requirements of the Agreement Documents or sound professional principles, or is impractical, uneconomical or unsuited for the purposes for which the Service, document or item is intended. If any of the said items or any portion thereof are so disapproved, Contractor shall revise and/or correct the Work so that it meets the approval of the City Representative at no additional cost to the City. The "City Representative" may also be referred to as the "City Engineer."

6.9 Contractor shall diligently perform the Services required by a Task Order within the time required by the Task Order notwithstanding any disputes or disagreements with City. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as City may otherwise direct pursuant to this Agreement. Contractor's failure or refusal to work through disputes in accordance with this Article 6.9 shall be deemed a material default under this Agreement, which will entitle the City to immediately rely upon Contractor's sureties to cure said default.

6.10 Except as otherwise expressly provided in this Agreement, all Drawings, Documentation, reports, information, data, specifications, computer programs, technical reports, operating manuals and similar work or other documents, all deliverables, and other work product prepared or authored by Contractor or any of its sub-tier contractors exclusively for the City under this Agreement, and all intellectual property rights associated with the foregoing items (collectively, the "Work Product") shall be and remain the sole and exclusive property of the City. Any of Contractor's or its sub-tier contractors' works of authorship comprised within the Work Product (whether created alone or in concert with City or a third party) shall be deemed to be "works made for hire" and made in the course of Services rendered and, whether pursuant to the provisions of Section 101 of the U.S. Copyright Act or other applicable law, such Work Product shall belong exclusively to City. Contractor and its sub-tier contractors grant the City a non-exclusive, irrevocable, global, perpetual, transferable, fully paid up, royalty free license to all Work Product not exclusively developed for City under this Agreement.

6.10.1 If any of the Work Product is determined not to be a work made for hire, Contractor hereby assigns to the City, worldwide and in perpetuity, all rights, including proprietary rights, copyrights, and related rights, and all extensions and renewals of those rights, in the Work Product. If Contractor has any rights to the Work Product that

cannot be assigned to City, Contractor unconditionally and irrevocably waives the enforcement of such rights and irrevocably grants to City during the term of such rights an exclusive, irrevocable, perpetual, transferable, global, fully paid and royalty-free license, with rights to sublicense through multiple levels of sub-licensees, to reproduce, make, have made, create derivative works of, distribute, publicly perform and publicly display by all means, now known or later developed, such rights.

6.10.2 The City shall have the sole and exclusive right to apply for, obtain, register, hold and renew, in its own name or for its own benefit, all patents, copyrights, applications and registrations, renewals and continuations and all other appropriate protection.

6.10.3 To the extent exclusive title or complete and exclusive ownership rights in any Work Product created by Contractor may not originally vest in City by operation of applicable law, Contractor shall immediately upon request, unconditionally and irrevocably assign, transfer and convey to the City all rights, title and interest in the Work Product.

6.10.4 Without any additional cost to the City, Contractor and its personnel shall promptly give City all reasonable assistance and execute all documents the City may reasonably request to enable the City to perfect, preserve, enforce, register and record its rights in all Work Product. Contractor irrevocably designates City as Contractor's agent and attorney-in-fact to execute, deliver and file, if necessary, any documents necessary to give effect to the provisions of this Article 6.10 and to take all actions necessary, in Contractor's name, with the same force and effect as if performed by Contractor.

6.11 Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury, or loss to: (a) all employees on the Work and all other persons who may be affected thereby; (b) all the Work and materials to be incorporated therein, whether in storage or not, under the care, custody, or control of Contractor or any of Contractor's sub-tier contractors; (c) other property at the site where the Work is being performed or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction; and (d) the Work of the City or other separate contractors.

6.11.1 Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury, or loss.

6.11.2 Contractor shall erect and maintain, as required by existing conditions and the progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

6.11.3 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

6.11.4 Contractor shall promptly remedy all damage or loss to any property caused in whole or in part by Contractor, any subcontractor, any sub-tier contractor or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, except damage or loss attributable solely to the acts or omissions of the City and not attributable to the fault or negligence of Contractor. The foregoing obligations of Contractor are in addition to Contractor's obligations under Article 7 and **Exhibit A** or other provisions of the Agreement Documents.

6.11.5 Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.

6.11.6 In any emergency affecting the safety of persons or property, Contractor shall act, at Contractor's discretion, to prevent threatened damage, injury or loss.

6.11.7 Contractor acknowledges that it is fully aware of appropriate and safe procedures regarding blasting, including the contents and requirements of Official Code of Georgia Annotated § 25-9-1 through § 25-9-12, Blasting or Excavating Near Underground Gas Pipes and Facilities, any amendments thereto and rules and regulations issued pursuant thereto, and Contractor shall fully comply therewith. Contractor agrees and acknowledges that any failure on its part to adhere to appropriate procedures and said laws, rules and regulations shall not only be a violation of law but shall also be a breach of Agreement.

6.11.8 Contractor acknowledges that it is fully aware of appropriate and safe procedures regarding high voltage lines, including the contents and requirements of Official Code of Georgia Annotated § 46-3-30 through § 46-3-39, Safeguards Against Contact with High Voltage Lines, any amendments thereto and rules and regulations issued pursuant thereto, and Contractor shall fully comply therewith. Contractor agrees that any failure on its part to adhere to appropriate procedures and said laws, rules and regulations shall not only be a violation of the law but shall also be a breach of Agreement.

6.11.9 Contractor acknowledges and agrees that it is the entity responsible under the law and that it is the entity employing or directing others to perform labor within the meaning of Official Code of Georgia Annotated § 34-1-1, Labor and Industrial Relations. It acknowledges and agrees likewise that it will comply with said law.

6.11.10 Contractor shall protect all Work, including but not limited to, excavations and trenches, from rain water, surface water, and backup of drains and sewers. Contractor shall furnish all labor, pumps, shoring, enclosures, and equipment necessary to protect and keep the Work free of water.

6.11.11 The provisions, terms and conditions of this Article 6 are in no way intended to limit the general requirements or the applicability of laws relating to Work conditions, safety or accident prevention and no specific provision or combination of specific provisions in any provision of Article 6 or in any other parts of the Agreement Documents shall be deemed to limit the obligations or responsibility of Contractor contained in general provisions with respect thereto or in laws, statutes, acts, rules or regulations which are applicable to Contractor but which are not specifically referred to in any part of the Agreement Documents.

7. INSURANCE AND BONDING

The Contractor shall procure and maintain, at its own cost, during the term of this Agreement the Insurance and Bonds Required by **Appendix B**.

8. CHANGES AND CLAIMS

8.1 Owner shall have the right at any time during the progress of the Work to increase or decrease the Services required by a Task Order or the time required for delivery of the Services (a "Change") pursuant to this Agreement. Any modification to a Task Order or this Agreement shall be set forth in a Change Form executed by the City and the Contractor, which documents the parties' mutual agreement as to the effect of the Change, the modification of the scope of the Task Order, and/or the amount of time required by a Task Order. It is expressly agreed that, except in an emergency endangering life or property, no additions or changes to the Work shall be made except upon written order of Owner, and Owner shall not be liable to Contractor for any extra labor, materials, or equipment furnished without such written order. No officer, employee, or agent of Owner is authorized to direct any extra or changed work by verbal order nor is Contractor authorized to proceed with any Work upon verbal order that results in a modification to the time or price of a Task Order.

8.2 The unit prices set forth in Exhibit A.1 shall not be subject to modification pursuant to this Article. Except as provided by applicable law, in no event will a Change Order exceed the Total Sum authorized by the City pursuant to this Agreement.

8.3 Subject to the limitations set forth in Article 17, Contractor shall provide written notice to the City of any Claim within seven (7) calendar days of the occurrence of the event giving rise to the Claim, as well as (a) a narrative statement describing the amount and bases of the Claim; (b) the precise number of days claimed as a result of any delay or impact to the Work; and (c) a detailed calculation of the precise amount of additional compensation claimed with all required supporting Documentation. The failure of the Contractor to file any Claim within the time limits prescribed herein or in the form or manner as required hereby shall be deemed a material prejudice to the interests of the City and shall constitute a waiver and release of the Claim and the right to file or thereafter prosecute the same.

9. TIME

9.1 The Parties acknowledge that TIME IS OF THE ESSENCE for performance of the obligations required by this Agreement.

9.2 Contractor shall commence Work and proceed diligently with the Services, in accordance with the time specified by a Task Order. Contractor shall achieve Substantial Completion and Final Completion of the Services required by a Task Order within the times set forth in a Task Order.

9.2.1 When Contractor believes that the Services that are the subject of a Task Order are substantially complete, Contractor shall prepare a list of items and deliverables to be completed or corrected. The City may review the list of items and deliverables to be completed or corrected prepared by the Contractor and review the Services within a reasonable time after receipt of written notice from the Contractor and modify this list to include additional items. After Contractor has completed or corrected items necessary for achieving Substantial Completion it shall notify the City in writing. Thereafter, the City will review the Services and notify the Contractor in writing whether the Services have achieved Substantial Completion, as applicable.

9.2.2 If applicable, upon achieving Substantial Completion of the Services, as required by a Task Order, the Contractor will identify all punch-list items necessary for achieving Final Completion of the Work and provide this information to the City. After completion of all punch-list items and delivery of all Documentation necessary for Final Completion of a Task Order, the Contractor shall forward written notice to the City that the Services are ready for final review and acceptance and shall also forward a final application for payment. When the City finds that the Services are acceptable and fully completed in accordance with the Agreement Documents, the City will issue a certificate for Final Payment that will approve the Final Payment due the Contractor under an applicable Task Order.

9.2.3 Neither Final Payment nor retention shall become due until the Contractor submits to the City the following: (a) an affidavit that all payrolls and other indebtedness connected with the Work have been paid or otherwise satisfied; (b) consent of Contractor's surety to Final Payment; and (c) any Drawings and Documentation required by a Task Order.

9.2.4 The acceptance of Final Payment by Contractor shall constitute a complete waiver and release of all claims against the City by Contractor.

9.3 In the event Contractor fails to achieve either Substantial Completion or Final Completion within the time required by a Task Order, then Contractor or its sureties shall pay to the City the following amounts upon demand:

Applicable Range of Estimated Task Order Amount	Substantial Completion Liquidated Damages	Final Completion Liquidated Damages
0 to \$50,000	Not Applicable	Up to \$1000 per day
\$50,000.01 - \$100,000	Not Applicable	Up to \$1000 per day
\$100,000.01 - \$250,000	Not Applicable	Up to \$1000 per day
\$250,000.01 - \$500,000	Not Applicable	Up to \$1000 per day
\$500,000.01 - \$1,000,000	Not Applicable	Up to \$1000 per day
Over \$1,000,000.00	Not Applicable	Up to \$1000 per day

9.3.3 The amounts set forth in Articles 9.3.1 and 9.3.2 shall be referred to herein as "Liquidated Damages." The amount of such charges is hereby agreed upon as a reasonable estimate of the probable loss of the City in the event Contractor fails to achieve the Substantial Completion and/or the Final Completion requirements of Task Orders. The Liquidated Damages are fixed per this Article 9 because of the difficulty of ascertaining the exact amount of losses the City will actually incur as a result of Contractor's delayed completion of a Task Order.

9.4 No payment(s) made, payment application(s) approved, partial use of the Services, or complete use of the Work by the City shall be deemed an acceptance of Services that do not conform to the requirements of the Agreement Documents.

10. FAILURE TO PERFORM AND TERMINATION FOR DEFAULT.

10.1 If Contractor (a) fails or refuses to proceed with or to perform its Work in accordance with the Agreement Documents, (b) fails or refuses to perform properly or abide by any terms, covenants, conditions or provisions contained in this Agreement or (c) fails or refuses to obey laws, ordinances, regulations or other codes of conduct, Owner shall have the right to terminate Contractor's right to proceed under this Agreement. If Owner determines that Contractor has not remedied and cured the default or defaults in its performance within seven (7) calendar days following receipt by Contractor of written notice of said default or defaults or such shorter period as the circumstances may justify, in which case such shorter period shall be identified in Owner's written notice, then Owner may, at its option, without releasing or waiving its rights and remedies against the Contractor's sureties and without prejudice to any other right it may be entitled to hereunder or by law, terminate Contractor's right to proceed under a Task Order or this Agreement and take possession of the Work and all materials, tools, equipment and appliances of Contractor, take assignment of all of Contractor's subcontracts and purchase orders, and complete Contractor's Work by whatever means, methods or agency which Owner may, in its sole discretion, choose. In the event that Contractor's right to proceed has been terminated, Contractor agrees that it shall not be entitled to receive any further payment until after the Work has been completed. Moreover, all monies expended and all of the costs, losses, damages and extra expenses, including all management, administrative and other direct and indirect expenses (including attorneys' fees, arbitrator's fees, filing fees, expert fees, and all other costs and expenses associated with the default) incurred by Owner incident to such completion, shall be deducted from any amounts otherwise due or to become due the Contractor, and if such expenditures, together with said costs, losses, damages and extra expenses, exceed the

unpaid balance of the Task Order Maximum Payment Amount, Contractor and its surety agree to pay promptly to Owner, on demand, the full amount of such excess, including costs of collection, attorneys' fees and interest thereon at the maximum legal rate of interest until paid.

10.2 Owner's determination of Contractor's default or defaults and Owner's decision as to Contractor's failure to remedy and cure said default or defaults upon notification of their existence, made by Owner under the belief that a default or defaults existed under the terms hereof and that Contractor failed to remedy and cure said default or defaults, shall be conclusive (a) as to Owner's right to proceed as herein provided, and (b) as to Contractor's surety's obligation to perform the obligations assumed under Contractor's performance and/or payment bond. The liability of Contractor hereunder shall extend to and include the full amount of any and all sums paid, expenses and losses incurred, damages sustained and obligations assumed by Owner under the belief that such payments or assumptions were necessary or required (a) in completion of the Work and in providing labor, materials, equipment, supplies and other items therefor or re-letting the Agreement and (b) in settlement, discharge or compromise of any claims, demands, suits and judgments pertaining to or arising out of the Work hereunder. A sworn itemized statement thereof or the checks or other evidence of payment shall be *prima facie* evidence of the fact and extent of Contractor's liability.

10.3 In the event Contractor is in default, Owner shall have the right to supplement Contractor's forces without terminating this Agreement for default and deduct the cost of the same from any amounts otherwise due Contractor.

10.4 In the event any termination for default is found to be wrongful or improper, Contractor agrees that its sole and exclusive remedy is to have the termination treated as a termination for convenience in accordance with Article 11, Termination for Convenience.

10.5 In addition to the bases for termination of this Agreement under Articles 10.1 and 10.2, the City may, at its option, terminate this Agreement for cause immediately by providing written notice to Contractor if Contractor engages in behavior that is dishonest, fraudulent, or constitutes a conflict of interest with Contractor's obligations under this Agreement or is in violation of any of the City's Ethics Ordinances. Contractor shall immediately notify the City in writing, specifically disclosing any and all potential or actual conflicts of interest, which arise or may arise during the Term of this Agreement. City shall make a written determination as to whether a conflict of interest actually exists and the actions to be taken to resolve the conflict of interest.

11. Termination For Convenience; Termination For Lack Of Appropriations.

11.1 Termination For Convenience. The City shall have the right to terminate this agreement or a Task Order without cause upon seven (7) calendar days' written notice to Contractor. In the event of such termination for convenience, Contractor's recovery against Owner shall be limited to Services performed through the date of termination, calculated on a percent complete basis, together with any retainage withheld, if applicable, plus reasonable close-out and termination costs approved by the Owner, less the amount of prior payments to the Contractor, and Contractor shall not be entitled to any other and further recovery against Owner, including, but not limited to, anticipated profit on work not performed. In no event shall Contractor be entitled to a "cost-plus" recovery from Owner.

11.2 TERMINATION For Lack Of Appropriations. If, during any year of this Agreement, legislation establishing a Total Sum for the following year is not enacted, this Agreement will terminate in its entirety on the last day of the Agreement term for which a total sum has been legislatively authorized; provided, however, that Task Orders funded out of a previously legislatively authorized total sum amount may continue beyond such termination date. Furthermore, at any time during the term of this Agreement, City shall be entitled to terminate the Agreement for lack of appropriations or sufficient funding under the agreement upon providing thirty (30) days written notice to Contractor that the sufficient funding is not present to perform the Services under this Agreement. If the City

terminates the Agreement pursuant to this provision, Contractor's recovery against Owner shall be in accordance with Section 11.1, above.

12. FORCE MAJEURE

Any delay in performance caused by terrorist attacks, insurrections, storms, fires, hurricanes, tornadoes, earth quakes, or other acts of God ("Force Majeure Event") shall excuse the performance of both parties for the duration the Force Majeure Event is in effect. If the Contractor is delayed at any time in the progress of the Work by a Force Majeure Event, then Contractor will be entitled to seek a Change Order in accordance with the requirements of Article 8. Any extension of Contract Time on account of a Force Majeure Event shall be net of any delays caused by or due to the fault or negligence of Contractor. The Contractor shall cooperate in good faith with the City to minimize the impact of any such occurrence. No extension of time shall be granted unless the Force Majeure Event causes a delay to a Substantial Completion Date, and such delay is proven by an independent critical path analysis of the effected work activities. Contractor shall not be entitled to any compensation for a Force Majeure Event delay. Contractor's sole remedy for Force Majeure Event delay shall be a time extension.

13. WARRANTY

Contractor warrants to the City that all materials and equipment furnished under this Agreement will be new and of workmanlike quality unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Agreement Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by City, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty is not limited by any other provision of the Agreement Documents. The Warranties set forth in this Article and elsewhere in the Agreement Documents shall survive Final Completion of any Work done and the Agreement Term. All warranties are in addition to the rights, remedies, and redress that the City has at law or in equity, and none of Contractor's warranties shall be deemed a sole or exclusive remedy to the City.

13.2 If within one (1) year from the expiration of the Agreement Term or Final Completion of a Task Order (whichever timeframe is longer), or within such longer period of time as may be prescribed by law or by the term of any applicable special warranty required by the Agreement Documents ("Warranty Period"), any of the Work is found to be defective or not in accordance with the Agreement Documents, Contractor shall correct it promptly after receipt of a written notice from the City to do so. This obligation shall survive both Final Payment for the Work or designated portion thereof and termination of the Agreement. Contractor acknowledges that the Warranty Period provides a period during which Contractor has a duty to repair and does not in any way limit Contractor's liability for Work that is not in accordance with the Agreement Documents, including any that may be discovered more than one (1) year after the date of Final Completion of a Task Order or expiration of the Agreement Term.

13.3 Without limiting the responsibility or liability of Contractor under the Agreement, all warranties given by manufacturers on materials or equipment incorporated in the Work are hereby assigned by Contractor to the City at no additional cost to the City. If requested, Contractor shall execute enforceable formal assignments of said manufacturer's warranties to the City at no additional cost to the City. Contractor shall not obtain any materials or equipment under warranties, which do not run directly to the benefit of the City, and all such warranties shall be directly enforceable by the City.

13.4 The foregoing warranties, and those contained elsewhere in the Agreement Documents or implied by law, shall be deemed cumulative and not alternative or exclusive. No one or more of them shall be deemed to alter or limit any other.

14. CORRECTION OF THE WORK

The Contractor shall promptly correct Work rejected by the City or Work failing to conform to the requirements of the Agreement Documents, whether discovered before or after Substantial Completion of a Task Order and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Owner's, Owner's consultants, or a design professionals' services and expenses made necessary thereby, shall be at the Contractor's expense. If the Contractor fails to correct defective or non-conforming Work within seventy-two (72) hours from receipt of the City's written notice, then the City shall have the right to correct the defective or non-conforming work at Contractor's expense.

15. INDEMNIFICATION

15.1 To the fullest extent permitted by law, the Contractor shall indemnify, defend, and hold harmless the Owner and from and against any and all claims, damages, losses, demands, judgments and costs of suit or defense, including attorneys' fees, and reimburse Owner for any expense, damage or liability incurred by Owner whether for personal injury, property damage, direct or consequential damage, or economic loss arising or alleged to have arisen from the acts or omissions of Contractor, a subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to any party or person. This indemnity obligation shall include, but not be limited to, claims made or lawsuits filed by employees of Contractor or employees of anyone for whose acts Contractor may be liable, and claims made or lawsuits filed by employees of Owner. The foregoing indemnification does not apply to claims arising out of the sole negligence of Owner. Contractor further agrees to reimburse Owner for all costs and expenses, including attorneys' fees, expert witness fees, and/or consultant fees incurred to enforce these indemnity obligations.

15.2 Contractor will save and keep all Projects related to this Agreement free from all mechanics' liens and all other liens by reason of its Work or of any materials or other things used by it therein. If Contractor fails to remove any lien by bonding it, or otherwise, Owner, among other remedies, may retain sufficient funds out of any money due or thereafter to become due by Owner to Contractor to pay the same and all costs incurred by reason thereof, and may pay said lien or liens and Owner's costs associated with the lien or liens including reasonable attorneys' fees out of any funds at any time in the hands of Owner owing to Contractor. Contractor agrees that it shall be obliged to bond off any claim of lien of any of its subcontractors or suppliers notwithstanding any claim or argument as to non-payment or an alleged prior breach by Owner as an alleged result of non-payment. Contractor's obligation to bond off all liens of its subcontractors and suppliers is absolute and unconditional, and Contractor's failure to bond off any lien shall be deemed a material breach and default of this Agreement. Contractor's performance and/or payment bond sureties shall be obliged to bond all liens filed by subcontractors and suppliers of Contractor in the event that Contractor fails for any reason whatsoever to bond any such lien filed after ten (10) days written notice from Owner to Contractor demanding the bonding of such lien(s). Contractor understands and agrees that it shall ensure that its own subcontractors and suppliers have the same obligations as Contractor under this Article.

15.3 Contractor shall indemnify and hold City, harmless from and against any losses, liabilities, damages, demands and claims, and all related costs (including reasonable attorneys' fees and costs of investigation, litigation, settlement, judgment, interest and penalties) arising from claims or actions based upon any of the Work, Services, materials or methodologies used by Contractor (or any Contractor agent, subcontractor, sub-tier contractor or representative), or the City's use thereof (or access or other rights thereto) in connection with the Work, infringes or misappropriates the intellectual property rights of a third party. If any Work, Services, materials, or methodologies provided by Contractor hereunder is held to constitute, or in the City's reasonable judgment is likely to constitute, an infringement or misappropriation, the City may direct that Contractor: (i) procure the right for the City to continue using such Work, Services, or methodologies; (ii) replace such Work, Services, materials or methodologies with a non-infringing equivalent, provided that such replacement does not result in a degradation of the functionality, performance or quality of the Work; (iii) modify such Work, Services, materials or methodologies, or have such Work,

Services, materials or methodologies modified, to make them non-infringing, provided that such modification does not result in a degradation of the functionality, performance or quality of the Work, Services, materials or methodologies; or (iv) create a feasible workaround that would not have any adverse impact on City.

16. DISPUTE RESOLUTION

16.1 At the City's sole election, any Claim arising out of or related to the Agreement shall be subject either to binding arbitration or litigation at the City's option. Prior to arbitration or litigation, the parties shall endeavor to resolve Claims or disputes in accordance with the terms of this Agreement.

16.2 If Claims are not resolved by negotiation, mediation, or otherwise, and the Owner elects arbitration, the arbitration shall be held in Atlanta, Georgia and shall be in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently then in effect or such other similar rules and organization as the Owner may elect. The demand for arbitration shall be in writing and filed with the appropriate organization selected by the Owner and shall be served on the Contractor. The agreement to arbitrate shall be specifically enforceable under applicable law in any court having jurisdiction thereof. In any arbitration or litigation, the arbitrators or the Court shall have the jurisdiction to award the City costs, arbitrator fees, expert fees, and attorneys' fees, and the arbitrators or the Court shall award all such fees to the City if it is the prevailing party.

16.3 Except at Owner's sole discretion and with its consent, no arbitration arising out of or relating to the Agreement shall include, by consolidation or joinder or in any other manner, any other person or entity, including but not limited to any of Contractor's subcontractors and suppliers, and any other separate contractors or suppliers. The Owner's consent or election to allow consolidation or joinder shall not constitute consent to arbitration of any Claim not subject to arbitration pursuant to this Contract.

16.4 Any award rendered by an arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

16.5 If the Owner does not elect arbitration, any Claims shall be resolved in Fulton County, Georgia Superior Court. Contractor hereby submits to jurisdiction and venue in Fulton County, Georgia, and waives all defenses based on a lack of jurisdiction and/or venue. Contractor acknowledges that this Agreement was negotiated, at least in part, in Fulton County, Georgia. In any arbitration or litigation, the arbitrators or the Court shall have the jurisdiction to award the City costs, arbitrator fees, expert fees, and attorneys' fees, and the arbitrators or the Court shall award all such fees to the City if it is the prevailing party.

17. EXTENSIONS OF TIME AND DELAY

Contractor shall not be entitled to payment or compensation of any kind from the City for indirect, impact, or delay damages, including but not limited to costs of delay, disruption, interference, ripple effect, unforeseen site conditions, loss of anticipated profits, impact or hindrance from any cause whatsoever (collectively "Delay Damages"), whether such delay, disruption, interference, ripple effect, unforeseen site conditions, impact or hindrance be reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable. Contractor expressly waives and releases any Claim for Delay Damages and agrees that Contractor's sole and exclusive remedy for any delay shall be an extension of time to perform the Work and Services required the Agreement Documents, which shall be administered in accordance with the requirements of Article 8.

18. MISCELLANEOUS

18.1 The law of the state of Georgia will govern the validity of this Agreement, its interpretation and performance, and any other claims related to it.

18.2 If any of the provisions contained in the Agreement Documents are held for any reason to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability will not affect any other provision, and the Agreement Documents will be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

18.3 Contractor shall not sell, transferor, or assign any or all of its respective rights and obligations under this Agreement to a third party without the City's written consent. Any attempted sale, transfer, or assignment of the rights or obligations of this Agreement shall be void and of no effect.

18.4 Articles 1, 4, 5, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, and 20 shall survive termination of this Agreement.

18.5 The Drawings or other Instruments of Service prepared by Contractor or its sub-tier contractors shall be owned by the City and may be used by the City on projects other than the Project(s) performed in connection with a Task Order issued per this Agreement.

18.6 Except as otherwise provided herein, all notices and other communications required or permitted to be given under this Agreement, including its Exhibits and Task Orders, shall be in writing, addressed to the parties at their respective addresses as provided below, and may be delivered in person, sent by overnight express mail or courier service, or by facsimile, or by certified mail postage prepaid, return receipt requested. The addresses of each party are as follows:

City of Atlanta:

Contractor:

Each party may from time to time change its address for receipt of notices by sending notice thereof in the manner provided herein to the other Party.

18.7 The failure of the City to insist upon or enforce strict performance of any provision of this Agreement or to exercise any right under the Agreement Documents shall not be construed as a waiver or relinquishment of the City's right to assert or rely upon any such provision or right and/or any other requirement of the Agreement Documents.

18.8 The Agreement Documents constitute the entire agreement and supersede all prior written or oral understandings, and may only be changed by a written amendment to the Agreement executed by both the City and the Contractor.

18.9 Contractor acknowledges and agrees that it may be adequately compensated in money damages for any Claims arising from performance of the Agreement Documents. Accordingly, Contractor waives and releases any right to assert a claim for *quantum meruit*, unjust enrichment, and any other equitable or quasi-contractual claim for relief that may be available under applicable law.

18.10 During the performance of this Agreement, Contractor agrees to comply with all provisions of Part 2, Chapter 2, Article X, Division 11, including Section 2-1441 through 2-1460 of the Code of Ordinances of the City of Atlanta, the Equal Business Opportunity ("EBO") Program as may be hereafter amended.

18.11 No presumption of any applicable law relating to the interpretation of contracts against the drafter shall apply to this Agreement.

18.12 Contractor is an independent contractor of the City and nothing in this Agreement shall be deemed to constitute Contractor and the City as partners, joint venturers, or be construed as requiring or permitting the sharing of profits or losses. Except as expressly provided in Article 6.10, nothing in this Agreement shall be deemed to constitute Contractor and the City as principal and agent and neither party has the authority to represent or bind or create any legal obligations for or on behalf of the other party.

18.13 Contractor acknowledges that this Agreement and any changes to it by amendment, modification, Change Order or other similar document may have required or may require the legislative authorization of the City's Council and approval of the Mayor. Under Georgia law, Contractor is deemed to possess knowledge concerning the City's ability to assume contractual obligations and the consequences of Contractor's provision of goods or Services to the City under an unauthorized contract, amendment, modification, Change Order or other similar document, including the possibility that the Contractor may be precluded from recovering payment for such unauthorized goods or Services. Accordingly, Contractor agrees that if it provides goods or Services to the City under a contract that has not received proper legislative authorization or if Contractor provides goods or Services to the City in excess of the any contractually authorized goods or Services, as required by the City's Charter and Code, the City may withhold payment for any unauthorized goods or Services provided by Contractor. Contractor assumes all risk of non-payment for the provision of any unauthorized goods or Services to the City, and it waives and releases all claims to payment or to other remedies for the provision of any unauthorized goods or Services to the City, however characterized, including, without limitation, all remedies at law or equity.

19. CONFIDENTIAL INFORMATION

Contractor agrees to preserve as strictly confidential all Confidential Information for two (2) years following the expiration or termination of this Agreement; provided, however, that Contractor's obligation for Confidential Information that constitutes trade secrets pursuant to applicable law will continue for so long as such Confidential Information continues to constitute a trade secret under applicable law. Any Confidential Information that may be deemed Sensitive Security Information by the Department of Homeland Security or any other similar Confidential Information related to security will be considered trade secrets. Upon request by City, Contractor will return any trade secrets to City. Contractor agrees to hold the Confidential Information of the City in trust and confidence and will not disclose it to any person, or use it (directly or indirectly) for its own benefit or the benefit of any other person other than in the performance of its obligations under this Agreement. Contractor will be entitled to disclose any Confidential Information if compelled to do so pursuant to: (i) a subpoena; (ii) judicial or administrative order; or (iii) any other requirement imposed upon it by applicable law. Prior to making such a disclosure, to the extent allowed pursuant to applicable law, the Contractor shall provide the City with thirty six (36) hours prior notice by facsimile of its intent to disclose, describing the content of the information to be disclosed and providing a copy of the pleading, instrument, document, communication or other written item compelling disclosure or, if not in writing, a detailed description of the nature of the communication compelling disclosure with the name, address, phone number and facsimile number of the person requesting disclosure.

20. ETHICS IN CONTRACTS

20.1 Gratuities and Kickbacks. In accordance with the City of Atlanta's Code of Ordinances, Section 2-1484, as may be amended, it shall be unethical for any person to offer, give or agree to give any employee or former employee or for any employee or former employee to solicit, demand, accept or agree to accept from another person a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification

or procurement standard, rendering of advice, investigation, auditing or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy or other particular matter pertaining to any program requirement or a contract or subcontract or to any solicitation or proposal therefor. Additionally, it shall be unethical for any payment, gratuity or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime contractor or higher tier subcontractor or any person associated therewith as an inducement for the award of a subcontract or order.

20.2 Fraud and misrepresentations. Any written or oral information provided by Contractor directly or indirectly related to the performance of the Work required by this Agreement constitutes material representations upon which the City relies for the requirements of the Agreement and compliance with local, state and federal rules and regulations. Contractor agrees to immediately notify the City of any information provided to the City that it knows and/or believes to be false and/or erroneous and immediately provide correct information to the City and take corrective action. Contractor further agrees to immediately notify the City of any actions or information that it believes would constitute fraud or intentional misrepresentations to the City in the performance of this Agreement, whether or not such information actually constitutes fraud and/or intentional misrepresentations, by contacting the Integrity Line 1-800-884-0911. Contractor agrees to place signage provided by the City regarding the Integrity Line at the location to which Contractor's employees report to perform the Work required by this Agreement. Contractor acknowledges and agrees that a finding of fraud or other impropriety on the part of the Contractor or any of its subcontractors may result in suspension or debarment; and the City may pursue any other actions or remedies that the City may deem appropriate. Contractor agrees to include this clause in its subcontracts and take appropriate measures to ensure compliance with this provision.

[Signatures on the following pages.]

DRAFT

The parties hereto by authorized representatives have executed this Agreement as of the Effective Date.

The City of Atlanta

Mayor

Attest:

Municipal Clerk (Seal)

Recommended:

Chief Procurement Officer:

Commissioner:

Department of Public Works

Commissioner:

Department of Watershed Management

Approved as to form:

City Attorney

Signature Block Options for Contractor:

Corporate signature:

[Insert Corporate Name]

By: _____

Name: _____

Title: _____

Corporate Secretary/Assistant

Secretary (Seal)

Limited Liability Company:

[Insert LLC Name]

By: _____

Name: _____

Title: _____

Notary Public (Seal)

My Commission Expires:

DRAFT

EXHIBIT A.2

TASK ORDER FORM

TASK ORDER NO. _____

PROJECT: FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters

Contractor will complete the Services described below in accordance with the terms and conditions in the Construction Services Agreement.

DATE OF ISSUANCE: _____

CONTRACTOR: _____

PROJECT LOCATION: _____

SERVICES UNDER TASK ORDER NO. _____:

Contractor shall perform the Services for the purpose of [insert general description of Services to be performed], as more particularly described in the scope of work and accepted proposal from Contractor attached and incorporated herein as **Exhibit 1** to this Work Order No. _____, including the attached schedule of unit prices for performing the required Services.

NOTICE TO PROCEED:

[check one of the following provisions]

____ Contractor shall commence Work within ____ days of the date of this Task Order.

____ Contractor shall commence Work within ____ days of receipt of a Notice To Proceed Work issued by the City.

TIME FOR COMPLETION: [identify with specificity all dates for Services from Contractor]

- a. Substantial Completion:
- b. Final Completion:
- c. Milestones:

PAYMENT METHOD:

____ Option 1: (Section 4.1.1); or

____ Option 2: (Section 4.1.2)

TASK ORDER MAXIMUM PAYMENT AMOUNT:

[insert total amount of payment for this Task Order based on unit prices in **Exhibit A.1**]

REQUIRED SUBMITTALS AND DOCUMENTATION:

[INSERT ANY AND ALL DOCUMENTATION REQUIRED FOR SERVICES, INCLUDING ALL SHOP DRAWINGS, AS-BUILTS REQUIRED FOR FINAL ACCEPTANCE]

LIST OF APPROVED MATERIALS AND EQUIPMENT: (IF REQUIRED FOR A WORK ORDER, LIST ALL APPROVED MANUFACTURERS AND EQUIPMENT PROVIDERS APPROVED IN CONTRACTOR'S PROPOSAL)

FINAL ACCEPTANCE OF WORK REQUIREMENTS:

[INSERT SPECIAL TERMS FOR FINAL ACCEPTANCE OF WORK, INCLUDING ANY SIGN OFFS, DELIVERABLES]

CONFIRMATION THAT SERVICES AS LISTED ARE REQUESTED BY THE CITY

By: _____
Name: _____
Title: Field Engineer
Dated this _____ day of _____, 20__

By: _____
Name: _____
Title: Project Manager
Dated this _____ day of _____, 20__

CONFIRMATION OF SERVICE ASSIGNMENT ACCEPTED BY CONTRACTOR

By: _____
Name: _____
Title: _____
Dated this _____ day of _____, 20__

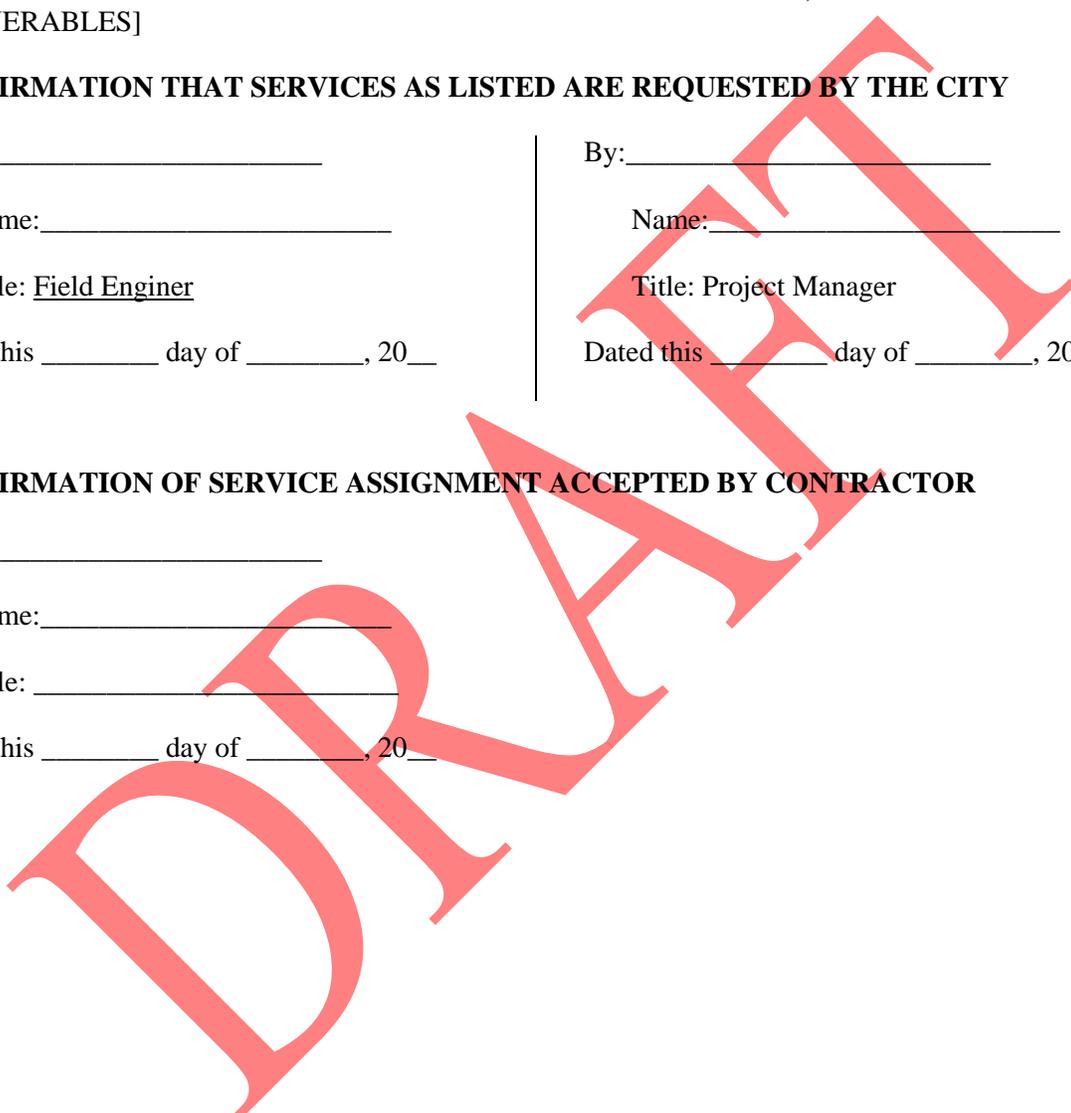


EXHIBIT 1 TO TASK ORDER FORM
SCOPE OF WORK/ACCEPTED CONTRACTOR
PROPOSAL

SCHEDULE OF UNIT PRICES FOR CONSTRUCTION SERVICES FOR EXHIBIT A TO TASK ORDER FORM

Date of Issue: _____

Issued to: _____

Project Location: _____

Project/Contract: **FC-7908, Annual Contract for the Construction of Sidewalks, Driveways, Curbs, and Gutters**

Purchase Order No: _____

ITEMIZED SCOPE OF WORK:

COA – ITEM #	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	AMOUNT
			Work Order Total:		

EXHIBIT B

**GENERAL CONDITIONS
NOT APPLICABLE**

EXHIBIT C

**SPECIAL CONDITIONS
NOT APPLICABLE**

EXHIBIT D

BID SCHEDULE

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE		COST	
				DOLLARS	CENTS	DOLLARS	CENTS
1	CITY STANDARD 4-INCH CONCRETE SIDEWALK	SY	22,700				
2	CITY STANDARD 4-INCH CONCRETE SIDEWALK WITH IMPRINTED HEXAGONAL PATTERN	SY	3,100				
3	COA STANDARD 4" CONCRETE SIDEWALK WITH IMPRINTED BRICK PATTERN AND COLOR	SY	4,500				
4	CITY MONOLITHIC CONCRETE SIDEWALK WITH CURB	SY	17,400				
5	CITY STANDARD MONOLITHIC SIDEALK WITH HEXAGONAL IMPRINTT	SY	5,556				
6	CITY STANDARD MONOLITHIC SIDEWALK WITH BRICK IMPRINT	SY	3,500				
7	CITY STANDARD CONCRETE DRIVEWAY APRON, 6-INCH THICK	SY	9,800				
8	CITY STANDARD CONCRETE DRIVEWAY APRON, 8-INCH THICK	SY	1,075				
9	CITY STANDARD WHEELCHAIR RAMP, 6-INCH THICK WITH DETECTABLE TACTILE WARNING SYSTEM	SY	2,550				
10a	CITY STANDARD COMBINATION CONCRETE CURB AND GUTTER, 30"	LF	2,560				
10b	CITY STANDARD COMBINATION CONCRETE CURB AND GUTTER 24"	LF	1,700				
11	CITY STANDARD CONCRETE HEADER CURB	LF	25,700				
12	CITY STANDARD GRANITE CURB (GRADE A)	LF	3,000				

12A	CITY STANDARD GRANITE CURB (GRADE B) ROUGH TOP	LF	3,000				
12B	CITY STANDARD GRANITE CURB (GRADE A RADIUS)	LF	600				
12C	CITY STANDARD GRANITE CURB (GRADE B RADIUS)	LF	600				
13	RESET OR ADJUST EXISTING GRANITE CURB	LF	3,500				
14	GRASSING	SY	10,815				
15	FURNISH AND INSTALL CITY STANDARD SIDEWALK FLUMES	EA	20				
16	ADJUST EXISTING MANHOLE RINGS AND COVERS OR CATCH BASIN GRATES, FRAMES AND COVERS TO GRADE	EA	80				
17	INSTALL GA DOT STD 1033 OR COA TYPE "C" CATCH BASIN	EA	6				
18	INSTALL COA TYPE "B" CATCH BASIN	EA	15				
19	INSTALL COA STD DROP INLET OR GA DOT 9031S OR DOT 9031U	EA	7				
20	INSTALL GA DOT STD 1034 OR COA DOUBLE TYPE "B" CATCH BASIN	EA	3				
21	STORM DRAINAGE STRUCTURE CLEAN UP - 6' DEPTH	EA	100				
22	ADJUST EXISTING VALVE BOXES, ELECTRICAL PULL BOXES, AND SIMILAR INSERTS IN THE WORK TO GRADE	EA	434				
22A	ADJUSTMENTS TO WATER LINES, REMOVE, FURNISH AND INSTALL WATER PIPES (3/4-INCH TO 2-INCH DIAMETER)	EA	110				
22B	SANITARY SEWER SERVICE LATERAL REPLACEMENT 6-INCHES DIAMETER AND UNDER	EA	50				

22C	SEWER, INTERNAL PIPE INSPECTION, SERVICE LATERAL, 4-INCH TO 6-INCH DIAMETER	EA	50				
22D	ADJUSTMENTS TO WATER LINES, REMOVE, FURNISH, AND INSTALL DUCTILE IRON PIPE AND FITTINGS (3-INCH TO 12 INCH DIAMETER)	EA	15				
23	PROVIDE AND INSTALL CLEANOUT BOXES, VALVE BOXES AND/OR METER BOXES TO GRADE	EA	75				
24a	CITY OF ATLANTA STANDARD MASONRY WALL, 0-4 FT IN HEIGHT	SF	8,500				
24b	CITY OF ATLANTA STANDARD MASONRY WALL, 4 FT AND HIGHER	SF	1,700				
25	COA SEGMENTAL RETAINING WALL	SF	3,500				
26	INTENTIONALLY LEFT BLANK						
27	CRUSHED AGGREGATE BASE, 4 INCH THICK	SY	100				
28	CRUSHED AGGREGATE BASE, 6 INCH THICK	SY	100				
29	ASPHALT CONCRETE BLACK BASE OR "B" BINDER 4 ½" THICK	SY	40				
30	ASPHALT CONCRETE BLACK BASE OR "B" BINDER 6 ½" THICK	SY	40				
31A	ASPHALT CONCRETE "E" OR "F" SURFACE COURSE , 1 ½" THICK	SY	40				
31B	ASPHALT CONCRETE "E" OR "F" SURFACE COURSE , 1 ½" THICK WITH GIBSONITE ADDITIVE	SY	40				
32	TREE REMOVAL 6" TO 18" IN DIAMETER	EA	350				
33A	TREE REMOVAL ABOVE 18" TO 36" IN DIAMETER	EA	45				

33B	TREE REMOVAL WITH GREATER THAN 36" IN DIAMETER	EA	10				
34A	TREE REPLACEMENT FOR TREES 2.5" TO 3.5"	EA	1,500				
34B	TREE REPLACEMENT FOR TREES 4" to 7" Medium	EA	50				
34C	TREE REPLACEMENT FOR TREES > 7.5" Large	EA	25				
35	REPLACEMENT OF FENCE (FIELD FENCE)	LF	200				
36	REPLACEMENT OF FENCE (WOVEN WIRE)	LF	150				
37	REPLACEMENT OF FENCE (BARBED WIRE)	LF	175				
38	REPLACEMENT OF FENCE (CHAIN LINK)	LF	500				
39	INSTALLATION OR REPLACEMENT OF RAIL (PIPE HANDRAIL)	LF	4,000				
40	INSTALLATION OF 18" RCP PIPE	LF	800				
41	INSTALLATION OF 18" DIP PIPE	LF	300				
42	INSTALLATION OF 24" RCP PIPE	LF	300				
43	INSTALLATION OF 24" DIP PIPE	LF	300				
44	REPLACEMENT OF GUARDRAIL ANCHOR (TYPE 1,9,11,12)	LF	150				
45	INSTALLATION OF WOOD POST MAILBOXES (All mailboxes shall be installed in PVC sleeves except where installed in grass strips.)	EA	200				

46	INSTALLATION OF STEEL POST MAILBOXES (All mailboxes shall be installed in PVC sleeves except where installed in grass strips.)	EA	200				
47	SAW CUT OF PAVEMENT (ASPHALT OR CONCRETE)	LF	3,000				
48	BANK (SLOPE) EXCAVATION	CY	4,230				
49	REPLACEMENT OF UNSUITABLE MATERIAL WITH CRUSHED STONE	CY	500				
49A	IMPORT BACKFILL	CY	3,000				
50	INSTALLATION, MAINTENANCE AND REMOVAL OF SAFETY FENCE	LF	500				
51	INSTALLATION, MAINTENANCE, AND REMOVAL OF SILT FENCE	LF	16,280				
52	INSTALLATION, MAINTENANCE, AND REMOVAL OF HAY BALES	LF	300				
53	INSTALLATION OF RIP RAP	TON	500				
54	REPLACEMENT OF UNSUITABLE MATERIAL WITH EARTH	CY	100				
55	MOBILIZATION	EA	10				
56	CASH ALLOWANCE	LS	N/A				
57	SIDEWALK DEMOLITION	SY	25,000				
58	CURB DEMOLITION	LF	5,100				
58A	CITY STANDARD DRIVEWAY APRON 6" DEMOLITION	SY	8,000				

58B	CITY STANDARD DRIVEWAY APRON 8" DEMOLITION	SY	8,000				
58C	REMOVAL OF WHEEL CHAIR RAMP	SY	4,000				
59	INTENTIONALLY LEFT BLANK						
60A	THERMOPLASTIC STRIPING REMOVAL 5" WHITE OR YELLOW	LF	1,500				
60B	THERMOPLASTIC STRIPING REMOVAL 5" DOUBLE YELLOW	LF	2,000				
60C	THERMOPLASTIC STRIPING REMOVAL 12" WHITE	LF	100				
60D	THERMOPLASTIC STRIPING REMOVAL 24" WHITE	LF	100				
60E	THERMOPLASTIC STRIPING REMOVAL 8' Ft. CROSSWALK	LF	240				
61	RESET SIGNS	EA	250				
62	THERMOPLASTIC STRIPE 6" WHITE	LF	200				
63	THERMOPLASTIC STRIPE 8" WHITE	LF	200				
64	THERMOPLASTIC STRIPE 12" WHITE	LF	1,000				
65	THERMOPLASTIC STRIPE WHITE 24" (STOP BAR)	LF	100				
66	THERMOPLASTIC STRIPE DOUBLE YELLOW	LF	1,000				
67	COA TYPE "C" LIGHTS - WITH POLES	EA	25				

68A	COA – TYPE “A” LIGHTS - WITH 25 Ft. POLES	EA	13				
68B	COA – TYPE “A” LIGHTS - WITH 29 Ft. POLES	EA	13				
69A	COA - BENCHES	EA	20				
69B	COA - BIKE RACKS	EA	20				
70	COA – TRASH RECEPTACLE	EA	20				
71	COA – REINFORCED CANTILEVER SIDEWALK SLAB 4”	SF	500				
72	COA – REINFORCED CANTILEVER SIDEWALK SLAB 5”	SF	500				
73	TWIN 2” PVC (HD) CONDUIT	LF	5,000				
74a	SIDEWALK/DRIVE WITH BRICK PAVERS, LAID OVER 4” CONCRETE	SF	1,000				
74b	SIDEWALK/DRIVE WITH BRICK PAVERS, LAID OVER 6” CONCRETE	SF	1,000				
74c	SIDEWALK/DRIVE WITH BRICK PAVERS, LAID OVER 8” GRAVEL AND TOPPED WITH ¾” SAND INCL. GEO-TEXTILE FABRIC WHEREVER REQUIRED	SY	1,000				
75a	SIDEWALK/DRIVE WITH CONCRETE PAVERS, LAID OVER 4” CONCRETE	SY	1,000				
75b	SIDEWALK/DRIVE WITH CONCRETE PAVERS, LAID OVER 6” CONCRETE	SY	1,000				
75c	SIDEWALK/DRIVE WITH CONCRETE PAVERS, LAID OVER 8” GRAVEL AND TOPPED WITH ¾” SAND INCL. GEO-TEXTILE FABRIC WHEREVER REQUIRED	SY	1,000				
76	CITY STANDARD CONCRETE DRIVEWAY APRON, 6-INCH THICK, MADE FROM RECYCLABLE AGGREGATES AND/OR CONCRETE	SY	9,800				

77	CITY STANDARD CONCRETE DRIVEWAY APRON, 8-INCH THICK, MADE FROM RECYLABLE AGGREGATES AND/OR CONCRETE	SY	1,075				
78	CITY STANDARD WHEELCHAIR RAMP, 6-INCH THICK WITH DETECTABLE TACTILE WARNING SYSTEM, MADE FROM RECYLABLE AGGREGATES AND/OR CONCRETE	SY	2,550				
79	CITY STANDARD COMBINATION CONCRETE CURB AND GUTTER 30", MADE FROM RECYLABLE AGGREGATES AND/OR CONCRETE	LF	2,560				
80	CITY STANDARD COMBINATION CONCRETE CURB AND GUTTER 24", MADE FROM RECYLABLE AGGREGATES AND/OR CONCRETE	LF	2,550				
81	CITY STANDARD CONCRETE HEADER CURB, MADE FROM RECYLABLE AGGREGATES AND/OR CONCRETE	LF	25,700				
82	FURNISH AND INSTALL CITY STANDARD SIDEWALK FLUMES, MADE FROM RECYLABLE AGGREGATES AND/OR CONCRETE	EA	50				
83	RECYCLED CRUSHED AGGREGATE BASE, 4 INCH THICK	SY	1,000				
84	RECYCLED CRUSHED AGGREGATE BASE, 6 INCH THICK	SY	1,000				
85	CRUSHED CONCRETE AGGREGATE, 4" THICK	SY	1,000				
86	CRUSHED CONCRETE AGGREGATE, 6" THICK	SY	1,000				
87	2'X3' RECYCLED PLASTIC SIDEWALK PANEL	EA	2,000				
88	ADJUST METER BOX / MASONRY / CONCRETE VAULT TO GRADE (METER SIZES 1 1/2 - INCH AND 2-INCH)	EA	10				
89	ADJUST EXISTING METER VAULT TOP TO GRADE (METER SIZES 3-INCH THROUGH 12-INCH)	EA	10				
90	FURNISH AND INSTALL FIRE HYDRANT ASSEMBLY	EA	25				
91	VERTICAL ADJUSTMENT OF EXISTING FIRE HYDRANT	VF	50				

92	HORIZONTAL ADJUSTMENT OF EXISTING FIRE HYDRANT	LF	10				
93	FURNISH AND INSTALL THRUST BLOCK (CLASS B UNREINFORCED CONCRETE)	CY	100				
94	CUT, PLUG AND ABANDON EXISTING SERVICE LINES (CURB STOP ABANDONMENTS)	EA	20				
95	CUT, PLUG AND ABANDON EXISTING SERVICE LINES (CORPORATION STOP ABANDONMENTS)	EA	20				
96	FURNISH AND INSTALL DUCTILE IRON PIPE AND FITTINGS (4-INCH DIAMETER)	LF	50				
97	FURNISH AND INSTALL DUCTILE IRON PIPE AND FITTINGS (6-INCH DIAMETER)	LF	100				
98	FURNISH AND INSTALL DUCTILE IRON PIPE AND FITTINGS (8-INCH DIAMETER)	LF	200				
99	FURNISH AND INSTALL DUCTILE IRON PIPE AND FITTINGS (12-INCH DIAMETER)	LF	100				
100	FURNISH AND INSTALL MECHANICAL JOINT GATE VALVES AND VALVE BOXES (4-INCH DIAMETER)	EA	10				
101	FURNISH AND INSTALL MECHANICAL JOINT GATE VALVES AND VALVE BOXES (6-INCH DIAMETER)	EA	15				
102	FURNISH AND INSTALL MECHANICAL JOINT GATE VALVES AND VALVE BOXES (8-INCH DIAMETER)	EA	25				
103	FURNISH AND INSTALL MECHANICAL JOINT GATE VALVES AND VALVE BOXES (12-INCH DIAMETER)	EA	6				
104	FURNISH AND INSTALL COPPER PIPE (3/4-INCH DIAMETER)	LF	100				
105	FURNISH AND INSTALL COPPER PIPE (3/4-INCH DIAMETER)	LF	100				
106	FURNISH AND INSTALL COPPER PIPE (1-1/2 -INCH DIAMETER)	LF	100				

107	FURNISH AND INSTALL COPPER PIPE (2-INCH DIAMETER)	LF	100				
108	EXCAVATION AND DISPOSAL OF SOILS, DEBRIS	CY	625				
109	# 57 STONE DRAINAGE LAYER, INSTALLED	CY	105				
110	# 3 STONE SUBBASE, INSTALLED	CY	350				
111	# 89 STONE DRAINAGE CHOKER LAYER, INSTALLED	CY	105				
112	4" PERFORATED PVC UNDERDRAIN, WITH FITTINGS	LF	200				
113	6" PERFORATED PVC UNDERDRAIN, WITH FITTINGS	LF	200				
114	CONNECTION OF UNDERDRAINS TO EXISTING STORM SEWER	EA	8				
115	ENGINEERED SOIL MIX	CY	55				
116	IMPERMEABLE GEOMEMBRANE LINER	SF	2100				
117	SHREDDED HARDWOOD MULCH	CY	5				
118	RIVER COBBLE, 4 TO 5 INCH IN DIAMETER	Ton	4				
119	PLANTINGS OTHER THAN TREES	EA	markup factor X * wholesale price				
120	CONCRETE PLANTER WALL	LF	150				
121	GEOTEXTILE	SF	4800				

122	PERMEABLE INTERLOCKING CONCRETE PAVERS	SY	270				
123	6 INCH PERVIOUS CONCRETE PAVING	SY	270				
124	MONITORING WELL: 1 INCH PERFORATED PVC WITH WATER VALVE BOX AND COVER	EA	10				
125	COA STANDARD DROP INLET YARD INLET	EA	2				
126	DOMED IRON GRATE FOR CATCH BASIN	EA	2				
127	1 ½" RIGID STEEL CONDUIT	LF	400				
128	6X6 Vehicle Loop Detectors	EA	20				
129	6X40 Vehicle Loop Detectors	EA	40				
130	6X50 Vehicle Loop Detectors	EA	40				
Bid Total (Items 1-127)		\$					
Bid Total In Words:							

EXHIBIT E

SCOPE OF SERVICES AND TECHNICAL SPECIFICATIONS

FC-7908, Annual Contract for Construction of Sidewalks, Driveways, Curbs and Gutters

TABLE OF CONTENTS

Scope of Work
Section 01025..... Measurement and Payment
Section 01040..... Coordination
Section 01045..... Cutting and Patching
Section 01055..... Construction Staking
Section 01060..... Regulatory Requirements
Section 01200..... Project Meetings
Section 01310..... Bar Chart Construction Schedule
Section 01320..... Construction Photographs
Section 01340..... Shop Drawings, Product Data & Samples
Section 01400..... Quality Assurance/Quality Control
Section 01410..... Testing Laboratory Services
Section 01540..... Job Site Security
Section 01550..... Traffic Regulation
Section 01562..... Dust Control
Section 01569..... Safety on Projects
Section 01580..... Project Identification and Signs
Section 01610..... Transportation and Handling
Section 01611..... Storage and Protection
Section 01630..... Substitution and Options
Section 01710..... Cleaning
Section 01720..... Record Documents
Section 02125..... Erosion and Sediment Control
Section 02140..... Dewatering
Section 02150..... Sheeting, Shoring and Bracing
Section 02200..... Earthwork
Section 02225..... Trench Excavation and Backfill
Section 02302..... Granite Curb
Section 02308..... Hexagonal Block Pavement
Section 02310..... Unit Pavers
Section 02371..... Green Infrastructure Geotextiles
Section 02491..... Rehabilitation of Sanitary Sewer Manholes
Section 02511..... Preconditioning and Cleaning Manholes and Sewers
Section 02513..... Construction of Sidewalks, Curbs, Ramps, and Aprons
Section 02530..... Concrete Segmental/Interlocking Retaining Wall System
Section 02532..... Concrete Curbs and Gutters
Section 02616..... Polyethylene Encasement of Ductile Iron Pipe
Section 02645..... Hydrants
Section 02665..... Water Mains and Accessories
Section 02668..... Service Connection
Section 02675..... Disinfection of Water Mains

Section 02681.....	Subdrainage for Stormwater Quality Facilities
Section 02682.....	Pretreatment for Stormwater Quality Facilities
Section 02683.....	Subsurface Infiltration Facilities
Section 02700.....	Removing and Replacing Pavement
Section 02730.....	Sewers and Accessories
Section 02735.....	Sewer Services Connections
Section 02750.....	Wastewater Flow Control
Section 02796.....	Permeable Interlocking Concrete Pavers
Section 02798.....	Pervious Concrete Paving
Section 02900.....	Trees, Shrubs, Perennials and Ground Cover General
Section 02920.....	Site Restoration
Section 02922.....	Amended Soil and Mulch
Section 02933.....	Seeding and Sodding
Section 02949.....	Stormwater Planters
Section 03100.....	Concrete Formwork
Section 03200.....	Concrete Reinforcement and Dowelling
Section 03250.....	Concrete Joints
Section 03300.....	Cast-in-Place Concrete
Section 03460.....	Large Water Meter Vaults
Section 03461.....	Small Water Meter Vaults
Section 03600.....	Grout
Section 03605.....	Doweling Into Existing Concrete
Section 04000.....	Masonry
Section 07900.....	Caulking and Sealants
Section 08305.....	Access Hatches
Section 15095.....	Pipe Couplings
Section 15100.....	Valves and Appurtenances

Scope of Work

1.01 SCOPE

This section describes the scope of work for this *Annual Contract for the construction of sidewalks, driveways, curbs and Gutters*. The provisions of this section shall not supersede the Requirements, Contract Forms or General Conditions of the contract.

1.02 PROJECT DESCRIPTION

The work to be performed under this contract shall consist of furnishing all labor, materials, tools, equipment and incidentals needed to perform the work described.

1.03 WORK ORDERS (Sample Work Order Next Page)

- A. The Contractor shall perform the work in accordance with the terms and conditions described herein on a Task Order basis. The Task Order incorporates by the reference all the terms and conditions contained in the Agreement between the City and the Contractor.
- B. The general description of the Work and services to be performed by the Contractor is set forth in the Agreement and incorporated in the Task Order reference. The detailed description of the task and services to be performed by the Contractor shall be set forth in the Task Order and incorporated in the Agreement herein by this reference.
- C. The general description of the Period of Performance to be performed by the Contractor shall be set forth in the Agreement and incorporated herein reference the schedule for the work to be performed by the Contractor shall be set forth in the Task Order.

1.04 TASK ORDER PROCESS

- A. The Department of Public Works or Department of Watershed Management Initiates Task Order Process: The Department of Public Works or Department of Watershed Management (the City) Project Manager will initiate a Task Order. The Contractor shall submit a proposal to perform the work outlined in the Task Order. The Task Order Request shall include a description of the nature and extent of the Work, its scope, Work start and finish dates and a budget center and a list of deliverables.
- B. Contractor Proposal: Contractor shall submit a proposal addressing the Task Order Request, which proposal shall include a Task Order Proposal, level of effort, key personnel, contracted unit prices and draft Near Term Schedule (NTS), see Section 01310 1.05. The proposal shall use cost elements identified on the Bid Form attached hereto and incorporated herein by reference.

- C. Execution of the Task Order: The City of Atlanta and Contractor shall formalize the agreement reached in an executed Task Order. An executed Task Order is a Task Order that is signed by both parties.
- D. Elements of the Task Order: A Task Order shall include, at a minimum: contract number, detailed scope of work, start date, finish date, NTS schedule for completion of the Task Order, key personnel, level of effort, labor requirements and unit costs.
- E. Disagreement with Task Order The Contractor shall notify the City of Atlanta Project Manager within (3) business days if there is a dispute over the finalized Task Order. The Contractor shall not perform any Work until the parties have reached resolution.
- F. No work shall occur until the Task Order is signed by all parties and Department of Public Works or Department of Watershed Management approvals are obtained, and the written Task Order Notice-to-Proceed (WONTP) is issued.
- G. It is the responsibility of the Contractor to gather and become familiar with all site information.
- H. Notice to Proceed: The City of Atlanta Construction Manager shall issue a notice to proceed for the Task Order. The Contractor shall perform the work in accordance with the approved Near Term Schedule.

1.05 MILESTONE DATES

The contractor shall be required to complete the following activities as outlined in the Task Order.

1.06 CONSTRUCTION SCHEDULES

See Section 01310.

1.07 SEQUENCE OF CONSTRUCTION

A. General

1. The contractor shall be solely responsible for all construction sequencing.
2. Coordinate timing of all work with the City.
3. The completion of specific preliminary sequencing tasks specified will be required prior to any significant site demolition.

- B. **Sequence Submittal**: Submit a proposed construction sequence with start and completion of tasks to City of Atlanta Project Manager for review.

- C. Alternate Sequences: Contractor may propose alternate sequences that may reduce the disruption and/or streamline the tasks of this contract.

1.08 MULTIPLE CONTRACTS

Due to the magnitude of work and time restraints, the City reserves the right to award more than one contract under this bid. These contracts may not be identical. Should this right be exercised, the City will award work on a project-by-project basis. Selection will be based on each project's estimated quantities, the contractor's bid, the contractor's work performance and the contractor's availability to do the work.

1.09 TERM OF CONTRACT

The successful proponent shall commence work with adequate force and equipment on a date to be specified in a written order from the City of Atlanta, and shall complete the work within two (2) years with the option to renew for three (3) one (1) year renewals.

**SECTION 01025
MEASUREMENT AND PAYMENT**

PART 1 GENERAL

1.01 SCOPE

- A. The bid form lists each item of the project for which payment will be made. No payment will be made for any items other than those listed in the bid form.
- B. Required items of work and incidentals necessary to complete the work which are not specifically listed in the bid form, shall be considered as incidental to the work. All costs thereof, including contractor's overhead costs and profit, shall be considered as included in the lump sum or unit prices bid for the various bid items.
- C. Work includes furnishing all labor, materials, equipment, tools, water, light, power, transportation, and superintendence, to complete the work satisfactorily, in place, as specified and as indicated by the Work Order.

1.02 DESCRIPTIONS

- A. Measurement of an item of work will be by the unit listed on the bid form.
- B. Final payment quantities shall be determined by field measurements accepted and verified by the City of Atlanta. Contractor shall provide as built sketches clearly depicting the work constructed with each pay application for the work performed that period.
- C. Unless otherwise stated in the Work Order, no separate payment will be made for any item of work, materials, parts, equipment, supplies or related items required to perform and complete the work. The costs for all such items required shall be included in the price bid for the work.
- D. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work. Such price and payment shall constitute full compensation to the contractor for furnishing all plant, labor, materials, equipment, tools, water, light, power, transportation, superintendence, and temporary construction of every nature necessary.
- E. "Products" to complete the work shall mean materials or equipment permanently incorporated into the work.

1.03 CASH ALLOWANCES

A. General

1. The Contractor shall include in the bid total, the cash allowance figure inserted in Bid Item #56 of the Bid Form included within the contract documents. This allowance shall cover the cost of any item not included in the bid document. Service(s) covered under this allowance shall include, but not be limited to, those identified in "Part D - Schedule of Cash Allowances," and any other City pre-approved service(s) required to perform the project intent. Under no circumstance will a service be paid for out of this allowance if that item is covered within the specification as being incidental to the item of work being performed.
2. Prior to performing any work under this section, the contractor shall submit a written proposal stating the Contractor's rate (including handling costs, labor, overhead, profit and other expenses) to perform the requested service(s) under this allowance and the Contractor's rate shall be in units as requested by the City. The City reserves the right to reject the contractor's rate should the City determine that it is inconsistent with the general market for similar work. Upon denying the rates submitted, the City may exercise its privilege to secure another contractor or to procure its own work force to perform the specified service(s) under this allowance. The engineer shall be the sole authority in determining whether any item shall qualify for payment from the cash allowance.
3. No payment will be made for nonproductive time on the part of testing personnel due to the contractor's failure to properly coordinate testing activities with the work schedule or the contractor's problems with maintaining equipment in good working condition. The contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests.
4. No payment shall be provided for services not pre-approved by the City and which fail to verify required results.
5. No payment shall be made for additional services required as a result of negligence of the contractor or his sub-contractors while performing work under this contract.
6. The contractor's handling costs, labor, overhead, profit and other expenses contemplated for the bid items shall be included in the items to which they pertain and not in allowances.
7. Rework due to poor materials or rejection resulting from non compliance shall be at the expense of the Contractor.

- B. Should the net cost be more or less than the specified amount of the allowance, the contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance.

- C. Documentation
 - 1. The contractor shall submit copies of invoices for subcontractors, testing firms, and materials with each periodic payment request.
 - 2. The contractor shall submit test results as requested by the engineer.

- D. Schedule of Cash Allowances
 - 1. Soils and Concrete Testing: Cash allowance may be utilized for the services of a geotechnical engineering firm and testing laboratory to verify soils conditions, including trench excavation and backfill, pile bearing resistance, if applicable, and similar issues and for the testing of concrete cylinders for poured-in-place concrete.
 - 2. Blasting Monitoring: Cash allowance may be utilized for the services of an independent, qualified specialty subcontractor to monitor the blasting, when directed by the engineer.
 - 3. Utility Repair: Cash allowance may be utilized for the services of (a.) having a certified plumber to adjust utilities (water, sewer, gas, etc.) , none bid items, in slopes generated as a result of the construction of sidewalk, (b.) having a certified plumber to modify, as necessary, sprinkler systems constructed in City right-of-way when directed by the engineer.
 - 4. Traffic Control: Cash allowance may be utilized to secure the services of a second certified flagman and/or qualified off-duty officer to serve as the second flagman for traffic control on projects that so warrant, when directed by the engineer This amount shall not be used for traffic cones, barricades, variable message boards or warning signs as may be warranted under a City standard lane closure or partial lane closure permit for the general welfare and safety of the public. **NOTE: The use of a single flagman and basic traffic control devices is incidental to installing the sidewalk.** A Uniformed Off Duty Police Officer shall be used at intersections that have electronic traffic signalizations.

1.04 CLEARING AND GRUBBING

- A. No separate payment shall be made for clearing and grubbing.
- B. The cost of moving and reestablishing landscape features, including labor and materials, shall be included in the unit price bid for the item to which it pertains.

1.05 EROSION AND SEDIMENTATION CONTROL

A. General

1. Payment shall be paid per unit bid price for temporary and/or permanent erosion and sedimentation controls for the item of work to which it pertain.
2. No payment will be made for any portion of the project for which temporary erosion and sedimentation controls are not properly maintained.
3. Erosion control devices will be required near creeks, streams and other water ways to insure siltation does not occur downstream. At the discretion of the engineer, the contractor is required to install and maintain these devices.

B. Sediment Barriers: Payment will be made for sediment barriers, whether specifically hay bales or silt fence, as required to meet state laws and shall include installation, maintenance, repair, replacement, and removal as per the unit bid price for the item of work to which it pertain.

C. Grassing

1. Payment shall be at the contract bid price per square yard.
2. Payment shall be made only for the final permanent perennial grassing. All costs for grassing, including seeding, fertilizing, mulching as well as temporary measures, shall be included in the price bid for grassing.

1.06 EARTHWORK

A. Earth Excavation

1. No separate payment will be made for earth excavation except as it pertains to the bid item for Bank (Slope) Excavation. The cost of such work and all costs incidental thereto shall be included in the price bid for the item to which the work pertains.
2. No separate payment will be made for providing sheeting, bracing and timbering.

B. Foundation Excavation

1. Costs for undercutting, foundation preparation, and removal and replacement of unsuitable material, where shown on the drawings or specified, shall be made at the unit price bid for the items as identified in this section.

2. Payment for removal of unsuitable material and replacement with suitable material (only as directed by the engineer) which is not shown on the drawings or specified shall be made at the unit price bid for:

a. **Replacement of Unsuitable Material with Crushed Stone**

b. **Replacement of Unsuitable Material with Earth**

3. Where ordered by the engineer, undercutting of solid rock will be paid utilizing the cash allowance appropriation.

4. Additional costs of corrective work, made necessary by unauthorized excavation of earth or rock, shall be borne by the contractor.

Dewatering: No separate payment will be made for dewatering required to accomplish the work.

C. Backfilling: No separate payment will be made for backfilling or excavation, hauling and placement of borrow material. The cost of all such work and all costs incidental thereto shall be included in the unit price bid for the item to which the work pertains.

1.07 TRENCH EXCAVATION AND BACKFILL

A. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the contractor's compliance with these specifications, regulatory requirements, permits, laws or regulations which govern this project.

B. Initial Backfill

1. No separate payment shall be made for initial backfill.

2. No separate payment shall be made for drying out the initial backfill material in order to meet the compaction requirements.

3. No separate payment shall be made for the adding of moisture to the initial backfill materials in order to meet the compaction requirements.

C Final Backfilling

1. No additional payment will be made for additional material when excavated materials are used.

2. No separate payment shall be made for drying out the final backfill material in order to meet the compaction requirements.
 3. No separate payment shall be made for the adding of moisture to the final backfill materials in order to meet the compaction requirements.
- D. Additional Material: No separate payment will be made for additional earth or fill materials imported to the project site
- E. Import backfill shall be used on an annual contract only if there isn't enough backfill existing onsite to perform work that includes but, not limited to backfilling back of curb, sidewalks, driveway aprons, valley gutter, and wheel chair ramps.

1.08 REMOVING AND REPLACING PAVEMENT

- A. Payment for removing and replacing pavement will be made as a separate item based on the measured quantity replaced at the unit price in the bid. The unit price bid shall include all costs associated with removing and replacing pavement, including providing select backfill if necessary, traffic control and temporary measures for maintaining traffic.
- B. Payment for soils testing shall be made from the cash allowance. No payment shall be made for tests, which fail to verify required results.
- C. No additional payment will be made for removing and replacing damaged adjacent pavement.
- D. Payment for pavement resurfacing shall be made at the unit price bid. Limits eligible for payment shall be based on widths and lengths as shown on the drawings or as directed by the engineer. Measurement shall be made based on record drawing or field-delineated dimensions.

1.09 GREEN INFRASTRUCTURE CONSTRUCTION

- A. Green infrastructure elements (bioretention, bioswales, pervious pavers, and porous concrete) will be paid for based on the component parts, as listed on the bid sheet. Typical components include excavation and soil disposal, stone drainage layer, underdrains, bioretention soil or pervious pavement material. Refer to included details numbered 1-4, 8-28 to see typical green infrastructure facility details.
- B. Price for soil excavation shall include hauling and disposing of material at an approved location

- C. Price shall be paid on a per cubic yard of excavated soil or soil volume hauled, but not both.
- D. No additional payment shall be made for any grading required to establish required grades at the base and sides of excavation, as well as any grading required for the construction of the green infrastructure facility
- E. No sediment laden water will be allowed to drain to the green infrastructure facility during or after construction. All areas draining to the green infrastructure facility must be fully stabilized or all flow from unstabilized area must be diverted around the green infrastructure facility during and after construction. Any sediment that that does drain into the green infrastructure facility during or after construction must be removed by the contractor at no additional cost. If sediment cannot be removed from sediment-contaminated stone, bioretention soil, geotextile, or other material, the contaminated material shall be removed and replaced at no cost to the owner.

PART 2

2.01 PAYMENT FOR BID ITEMS

The primary specifications governing this work are defined as follows:

Item No. 1: CITY STANDARD, 4" CONCRETE SIDEWALK.

Item No. 2: CITY STANDARD 4" CONCRETE SIDEWALK WITH IMPRINTED HEXAGONAL PATTERN.

Item No. 3: CITY STANDARD 4" CONCRETE SIDEWALK WITH IMPRINTED BRICK PATTERN.

Item No. 4: CITY STANDARD MONOLITHIC CONCRETE SIDEWALK AND CURB: Measurement and payment shall be at the contract bid price per square yard (Curb & Sidewalk).

Item No. 5: CITY STANDARD MONOLITHIC CONCRETE SIDEWALK AND CURB WITH IMPRINTED HEXAGONAL PATTERN.

Item No. 6: CITY STANDARD MONOLITHIC CONCRETE SIDEWALK AND CURB WITH IMPRINTED BRICK PATTERN.

Item No. 7: CITY STANDARD CONCRETE DRIVEWAY APRON, 6" THICK.

Item No. 8: CITY STANDARD CONCRETE DRIVEWAY APRON, 8" THICK.

Item No. 9: CITY STANDARD WHEEL CHAIR RAMP, 6" THICK:

Incorporating 2 ft by 4 ft fiberglass truncated domes as manufactured by ADA Solutions, Amor Tile, or City approved equivalent.

Item No. 10a: City Standard Combination Concrete Curb and Gutter, 30”.

Item No 10b: City Standard Combination Concrete Curb and Gutter, 24”.

Item No. 11: City Standard Concrete Header Curb.

Item No. 12 & 12 A - C: City Standard Granite Curb, Grades “A” and “B”:

This work shall consist of furnishing and installing granite curbing to the lines and grades as detailed in the plans, the standard details or as directed by the engineer. Work shall include, but is not limited to, demolition and removal of existing rock headers or other curbing, excavation, the installation of 3,000 p.s.i. concrete footings at curb joints, backfill and compaction as may be necessary to achieve the design intent, all of which, unless otherwise provided herein, are considered incidental to the work and no additional compensation shall be paid the contractor therefore.

Grade “A” granite curb shall have a split face and sawed top and otherwise conform to the requirements for Grade “B” granite curb.

Grade “B” granite curb shall be installed as directed herein and meet the following requirements:

Foundation, Excavation and Preparation: The bottom of the trench shall be thoroughly tamped, any soft or yielding material shall be removed to the depth ordered by the engineer, refilled with suitable material, and tamped in layers not more than 4 inches thick. Foundations to receive the granite curb shall be dry and firm before curb is placed.

Setting Curb: The curb shall be set true to line and grade. Adjacent sections are to be closely fitted. The curbing shall be thoroughly rammed and mauled into place; each joint shall be placed on concrete bed as shown on the plans, the standard details or as directed by the engineer.

The backfilling shall be of suitable material approved by the engineer, and shall be placed and rammed to firm compaction in layers not over 4 inches thick, just after the curb is set. When the curb is set on a fill or when more than 6 inches of the curb is above the surrounding ground, the contractor shall protect the curb by banking dirt behind it, level with the top of the curb and at least 18 inches wide at the top.

All granite for Type B curb shall be of the thickness and height indicated on the plans, the standard details or as directed by the engineer and shall be cut in lengths of 8’ or more as may be required for radial curb. The minimum length of curb used for closing sections of the work shall be in 4’-0”. The use of cast concrete sections of any length for closure purposes shall not be permitted. Tops of all curbs shall be dressed to an even, smooth surface for the full length, have straight even edges and slope 1/4 of an inch from the back down to the front edge. The curbing shall have the ends squared so as to permit

joints being made not more than 1/2 inch wide for the full depth. The back face shall be hand dressed to a depth of at least 4 inches below the exposed part of curb. The front face shall be hand dressed for 8 inches. Dressed surfaces shall not have projections or depressions more than 3/8 inch from the plane surface to the curb.

The granite from which the curbing is made shall have a percentage of wear of not more than 65.

Shop drawings shall be provided for each segment of radial curb to be installed and at each driveway and wheel chair ramp. The curb shall be continuous at driveways and wheel chair ramp. No distinction shall be made between radial or straight curb for payment purposes.

Prior to acceptance of the work, the asphalt pavement base and sub-base will be restored in accordance with the standard plans for the street classification applicable or as directed by the engineer. Payment for pavement and base replacement shall be at the contract bid price for these items of work. Limits of such payment shall be a line one foot from and parallel to the face of curb set for asphalt concrete finish course and base and from the same point for crushed aggregate base, but extending to a distance one (1) behind the face of curb.

Measurement of City Standard Grade "B" granite curb shall be in linear feet as field measured of the work acceptably installed.

Payment shall be at the contract bid price in linear feet for the work in place, complete.

Item No. 13: RESET OR ADJUST EXISTING GRANITE CURB:

This work will consist of resetting or adjusting existing granite curb to lines and grades as shown on the plans, the standard details, or as directed by the engineer. Work shall include, but is not limited to, the removal of asphalt concrete or other paving required to accomplish the work, excavation, backfilling and compaction, the installation or 3,000 p.s.i. concrete footings at joints, the replacement of damaged sections of granite curbing with new granite curb sections, and all other work necessary and incidental to accomplishing the intent. Except as otherwise provided herein, no additional compensation shall be paid the contractor for these tasks.

Work shall conform to these special conditions, item no. 14, City Standard Grade Granite Curb, Grades "A" or "B".

Where applicable, such as on concrete driveway aprons or wheel chair ramps, where granite and combination concrete curb and gutter exist or are proposed, the granite curb section passes through the depressed section of the driveway or wheel chair ramps, requiring the use of special cut sections of granite curb in these instances and, in the case of combination concrete curb and gutter, requiring valley gutter, D.O.T. Standard 9031J.

In instances where concrete driveway apron or wheel chair ramps are installed separately from the curb, the replacement of portions of the granite or combination concrete curb and gutter is a part of that installation. For pay purposes, the replacement of depressed granite curb sections shall be paid as granite curb. The replacement of valley gutter sections shall be paid as combination curb and gutter.

Measurement will be made in linear feet of granite curb reset or adjusted as field measured.

Payment shall be at the contract bid price for resetting or adjusting existing granite curb.

NOTE: Work covered in items 1 through 13 shall conform to Section No. 02513 of this document, these special conditions and to the standard details. Work shall include, but is not limited to: demolition and removal of existing pavement, sidewalks, or curb; removing and reinstalling existing mailboxes disturbed during construction but are in good condition; removing and reinstalling existing traffic signs, street signs, MARTA post, school signs, etc., disturbed during construction but are in good condition; grading, excavating or filling and compacting to achieve required elevations, grades and slopes as specified; the saw cutting of pavement as required to establish clean edge for curb construction; the removal of vegetation, shrubbery, and small trees up to 6" in diameter; the replacement of sub-base, base and asphalt concrete required to be removed to construct the work; the provision of fiber expansion joint material where specified in the standard details or as directed by the engineer; the furnishing, placement and finishing of the concrete; the cleanup of the site, restoration of the site and disposal of materials excavated such as debris from demolition or from the work; all of which are included in the bid item applicable and, unless otherwise provided herein, no additional compensation shall be paid therefore.

Where imprinted hexagonal or brick patterns are specified, this is to be accomplished by manual methods by pressing a fabricated steel form into the finished surface of the cast concrete prior to the initial set of the concrete and while the concrete mass is still sufficiently plastic to permit molding by this method. The imprinted pattern thus implanted shall be enhanced using hand methods, which will include steel trowels, edging tools, soft brooms and other appropriate implements. The steel forms to be used for this purpose shall be fabricated by the contractor to the specifications furnished by the engineer. The resulting indentations in the concrete surfaces of the finished work shall not be less than one quarter (1/4) inch in depth below the finished surface of the concrete, result in a clear and neat tile or brick pattern, regularly spaced and have the appearance of the type of pavement intended to be represented. On imprinted sidewalk, the six-inch top of curb area is not to be imprinted.

On driveway aprons or wheel chair ramps installed in existing curb or sidewalk or where sidewalk and curb are not part of the work as a whole, the existing sidewalk and curb is to be saw cut in the form of the wheel chair ramp. The existing pavement is to be removed to neat lines and grades, the specified fiber expansion material installed along with subgrade granite curb, effected sections of which shall be removed and replaced with new

granite curb, either straight or radial, as appropriate in conformance with the standard details. In the case of existing combination concrete curb and gutter or monolithic concrete sidewalk and curb, the required curb, gutter, pavement and base necessary to install the work in accordance with the standard details shall be removed and replaced. All work necessary to accomplish the plan intent shall conform to these special conditions, the standard plans and the street and sidewalk specifications. Sidewalk or curb and gutter adjacent to but not part of the work and damaged by the contractor's operations shall be removed and replaced at the contractor's expense. Curb, gutter, sidewalk, pavement and base removed and replaced as part of the work and necessary to accomplish the plan intent, as determined by the engineer, shall be paid as specified under the appropriate items of the work defined herein.

Measurement of this work shall be in the bid unit quantities applicable based on field measurement of the completed work acceptably constructed.

Payment shall be made at the contract bid price in the bid unit quantity applicable for the work in place complete.

Item No. 14: GRASSING:

This work will consist of ground preparation, furnishing and planting, seeding, fertilizing and strawing of all disturbed areas within the limits of the right of way and easement (right of entry) areas adjacent to the right of way as shown on the plans, except those areas designated by the engineer to remain natural. This work shall conform to GDOT Specification Section 700.

Measurement and payment shall be at the contract bid price per square yard.

Item No. 15: FURNISH AND INSTALL CITY OF ATLANTA STANDARD SIDEWALK FLUMES FURNISHED BY OTHERS:

The work will consist of furnishing and installing the City standard sidewalk flume in accordance with the plans, the standard details or as directed by the engineer. Work will include demolition of existing sidewalk, curb and gutter, if any, excavation, backfill and compaction to meet plan line and grades, the setting of the flume, placing and finishing concrete, replacing sidewalk curb and gutter required to be removed to install the work and the cleanup and disposal of debris from the construction, which tasks are considered incidental to the bid item of the work, and for which no additional compensation shall be paid.

Measurement of this work shall be by the unit, each, acceptably installed.

Payment shall be at the contract bid price for each sidewalk flume installed, in place, complete.

Item No. 16: ADJUST EXISTING MANHOLE RINGS AND COVERS OR CATCH BASIN GRATES, FRAMES AND COVERS TO GRADE, IF REQUIRED:

This work will consist of adjusting manholes and catch basins to grade in accordance with the plans, standard details or as directed by the engineer. In most instances, this will mean raising the structures. Adjustments in grade of these elements requires the removal of one or more existing leveling courses, usually brick, to a sound structural element of the basin or manhole and the raising of the frame and cover or hood and grate by relaying new, sound brick.

In instances where type "A" or "B" catch basins and grates and frames are adjusted to new grade and when the curb and gutter are not combination, it is usually necessary to remove a section of roadway pavement extending from ten (10) feet on the upstream side of the catch basin to ten feet below the downstream side and extending from the face of curb a distance of six (6) feet into the traveled way. The section of pavement is warped to drain to the catch basin.

Where concrete curb and gutter is proposed or exists, it will be necessary to install or remove and replace a section of the combination curb and gutter. The gutter section is wrapped to the catch basin and curb transition as detailed in the standards. In instances where it is necessary to modify the pavement (most), pavement replacement will conform to the standard details for residential street pavement sections in the case of residential streets. On streets classified as "commercial," the crushed aggregate base section shall be increased to six (6) inches and the black base (or "B" binder) section shall be increased to six and a half (6 1/2) inches, with all other elements being unchanged. Sub-base, base and asphalt pavement replacement shall conform to the street and sidewalk specifications and paid for under the appropriate item of the work.

In the case of manholes, a total of a maximum of three (3) courses of vertical brick shall be permitted to make any grade adjustment, including any existing grade adjustment that may be in place. If more courses of brick either exist or are required to make the adjustment needed, the brick corbel (in the case of a brick manhole) or the pre-cast manhole riser (in the case of a pre-cast manhole) shall require adjustment. In the case of a brick manhole, part or all of the corbel may have to be demolished and reconstructed, reducing the corbel overhang per brick course. In the case of a pre-cast manhole, the pre-cast corbel section may have to be removed and a modified riser section added before the corbel section is replaced. It may be necessary to add manhole steps to the heightened corbel or riser. Pavement replacement around the manhole in streets shall be in accordance with the standard details for the type of street applicable.

Limits of pavement for pavement replacement shall be a four-by-four feet concentric square about the manhole. At the option of the engineer, the asphalt concrete base course may be substituted with high early strength six (6) inch concrete, which will be paid for at the bid price applicable for black base or "B" binder asphalt concrete, 6" thick.

Brick and mortar used for these purposes shall meet the requirements of Section 02513. Pre-cast manhole risers required for these purposes shall meet the requirements of the standard plans, the sewer specifications and bear the stamp of the City inspector affixed at the plant of fabrication.

Measurement of this work shall be by the unit, each acceptably installed.

Payment shall be at the contract bid price for each manhole or catch basin adjusted, complete, in place.

Item No. 17: INSTALL GA DOT STD. 1033 OR COA TYPE “C” CATCH BASIN:

This work will consist of installing a single wing catch basin structure in accordance with the plans, standard details or as directed by the engineer, in order to accomplish the plan intent. Work under this item shall include, but is not limited to, furnishing all casting necessary to make pipe connections regardless of skew, and for all materials, forms, and the disposal of surplus material. Work may include demolishing an existing structure and installing new structure in the same location. Depth of structure under this item shall not exceed 10 vertical feet.

Brick and mortar used for this purpose shall meet the requirements of Section 02513. Measurement of this work shall be by the unit for each structure, in place, complete, and accepted.

Item No. 18: INSTALL COA STD. TYPE “B” CATCH BASIN:

This work will consist of installing a catch basin structure in accordance with the plans, standard details or as directed by the engineer, in order to accomplish the plan intent. Work under this item shall include, but is not limited to, furnishing all casting necessary to make pipe connections regardless of skew, and for all materials, forms, and the disposal of surplus material. Work may include demolishing an existing structure and installing new structure in the same location. Depth of structure under this item shall not exceed 10 vertical feet.

Brick and mortar used for this purpose shall meet the requirements of Section 02513.

Measurement of this work shall be by the unit for each structure, in place, complete, and accepted.

Item No. 19: INSTALL GA DOT STD. 9031S, 9031U OR COA STD. DROP INLET:

This work will consist of installing a standard drop inlet structure trapped or Type “B,” in accordance with the plans, standard details or as directed by the engineer, in order to accomplish the plan intent. Work under this item shall include, but is not limited to, furnishing all casting necessary to make pipe connections regardless of skew, and for all

materials, forms, and the disposal of surplus material. Work may include demolishing an existing structure and installing new structure in the same location. Depth of structure under this item shall not exceed 10 vertical feet.

Brick and mortar used for this purpose shall meet the requirements of Section 02513.

Measurement of this work shall be by the unit for each structure, in place, complete, and accepted.

Item No. 20: INSTALL GA DOT STD. 1034 CATCH BASIN OR DOUBLE TYPE “B” CATCH BASIN:

This work will consist of installing a double wing catch basin or a double type “B” catch basin structure in accordance with the plans, standard details or as directed by the engineer, in order to accomplish the plan intent. Work under this item shall include, but is not limited to, furnishing all casting necessary to make pipe connections regardless of skew, and for all materials, forms, and the disposal of surplus material. Work may include demolishing an existing structure and installing new structure in the same location. Depth of structure under this item shall not exceed 10 vertical feet.

Brick and mortar used for this purpose shall meet the requirements of section 02513.

Measurement of this work shall be by the unit for each structure, in place, complete, and accepted.

Item No. 21: STORM DRAINAGE STRUCTURE CLEAN UP - 6' DEPTH

Measurement for payment will be for each storm water structure, up to 6-foot depth, that is cleaned of all trash, debris and silt. Payment will constitute full compensation for removal, transportation and disposal of debris from drainage structures or sewer cleaning operations, including but not limited to labor, equipment, transportation, tools, and all other related procedures and materials necessary.

Item No. 22: ADJUST EXISTING VALVE BOXES, METER BOXES, ELECTRICAL PULL BOXES AND SIMILAR INSETS IN THE WORK TO GRADE”:

This work shall consist of adjusting various insets in the pavement to plan line and grades as shown on the plans, standard details or as directed by the engineer. Work shall include demolition of existing pavement, excavation, raising of the valve casing, meter box, pull box or other inset to appropriate grade, the installation of brick footings under metal or plastic casings, the seating of these footings with sand or other appropriate means and the backfill and compaction around the adjusted casing or box, all of which are considered incidental and included in the bid item of the work and no additional payment shall be paid therefore.

Brick and mortar used for this purpose shall meet the requirements of section 02513.

Measurement of this work shall be by the unit for each valve box, meter box, electrical pull box or similar inset acceptably adjusted.

Payment shall be at the contract bid price for each unit acceptably adjusted.

Item 22A: ADJUSTMENTS TO WATER LINES, REMOVE, FURNISH AND INSTALL COPPER PIPE AND FITTINGS (3/4-INCHES TO 2-INCH DIAMETER):

Measurement for payment for removing and furnishing and installing replacement copper pipes of the size and type specified in the Bid Schedule, for the purpose of making adjustments to existing water pipes to accommodate installation of proposed sub-surface infrastructure, will be measured in place, on a per each basis. Payment will be based upon the actual quantity of conflicts with existing water lines and installation or improvements of proposed storm or sewer pipes. Measurement for payment does not signify that the pipe is accepted.

Payment for removing existing water pipe that obstructs proposed construction and furnishing and installing new copper water pipe and fittings, of the sizes specified in the Bid Schedule, will be made at the unit price per each established in the Bid Schedule.

Payment shall include full compensation for all labor, materials, and incidentals necessary for installation of a water line complete in place, including but not limited to construction staking, furnishing, transporting, storing and installing the pipe and fittings, couplings, casing if needed, tracer wire, and all other fittings and items as required by the Contract Documents including connection to the existing pipe, meter, or to the corporation stop and all else incidental thereto for which separate payment is not provided under other items in the Bid Schedule.

Payment for Open Cut shall include saw cutting asphalt or concrete pavement, all excavation, removal and disposal of asphalt or concrete pavements and excavated material, excavation support system, utility support system, dewatering, backfilling and compaction, restoration, and all else incidental thereto for which separate payment is not provided under other items in the Bid Schedule.

Payment shall include any coordination and notifications necessary with the property owner for service interruptions, or temporary service connections if service interruption is prohibited by the water customer.

Payment under these items shall also include compaction testing as specified in paragraph 3.16.B.2 of Section 02225, Trench Excavation and Backfill.

Copper pipe in excess of twenty linear feet (20-LF) will be paid for under another item when approved or directed by the Engineer.

Item No. 22B SANITARY SEWER SERVICE LATERAL REPLACEMENT 6-INCH DIAMETER AND UNDER:

Measurement for payment will be per each (EA) service lateral replaced.

Payment will constitute full compensation to remove, replace and reconnect the existing sewer lateral piping from the sewer main to the right-of-way or easement property boundary.

Each service lateral replacement shall include, but not be limited to excavation, shoring, dewatering, pavement saw-cutting, removal and disposal of excavated material if replaced with imported material, piping and piping products for a complete installation (i.e. sewer main coupling(s), sleeve(s), sewer main tee fitting, wye fitting or saddle the mainline, lateral piping, lateral pipe fittings and lateral connection coupling) at no additional cost.

All related costs for testing, post-installation cleaning (if required), and post-installation CCTV inspection for quality control shall be included under this item. Payment may be withheld due to failure to submit all post-installation CCTV video and other required quality control documentation for the work.

No separate or additional payment will be provided in the event the City directs the contractor to install ductile iron piping or fittings for the service pipe reconnection.

The lateral replacement depth shall be considered the same as the average sewer main depth for measurement and payment purposes regardless of the actual excavation depth required. The average sewer main pipeline depth shall be as measured from the pipe invert to the existing ground level at the upstream and downstream manhole.

No separate or additional payment will be made installation of a new clean-out at the property line in conjunction with each service lateral replacement.

Item No. 22C: SEWER, INTERNAL PIPE INSPECTION, SERVICE LATERAL, 4-INCH TO 6-INCH DIAMETER:

Measurement for payment will be per linear foot (LF).

Payment will constitute full compensation for inspection of service laterals, including, but not limited to, hand held (“Push Camera”) CCTV inspection, labor, other equipment, transportation setup, tools, and all other related procedures and materials necessary to complete the inspection in accordance with the requirements of the City of Atlanta Department of Watershed Management Engineer for Internal Sewer Condition Assessment.

The Contractor shall perform service lateral television inspection on all service laterals exposed for open cut replacement, and/or when directed to do so by the Engineer. This item does not include post-construction CCTV quality control inspection for service lateral rehabilitation or repair work.

The cost for post CCTV quality control inspection for service lateral replacement and repair work is to be included in the price of the respective service lateral replacement bid item and will not be paid for separately.

Payment shall only be made for the footage of service lateral that is inspected (when directed by the Engineer) commencing with zero footage at the portal of the pipeline associated with the mainline or at the clean-out. If a defective service lateral must be repaired before inspection can continue, then that service lateral will be replaced from the mainline to the property line, or as approved by the Engineer.

Item 22D: ADJUSTMENTS TO WATER LINES, REMOVE, FURNISH AND INSTALL DUCTILE IRON PIPE AND FITTINGS (3-INCH TO 12-INCH DIAMETER):

Measurement for payment for removing, furnishing and installing replacement ductile iron pipes and fittings of the size and type specified in the Bid Schedule, for the purpose of making adjustments to existing water pipes to accommodate installation of proposed sub-surface infrastructure, will be measured in place, on a per each basis. There will be no deduction or separate measurement for valves and fittings. Payment will be based upon the actual quantity of conflicts with existing water lines and installation or improvements of proposed storm or sewer pipes. Measurement for payment does not signify that the pipe is accepted.

Payment for furnishing and installing ductile iron pipe, fittings, and restraint as specified in the Bid Schedule will be made for quantities as measured in place at the unit prices established in the Bid Schedule.

Payment shall include full compensation for all labor, materials, equipment and incidentals necessary for installation of ductile iron pipe and fittings complete in place, measured from existing grade to top of pipe bell, including but not limited to, construction staking, furnishing, transporting, storing and installing the pipe and fittings, sleeves and sleeve-type couplings.

Payment for saw cutting asphalt or concrete pavement, all excavation (except rock excavation), removal and disposal of asphalt or concrete pavements and excavated material, excavation support system, utility support system, dewatering, bedding and haunching materials, backfilling and compaction, 6-inch graded aggregate base, erosion and sedimentation control, pipe cleaning, testing and disinfection, temporary water service and all else incidental thereto for which separate payment is not provided under other items in the Bid Schedule.

Payment under these items shall also include compaction testing as specified in paragraph 3.16.B.2 of Section 02225, Trench Excavation and Backfill.

Payment under these items shall also include polyethylene encasement for ductile iron pipe and fittings.

Concrete for thrust blocks will be paid for under another item.

Payment shall include any coordination and notifications necessary with the property owner for service interruptions, or temporary service connections if service interruption is prohibited by the water customer.

Ductile Iron Pipe in excess of 20-LF will be paid for under another item when approved or directed by the Engineer.

Item No. 23: PROVIDE AND INSTALL CLEANOUT BOXES, VALVE BOXES AND/OR METER BOXES TO GRADE:

This work shall consist of providing and installing various insets in the pavement to plan line and grades as shown on the plans, standard details or as directed by the engineer.

Work shall include demolition of existing sidewalk (if applicable), excavation, providing and installing of the cleanout boxes, valve casing, meter box, other inset to appropriate grade, the installation of brick footings under metal or plastic casings, the seating of these footings with sand or other appropriate means and the backfill and compaction around the adjusted casing or box, all of which are considered incidental and included in the bid item of the work and no additional payment shall be paid there of.

Brick for these purposes shall conform to section 02513.

Measurement of this work shall be by the unit for each cleanout box, valve box, meter box, or similar inset acceptably provided and installed.

Payment shall be at the contract bid price for each unit acceptably provided and installed.

Item No. 24A and Item 24B:

CITY OF ATLANTA STANDARD MASONRY WALL, HEIGHT CLASSIFICATION APPLICABLE:

This work will consist of furnishing and installing the gravity masonry retaining walls as detailed in the plans, the standard details (MS-1), or as directed by the engineer. Work will include, but is not limited to, demolition of existing walls, pavement or structures, excavation, fill, backfill and compaction as may be required to meet plan lines and grades, the installation of concrete footings, weep holes and insets in the work, the cleanup of and disposal of debris from the work and such other work as may be required to accomplish the intent, all of which are considered incidental to the bid item of the work described hereunder and for which no additional compensation shall be paid the contractor

This work shall conform to sections 02513.

Wall heights shall be measured from the top of the footing.

Payment shall be at the contract bid price per square foot in place. (Measure of Payment shall only include the front face of wall that isn't exposed to earthwork. Measurement is only based on the length and height of the front face, only. The top of the masonry wall and sides of the masonry wall, and back of the masonry wall will not be included for payment.)

Item No.25 : CONCRETE SEGMENTAL /INTERLOCKING RETAINING WALL SYSTEM:

See Section 02530 for complete specification and summary

Item No. 26: Intentionally left blank.

Item No. 27: CRUSHED AGGREGATE BASE, 4" THICK AND

Item No. 28: CRUSHED AGGREGATE BASE, 6" THICK:.

Measurement shall be in square yards as may be limited or modified by other sections of these special conditions based on field measurement of the work as acceptably installed.

Payment shall be at the contract bid price in square yards for the work in place, complete.

Item No. 29: ASPHALT CONCRETE BLACK BASE OR "B" BINDER, 4 1/2" THICK,
Item No. 30: ASPHALT CONCRETE BLACK BASE OR "B" BINDER, 6 1/2" THICK,
AND
Item No. 31a: ASPHALT CONCRETE "E" OR "F" SURFACE COURSE, 1 1/2"
THICK:

Measurement shall be in square yards as may be limited or modified by other sections of these special conditions based on field measurement of the work as acceptably installed.

Payment shall be at the contract bid price in square yards for the work in place, complete.

Item No. 31b: ASPHALT CONCRETE "E" OR "F" SURFACE COURSE, 1 1/2"
THICK. WITH GIBSONITE ADDITIVE:

Item No. 32: TREE REMOVAL (6" - 18" DIAMETER):

This work involves removing 6" to 18" diameter trees as shown in the plans and/or as directed by the engineer to be removed. The diameter of the tree shall be determined by measuring the circumference (converting it to its diameter equivalent) of the trunk at the DBH(Diameter Breast Height – approx. 42" up from the ground or root, as determined by the engineer). NOTE: The engineer shall make final determination of a tree size. Work will include, but is not limited to, cutting down the tree, removing the stumps by extraction with hydraulic equipment or chipping to 18" depth, discarding of the chips and backfilling the stump hole with engineer-approved fill. All spoil material generated by this operation shall be removed and disposed of outside of the right-of-way. The method of removal and location of the dump shall be the responsibility of the contractor, subject to the approval of the engineer. Removal of trees 6" diameter or less shall be incidental to the installation of sidewalk and shall receive no additional payment.

Measurement of this work will be for each tree and stump removed as shown on plan and/or as directed by the engineer.

Payment shall be at the contract bid price for each tree and stump removed, complete.

Item No. 33a: TREE REMOVAL (GREATER THAN 18" - 36" DIAMETER):

This work involves removing 18" to 36" diameter trees as shown in the plans and/or as directed by the engineer to be removed. The diameter of the tree shall be determined by measuring the circumference (converting it to its diameter equivalent) of the trunk at the DBH(Diameter Breast Height – approx. 42" up from the ground or root, as determined by

the Engineer). NOTE: The engineer shall make final determination of a tree size. Work will include, but is not limited to, cutting down the tree, removing the stumps by extraction with hydraulic equipment or chipping to 18" depth, discarding of the chips and backfilling the stump hole with engineer-approved fill. All spoil material generated by this operation shall be removed and disposed of outside of the right-of-way. The method of removal and location of the dump shall be the responsibility of the contractor, subject to the approval of the engineer.

Measurement of this work will be for each tree and stump removed as shown on plan and/or as directed by the engineer.

Payment shall be at the contract bid price for each tree and stump removed, complete.

Item No. 33b: TREE REMOVAL (GREATER THAN 36" DIAMETER):

This work involves removing 36" and greater diameter trees as shown in the plans and/or as directed by the engineer to be removed. The diameter of the tree shall be determined by measuring the circumference (converting it to its diameter equivalent) of the trunk at the DBH (Diameter Breast Height – approx. 42" up from the ground or root, as determined by the Engineer). NOTE: The engineer shall make final determination of a tree size. Work will include, but is not limited to, cutting down the tree, removing the stumps by extraction with hydraulic equipment or chipping to 18" depth, discarding of the chips and backfilling the stump hole with engineer-approved fill. All spoil material generated by this operation shall be removed and disposed of outside of the right-of-way. The method of removal and location of the dump shall be the responsibility of the contractor, subject to the approval of the engineer.

Measurement of this work will be for each tree and stump removed as shown on plan and/or as directed by the engineer.

Payment shall be at the contract bid price for each tree and stump removed, complete.

Item No. 34a: TREE REPLACEMENT FOR TREES 2.5" TO 3.5":

See Georgia Standards & Specifications, Section 702 and 703 for general description, construction requirements, and quality acceptance

Item No. 34b: TREE REPLACEMENT FOR TREES 4" TO 7":

See Georgia Standards & Specifications, Section 702 and 703 for general description, construction requirements, and quality acceptance.

Item No. 34c: TREE REPLACEMENT FOR TREES > 7.5" :

See Georgia Standards & Specifications, Section 702 and 703 for general description, construction requirements, and quality acceptance.

Item No. 35: through 38: REPLACEMENT OF FENCE:

This work shall conform to Georgia Department of Transportation Standard Specifications, Latest Edition, Section 643. Work shall include, but is not limited to, removing existing fence, providing incidental clearing and grading as may be required to install new fence to line and grade, replacing of existing gate where shown on plan or as directed, cleaning up of and disposal of debris from the work, and such other work as may be required to accomplish the intent, all of which are considered incidental to the bid item of the work, described hereunder and for which no additional compensation shall be paid the contractor.

Measurement of this work shall be in square feet along the fence from outside of end post for each continuous run of fence, including gates.

Item No. 39: INSTALLATION, REMOVAL, RESET, AND DISPOSAL OF HAND RAIL:

Handrail shall be the product of a company normally engaged in the manufacture of pipe railing. Railing shall be shop assembled in lengths not to exceed 24 feet for field erection. Handrails shall be designed to withstand a 200# concentrated load applied in any direction to the top rail.

The supplier shall submit calculations to the Engineer for approval. Testing of base casting or base extrusions by an independent lab or supplier's lab (if supplier's lab meets the requirements of the Aluminum Association) will be an acceptable substitute for calculations. Calculations will be required for approval of all other design aspects.

Post spacing shall be a maximum of 6'-0". Posts and railings shall be a minimum of 1 1/2" schedule 40 aluminum pipe, alloy 6105-T5, ASTM B-429 or B-221. The handrail supplier shall show that their posts are of adequate strength to meet the loading requirements. If the supplier's posts are not of adequate strength, the supplier may reduce the post spacing or add reinforcing dowels or do both in order to meet the loading requirements.

The handrail shall be made of pipes joined together with component fittings. Samples of all components, bases, toeplate and pipe must be submitted for approval. Components that are glued or pop-riveted at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. Handrail and components shall be "TUFRAIL" as manufactured by Thompson Fabricating Company (Birmingham, AL.) **or approved equal.**

Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations (OSHA 1910.23) The top surface of the top railing shall be smooth and shall not be interrupted by a projecting fitting.

The midrail at a corner return shall be able to withstand a 200# load without loosening. The supplier is to determine this dimension for their system and provide physical tests from a laboratory to confirm compliance.

Expansion bolts shall be spaced 10d apart and 5d edge distance for no reduction in pullout strength. A safety factor of 4 shall be used on expansion bolt pullout values published by the supplier. Expansion bolts shall be stainless steel type 303 wedge bolts and shall be furnished by the handrail supplier.

Toeplate shall conform to OSHA standards. Toeplate shall be a minimum of 4" high and shall be an extrusion that attaches to the posts with clamps which allow for expansion and contraction between posts. Toeplate shall be set 1/4" above the walking surface. Toeplates shall be provided on handrails as required by OSHA and/or as shown on the drawings. Toeplate shall be shipped loose, in stock lengths with pre-manufactured corners, for easy field installation.

Openings in the rail shall be guarded by a self-closing gate (OSHA 1910.23). Safety chains shall not be used unless specifically shown on the drawings.

Finish shall be Aluminum Association M10C22A41 (215-R1) clear anodized. The pipe shall be plastic wrapped. The plastic wrap shall be removed after erection.

Aluminum surfaces in contact with concrete, grout or dissimilar metals will be protected with a mylar isolator, bituminous paint or other approved material.

Item No. 40 - 43 FURNISH AND INSTALL AN 18" TO 24" R.C.P. OR DIP:

This work shall conform to the sewer specifications and will include, (but is not limited to),

furnishing and installing the pipe, excavation, backfill, sheeting and shoring, maintenance of existing flows, demolition and disposal of existing pipe, fully tying in to the existing storm drainage structures with the specified pipe and all material required to make the tie-in, and reconstruction for storm sewers not otherwise provided for which may be intercepted or interrupted by this installation. All of the tasks listed above are considered incidental to the bid item of the work described hereunder and for which no additional compensation shall be paid the contractor.

Ancillary pipe required to penetrate the pipe will be installed using a concrete coring machine specifically designed for that purpose which will not otherwise compromise the structural integrity of the pipe wall being penetrated. Cores may be through pipe wall to accommodate other pipes connecting thereto and will not be large than one (1) inch in diameter greater than the outside diameter of the pipe entering. The pipe will be dressed smooth with the inside face of the pipe penetrated and grouted securely in placed all around.

Measurement of this work shall be in linear foot of pipe based on field measurement of the completed work acceptably constructed and will include any other work or material not included in the contract bid items.

Payment shall be made at the contract bid price per linear foot for the work in place completed and accepted.

Item No. 44: REPLACEMENT OF GUARDRAIL ANCHOR (TYPE 1, 9, 11, 12):

See Georgia Standards & Specifications, Section 641 for general description, construction requirements, and quality acceptance.

Item No. 45: WOOD POST MAILBOXES:

This work will consist of removing an existing mailbox with post and furnishing and installing a new mailbox with wood post where detailed on the plans or as directed by the Engineer. Post material for the mailbox stand shall consist of 4" x 4" pressure treated wood mitered at 45-degree angles on all four (4) sides of all exposed ends. The mailbox post design is to be similar in appearance to an asymmetrical "T" with the long arm braced, such as typically found in a home improvement store. Work shall include, but is not limited to, removing the existing mailbox and post (brick, metal, wood, etc.), disposing of old mailbox, installing new wood post mailbox (as described above and approved by the engineer) and forming a 6" cut-out around the mailbox post. Mailboxes posts are to be embedded a minimum of 12" deep and plumbed, placed to meet postal requirements. Mailboxes shall be re-installed the same working day that the existing mailbox was removed.

Measurement of this work shall be by the unit for each mailbox and post removed and a new wood post with mailbox installed.

Payment shall be at the contract bid price for each mailbox and post removed and a new mailbox with wood post installed and accepted, complete, in place.

Item No. 46: STEEL POST MAILBOXES:

This item shall be identical to wood post mailboxes, except that mailbox post shall be fabricated steel acceptable to the engineer.

Item No. 47 SAW CUT OF PAVEMENT (ASPHALT OR CONCRETE):

See Georgia Standards & Specifications, Section 444 for general description, construction requirements, and quality acceptance.

Item No. 48: BANK (SLOPE) EXCAVATION:

This work will consist of excavating, sloping and hauling earthwork generated from an area as specified on the plans or as directed by the engineer. This item is not intended to compensate for routine grading. Work under this item shall pertain only to cases where the slope would otherwise require a retaining wall. The engineer shall determine where this item shall apply. Work shall include, but is not limited to, excavating and reworking the existing topography to provide the appropriate slope, removal of trees (6" diameter or less), removal of encumbrances, hauling of the earthwork to an approved dump site, cleanup and disposal of debris from the work, and such other work as may be required to accomplish the intent. No additional compensation beyond the unit price bid shall be paid for work herein described.

Measurement of this work shall be per cubic yard of earthwork.

Payment shall be at the contract bid price per cubic yard.

Item No. 49: REPLACEMENT OF UNSUITABLE MATERIAL WITH CRUSHED STONE:

This work will consist of removal and replacement of unsuitable material with crushed stone from an area as specified on the plans or as directed by the engineer. Work shall include, but is not limited to, excavating unsuitable material, hauling and discarding material to an approved dump site, filling excavated area with crushed stone, compacting material to required density, cleanup and disposal of debris from the work and such other work as may be required to accomplish the intent, all of which are considered incidental to the bid item of the work described hereunder and for which no additional compensation shall be paid the contractor.

Measurement of this work shall be per cubic yard of crushed stone material.

Payment shall be at the contract bid price per cubic yard. Such payment will be full compensation for unsuitable soil removed, replaced (with crushed stone) and accepted, complete, in place.

Item No. 49a: IMPORT BACKFILL:

Measurement of this work shall be per cubic yard of crushed stone material. See section 1.07 E of this section.

Item No. 50: INSTALLATION, MAINTENANCE, REMOVAL, AND DISPOSAL OF SAFETY FENCE:

This work will consist of installation, maintenance, and removal of safety fence. The fence shall be installed as indicated on the plan or as directed by the engineer

Measurement of this work shall be per unit foot.

Payment shall be at the contract bid price per linear foot for completed in place.

Item No. 51: INSTALLATION, MAINTENANCE, REMOVAL, AND DISPOSAL OF SILT FENCE:

This work will consist of installation, maintenance, removal, and disposal of silt fence. The fence (type A, B, or C) shall be installed as indicated on the plan or as directed by the engineer.

Measurement of this work shall be per unit foot.

Payment shall be at the contract bid price per linear foot for completed in place.

Item No. 52: INSTALLATION, MAINTENANCE, REMOVAL, AND DISPOSAL OF HAY BALES:

This work will consist of installation, maintenance, removal, and disposal of hay bales. The bales shall be installed as indicated on the plan or as directed by the engineer.

Measurement of this work shall be per unit foot.

Payment shall be at the contract bid price per linear foot for completed in place.

Item No. 53: 12”-18” THICK RIP RAP HAND PLACED:

This work shall consist of removal and replacement of unsuitable material with acceptable fill from an area as specified on the plans or as directed by the engineer. Work shall include, but is not limited to, excavating unsuitable material, hauling and discarding material to an approved dump site, filling excavated area with acceptable borrow material, compacting material to required density, cleanup and disposal of debris from the work and such other work as may be required to accomplish the intent, all of which are considered incidental to the bid item of the work described hereunder and for which no additional compensation shall be paid the contractor.

Measurement of this work shall be based on dimensions of work as shown on plans, details, or as directed by the engineer.

Payment shall be at the contract unit price per ton (TON) for the work accepted in place and completed.

Item No. 54: REPLACEMENT OF UNSUITABLE MATERIAL WITH EARTH:

This work will consist of removal and replacement of unsuitable material with acceptable earth fill from an area as specified on the plans or as directed by the engineer. Work shall include, but is not limited to, excavating unsuitable material, hauling and discarding material to an approved dump site, filling excavated area with acceptable borrow material, compacting material to required density, cleanup and disposal of debris from the work and such other work as may be required to accomplish the intent, all of which are considered incidental to the bid item of the work described hereunder and for which no additional compensation shall be paid the contractor.

Measurement of this work shall be per cubic yard of earth fill material as installed.

Payment shall be at the contract bid price per cubic yard of earth material. Such payment will be full compensation for unsuitable soil removed, replaced (with fill) and accepted, complete, in place.

Item No. 55: MOBILIZATION:

This item provides for mobilization compensation for small projects only. Work will consist of all preparations and operations necessary to perform sidewalk, driveway and/or curb work, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site. A mobilization charge will be allowed under this item only if that project qualifies by meeting the following criteria:

Project must be such that the combined length of sidewalk with driveway apron is less than or equal to 200 feet. Combined lengths of sidewalk, driveways and/or curbs are to be determined from field measurements made by the city engineer.

Project must have written approval by the city engineer to receive this mobilization fee.

Only one mobilization payment will be made for each project that qualifies herein as stipulated.

Groups of at least three or more individual projects located within a 1000-foot radius of each other as determined from a map book (the scale must be less than or equal to 1" = 2000') will qualify for only one mobilization payment for that group of projects.

Measurement of this work shall be for each qualifying and approved mobilization as a lump sum unit.

Payment shall be a lump sum payment at the contract bid price for each qualified and approved mobilization.

Item No. 56: CASH ALLOWANCE:

Refer to Section 01025 – Part 1.03 for details concerning payment under this bid item.

Item No. 57: SIDEWALK DEMOLITION:

Measurement and payment shall be at the contract bid price per square yard.

Item No. 58: CURB DEMOLITION:

Measurement and payment shall be at the contract bid price per linear foot.

Item No. 58-A: CITY STANDARD DRIVEWAY APRON 6 – INCH THICK DEMOLITION:

Measurement and payment shall be at the contract bid price per square yard.

Item No. 58-B: CITY STANDARD DRIVEWAY APRON 8 – INCH THICK DEMOLITION:

Measurement and payment shall be at the contract bid price per square yard.

Item No. 58-C: REMOVAL OF WHEEL CHAIR RAMP DEMOLITION:

Measurement and payment shall be at the contract bid price per square yard.

Item No. 59 INTENTIONALLY LEFT BLANK

Item No. 60 A - E: REMOVAL OF PAVEMENT MARKINGS:

See Georgia Standards & Specifications, Section 656 for general description, construction requirements, and quality acceptance. Removal is measured in linear feet.

Item No.61: RESET SIGNS:

Payment shall be for the contracted price for each sign.

Item No. 62 - 66: THERMOPLASTIC STRIPING:

See Georgia Standards & Specifications, Section 652 & 653 for general description, materials, and construction requirements. Measurement of strip shall be in linear feet. Glass beads for bicycle lane striping shall follow the requirements set forth in section AASHTO M 247 Type 1.

Item No. 67 - 70: LIGHTING & STREET FURNITURE:

See street furniture + lighting specification sheet attached.

Item No. 71 - 72: REINFORCED CANTILEVER SIDEWALK SLAB (4' & 5'):

See Georgia Standards & Specifications, Bridge Section 500 – 542 for general description, materials, and construction requirements. Measurement and payment shall be at the contract bid price per square foot.

Item No. 73: TWIN 2" PVC (HD) CONDUIT:

See Georgia Standards & Specifications, Section 923 for general description, materials, and construction requirements. Measurement and payment shall be at the contract bid price per linear foot.

Item No.74a: SIDEWALK/DRIVE WITH BRICK PAVERS, LAID OVER 4" CONCRETE

Installation of sidewalk/Drive with brick pavers, laid over 4" concrete
See Georgia Standards & Specifications, Section 441, 608, & 900 for general description, materials, and construction requirements

Item No 74b: SIDEWALK/DRIVE WITH BRICK PAVERS, LAID OVER 6" CONCRETE

Installation of Sidewalk/ Drive with brick pavers, Laid over 6" concrete
See Georgia Standards & Specifications, Section 441, 608, & 900 for general description, materials, and construction requirements

Item No 74c: SIDEWALK/DRIVE WITH BRICK PAVERS, LAID OVER 8" GRAVEL AND TOPPED WITH ¾" SAND INCLUDING GEOTEXTILE FABRIC WHEREVER REQUIRED

Installation of Sidewalk/Drive with brick pavers, laid over 8" gravel and topped with ¾" sand incl. GEO-Textile fabric wherever required.
See Georgia Standards & Specifications, Section 441, 608, & 900 for general description, materials, and construction requirements

Item No.75a: SIDEWALK/DRIVE WITH CONCRETE PAVERS, LAID OVER 6" CONCRETE

Installation of sidewalk with concrete pavers, laid over 4" concrete
See Georgia Standards & Specifications, Section 441, 608, & 900 for general description, materials, and construction requirements.

Item No 75b: SIDEWALK/DRIVE WITH CONCRETE PAVERS, LAID OVER 6" CONCRETE

Installation of Sidewalk/ Drive with concrete pavers, Laid over 6" concrete
See Georgia Standards & Specifications, Section 441, 608, & 900 for general description, materials, and construction requirements.

Item No 75c: SIDEWALK/DRIVE WITH CONCRETE PAVERS, LAID OVER 8" GRAVEL AND TOPPED WITH ¾" SAND INCLUDING GEOTEXTILE FABRIC WHEREVER REQUIRED

Installation of Sidewalk/Drive with concrete pavers, laid over 8" gravel and topped with ¾" sand incl. GEO-Textile fabric wherever required

See Georgia Standards & Specifications, Section 441, 608, & 900 for general description, materials, and construction requirements

Item No. 76 - 82: FURNISH AND INSTALL CITY STANDARD WHEELCHAIR RAMPS, CURB, DRIVEWAY APRONS, AND SIDEWALK FLUMES, MADE FROM RECYCLABLE AGGREGATES AND/OR CONCRETE:

Installation of City standard header curb, including aggregate base or compacted subgrade, per City Standard Detail No. TR-B_SW003. This item will also be used for a poured-in-place flush restraint curb alongside pervious paver installations, and as poured-in-place concrete check dams in bioretention planters. In both alternate applications, the dimensions will be the same (6 inches by 18 inches) and price will include connection to abutting concrete curb or sidewalk, as required. See Detail #22 for example of Concrete Check Dam.

See Georgia Standards & Specifications, Section 441, 608, & 900 for general description, materials, and construction requirements.

In addition to the descriptions provided for similar items 7 - 11, these items are to be constructed with recycled concrete/concrete made from recycled materials and/or aggregates. Production process of such concrete must be certified by GDOT. The concrete must meet GDOT specifications for Recycled concrete.

Item No. 83: RECYCLED CRUSHED AGGREGATE BASE, 4 INCH THICK AND, Item No. 84: RECYCLED CRUSHED AGGREGATE BASE, 6 INCH THICK:

Recycled aggregates from a source approved by GDOT. Aggregates must meet or exceed GDOT specifications for recycled aggregates.

Item No. 85: CRUSHED AGGREGATE BASE, 4 INCH THICK AND, Item No. 86: CRUSHED AGGREGATE BASE, 6 INCH THICK:

Crushed Concrete aggregates from a source approved by GDOT. Aggregates must meet or exceed GDOT specifications for crushed concrete aggregates

Item No. 87: 2X3 RECYCLED PLASTIC SIDEWALK PANEL:

Recycled Plastic Sidewalk Panels, comparable with Terrewalks© as manufactured by Terrecon Corp., or an approved equal

Item No. 88: ADJUST METER BOX / MASONRY / CONCRETE VAULT TO GRADE (METER SIZES 1 ½ - INCH AND 2-INCH):

Measurement for payment to adjust an existing water meter box/vault to grade shall be on a per unit basis. Payment shall be made for actual quantities adjusted, complete in place and accepted by the Engineer.

Payment shall constitute full compensation for all work required for water meter box/vault adjustment complete and in place including but not limited to: disconnecting, adjusting and reconnecting existing meter, back flow preventor, AMR device with antenna, meter boxes/vaults and lids, all valves, and fittings, and pipeline; test to confirm flow through meter and that meter is registering flow (bucket test), traffic control, restoration, and all else incidental thereto to completed the Work. Contractor shall minimize area required for excavation around meter box and service line for required adjustments.

Payment shall require a document containing the serial and identification numbers of the meter and AMR device, confirmed electronic meter read of AMR device, and photographic documentation of meter and AMR antenna placement on the meter box lid. The installation shall reflect the meter as twelve (12) inches below final grade, the meter box lid being level with final surface grade with antenna placed on the meter box lid.

Payment for removal and restoration of pavement, sidewalk, curb, curb and gutter, fencing and service line shall be made under other items.

Item No. 89: ADJUST EXISTING METER VAULT TOP TO GRADE (METER SIZES 3-INCH THROUGH 12-INCH):

Measurement for payment to adjust (raise or lower) an existing large meter vault top to grade, less than or equal to 3-feet shall be on a per unit basis. Payment shall be made for actual quantity of vaults adjusted, complete in place, and accepted by the Engineer.

Payment will be full compensation for all work required to raise or lower an existing large meter vault to grade, less than or equal to 3-feet complete and in place including but not limited to; saw cutting concrete and/or asphalt pavement, sidewalk, curb and gutter; excavation (excluding rock); removal and disposal of asphalt and/or concrete pavements, sidewalk, curb, gutter; removal and reinstallation of vault top and access hatch; installation of material and reinforcement to raise/lower existing vault walls; utility support systems; backfill and compaction, compaction testing; temporary water service; erosion and sedimentation control; traffic control; and restoration.

Payment will require documentation containing the serial and identification numbers of the meter(s) and AMR device(s), confirmed electronic meter read of AMR device(s), and photographic documentation of meter installation and AMR antenna placement on the meter box lid. Contractor shall document the size of the meter and register separately and confirm the sizes are the same (example: ¾" register and ¾" meter, not ¾" register and 5/8" meter).

Item No. 90: FURNISH AND INSTALL FIRE HYDRANT ASSEMBLY:

Measurement for payment for furnishing and installing fire hydrant assemblies on existing water mains will be on a per each basis. Payment will be based upon actual quantity of complete fire hydrant assemblies furnished and installed, in accordance with the requirements of the Contract Documents and accepted by the Engineer.

A complete fire hydrant assembly shall include a fire hydrant, fire hydrant barrel and inlet, concrete pad around barrel, main line tap and sleeve, 4 linear feet of 6-inch ductile iron piping, valve and valve box, extension stem and concrete pad, thrust blocks, gravel pocket and all fittings and thrust restraint as shown on the Drawings as well as temporary water for fire protection.

Payment for furnishing and installing fire hydrant assemblies on existing water mains will be made at the unit price per each established in the Bid Schedule and will be full compensation for furnishing, transporting, storing and installing the complete fire hydrant assembly, complete and in place, including, but not limited to, excavation, dewatering; backfilling, compaction, 6-inch graded aggregate base and field painting the installed hydrant all as specified in Section 02645, Hydrants.

Payment under this item shall include all labor and material to furnish and connect to, complete, and in place on the existing water main.

6-inch ductile iron hydrant connector piping in excess of 5 feet will be paid for under another item.

Item No. 91: VERTICAL ADJUSTMENT OF EXISTING FIRE HYDRANT:

Measurement for payment to vertically adjust existing fire hydrant assemblies shall be on a per vertical foot (VF) basis. Payment shall be made for actual vertical feet of hydrant barrel adjustment, as directed by the Engineer, complete in place and accepted by the Engineer.

Payment shall constitute full compensation for all work required to vertically adjust existing fire hydrants complete and in place including, but not limited to furnishing and installing hydrant barrel extensions, excavation and backfill as directed by the Engineer.

Item No. 92 – HORIZONTAL ADJUSTMENT OF EXISTING FIRE HYDRANT:

Measurement for payment to horizontally adjust existing fire hydrant assemblies shall be on a per linear foot basis. Payment shall be made for actual horizontal feet of adjustment, complete in place and accepted by the Engineer.

Payment shall constitute full compensation for all work required to horizontally adjust existing fire hydrants complete and in place including, but not limited to furnishing and installing required length of connector pipe and connection, excavation and backfill, compaction, 6-inch graded aggregate base as directed by the Engineer.

6-inch ductile iron hydrant connector piping in excess of 10 -linear feet will be paid for under another item.

Thrust blocks will be paid for under another item.

Item No. 93 – FURNISH AND INSTALL THRUST BLOCK (CLASS B UNREINFORCED CONCRETE):

Measurement for payment of 3000 psi unreinforced concrete will be made on a cubic yard basis in place and accepted by the Engineer. Concrete will not be measured and paid for separately when included in another item of work for which payment is based on units of length or area.

Payment will be full compensation for all work necessary to furnish and install the unreinforced concrete, including, but not limited to purchase of concrete, delivery to the work site, excavation, placement of formwork and concrete, backfill and compaction and cleanup.

Payment for concrete encasement of water and sewer lines shall be calculated by multiplying the longitudinal length of the encasement measured along the center line of the pipe, as accepted by the Engineer, times the cross sectional area of the encasement. Deduction shall be made for the volume occupied by the pipe.

Items No. 94 AND 95: CUT, PLUG AND ABANDON EXISTING SERVICE LINES (CURB STOPS AND CORPORATION STOP ABANDONMENTS):

Measurement for payment to cut, plug and abandon existing water services, at the location specified in the Bid Schedule, will be on a per each basis for the actual number of water services cut, plugged and abandoned, complete and in place at the water main and accepted by the Engineer.

Payment will be full compensation for all Work required to cut, plug and abandon existing service lines complete and in place including, but not limited to; field recording and documentation of final water meter reading, meter and AMR serial and identification numbers, all excavation (except rock excavation), removal and disposal of asphalt or concrete pavements and excavated material, dewatering, backfilling and compaction, restoration, traffic control, removal and salvage of water meter, AMR device and antenna, meter box and lid, meter box lid and frame only (applicable to meters in masonry/concrete vaults), removal and disposal of masonry/concrete top and vault to 12" below finished grade (applicable to meters in masonry/concrete vaults), restoration and all else incidental thereto for which separate payment is not provided under other items in the Bid Schedule.

Payment for curb stop abandonment shall include abandon existing service line, complete and in place, up to and including the curb stop including but not limited to water shut off at the curb stop, cut and cap service line on the discharge side of the curb stop.

Payment for corporation stop abandonment shall include abandon existing service line, corporation stop, and curb stop, complete and in place, including but not limited to water shut off at the corporation stop, cut and cap of service line on the discharge side of the corporation stop, cap of the service line to be abandoned, shut off curb stop, cut and cap service line at curb stop.

Payment shall include the Contractor transporting and returning salvaged items to a location designated by the City.

Payment for cut, plug, and abandonment of existing service line at the curb stop for water service relocation or water service change over shall be made under another item.

Items No. 96 THROUGH 99: FURNISH AND INSTALL DUCTILE IRON PIPE AND FITTINGS:

Ductile iron pipe, of the size and type specified in the Bid Schedule, will be measured in place, on a linear foot basis. Measurement will be along the centerline of the pipe in place, with no deduction for valves and fittings. Measurement for payment does not signify that the pipe line is accepted.

Payment for furnishing and installing ductile iron pipe, fittings, and restraint as specified in the Bid Schedule will be made for quantities as measured in place at the unit prices established in the Bid Schedule.

Payment shall include full compensation for all labor, materials, equipment and incidentals necessary for installation of ductile iron pipe and fittings, measured from existing grade to top of pipe bell, including but not limited to, construction staking, furnishing, transporting, storing and installing the pipe and fittings, sleeves and sleeve-type couplings, saw cutting asphalt or concrete pavement, all excavation (except rock excavation), removal and disposal of asphalt or concrete pavements and excavated material, excavation support system, utility support system, dewatering, bedding and haunching materials, backfilling and compaction, 6-inch graded aggregate base, erosion and sedimentation control, pipe cleaning, testing and disinfection, temporary water service and all else incidental thereto for which separate payment is not provided under other items in the Bid Schedule.

Payment shall include saw cutting asphalt or concrete pavement, all excavation (except rock excavation), removal and disposal of asphalt or concrete pavements and excavated material, excavation support system, utility support system, dewatering, backfilling and compaction, restoration, and all else incidental thereto for which separate payment is not provided under other items in the Bid Schedule.

Payment under these items shall also include compaction testing as specified in paragraph 3.16.B.2 of Section 02225, Trench Excavation and Backfill.

Payment under these items shall also include polyethylene encasement for ductile iron pipe and fittings.

Concrete for thrust blocks will be paid for under another item.

Items NO. 100 THROUGH 103: FURNISH AND INSTALL MECHANICAL JOINT GATE VALVES AND VALVE BOXES (4 -INCH THROUGH 12-INCH DIAMETER):

Measurement for payment for furnishing and installing valves of the size and type as specified in the Bid Schedule will be on a per each basis. Payment will be based upon actual quantity, of each valve furnished and installed, in accordance with the requirements of the Contract Documents and accepted by the Engineer.

Payment for furnishing and installing valves with valve boxes and extension stems will be made at the unit price per each established in the Bid Schedule and will be full compensation for all work necessary to furnish and install the valve, extension stem and concrete pad, complete in place, including, but not limited to, providing and purchasing, transporting, storing, and delivering to the worksite necessary materials, tools and

equipment, labor, excavation, dewatering; backfilling, compaction, 6-inch graded aggregate base, site restoration, and cleanup.

Items No. 104 THROUGH 107– FURNISH AND INSTALL COPPER PIPE (SIZES ¾-INCH THROUGH 2-INCH DIAMETER):

Measurement for payment for furnishing and installing a copper water pipe, of the size and type specified in the Bid Schedule, will be measured in place, on a linear foot basis. Measurement will be along the centerline of the pipe in place, without deduction for fittings or valves. Measurement for payment does not signify that the pipe is accepted.

Payment for furnishing and installing copper pipe water service lines, of the sizes specified in the Bid Schedule, will be made at the unit price per linear foot established in the Bid Schedule and will be full compensation for the complete installation and testing of the water service from the water main to the meter.

Payment shall include full compensation for all labor, materials, and incidentals necessary for installation of a water service line complete in place, including but not limited to service line piping, casing if installed, tracer wire, and all other fittings and items as required by the Contract Documents including connection to the meter and connection to the corporation stop, restoration and all else incidental thereto for which separate payment is not provided under other items in the Bid Schedule.

Payment shall include saw cutting asphalt or concrete pavement, all excavation (except rock excavation), removal and disposal of asphalt or concrete pavements and excavated material, excavation support system, utility support system, dewatering, backfilling and compaction, restoration, and all else incidental thereto for which separate payment is not provided under other items in the Bid Schedule.

Green Infrastructure Facility Installation:

Item No. 108: EXCAVATION AND DISPOSAL OF SOILS, DEBRIS:

This item includes the excavation and off-site disposal of any excavated soil or other material, not including the removal of paving covered in other items. Excavation includes establishing the final grade at base and sides of excavation, as well as any grading required for the construction of the green infrastructure facility., as per design and soil scarification.

Excavation must be performed in a manner to prevent compaction of the subgrade. Subgrade at base of excavation shall be scarified, tilled, or otherwise loosened to a depth of 6 inches at the completion of grading at no additional cost.

Measurement shall be based on haul and disposal records, or on size of excavated area, as determined by City engineer.

Item No. 109: # 57 STONE DRAINAGE LAYER, INSTALLED:

This includes the material, hauling, and installation of a drainage layer of #57 stone in a bioretention or pervious paving facility as shown in plans. Installation must be done in maximum 12 inch deep lifts and in a method that prevents compaction of the subgrade.

See “Subdrainage for Stormwater Quality Facilities” specification, sec. 02681 for general description, materials, and construction requirements.

Refer to Detail Nos. 1-4, 8-9, 16-20, 25 for construction details.

Item No. 110: # 3 STONE SUBBASE, INSTALLED:

This includes the material and installation of a drainage layer of #3 stone in a bioretention or pervious paving facility as shown in plans. Installation must be done in maximum 12” deep lifts and in a method that prevents compaction of the subgrade.

See “Permeable Interlocking Concrete Pavers” specification, sec. 02796 for general description, materials, and construction requirements.

Refer to Detail Nos. 1-4, 8-9, 16-20, 25 for construction details.

Item No. 111: # 89 STONE DRAINAGE CHOKER LAYER, INSTALLED:

This includes the material, hauling, and installation of a choker layer of #89 stone below or above the drainage layer in a bioretention or pervious paving facility as shown in plans. Installation must be done in maximum 6” deep lifts and in a method that prevents compaction of the subgrade.

See “Subdrainage for Stormwater Quality Facilities” specification, sec. 02681 for general description, materials, and construction requirements.

Refer to Detail No. 10 for construction detail.

Item No. 112: 4” PERFORATED PVC UNDERDRAIN, WITH FITTINGS:

This item includes all materials and labor for installing 4inch perforated underdrain piping, as well as connecting non-perforated piping connections necessary to connect to designated outlet point. This includes the upturned “S” piping, cleanouts, and all fittings.

See ‘Undrain Pipe’ and ‘Non-Perforated Piping’ description in “Subdrainage for Stormwater Quality Facilities” specification, sec. 02681 for general description, materials, and construction requirements.

Refer to Details 1-4, 8-9, 16-20, 25 for construction details

Item No. 113: 6” PERFORATED PVC UNDERDRAIN, WITH FITTINGS:

This item includes all materials and labor for installing 6 inch perforated underdrain piping, as well as connecting non-perforated piping connections necessary to connect to designated outlet point. This includes the upturned “S” piping, cleanouts, and all fittings. See detail #28 for upturned “S” configuration.

See ‘Undrain Pipe’ and ‘Non-Perforated Piping’ description in “Subdrainage for Stormwater Quality Facilities” specification, sec. 02618 for general description, materials, and construction requirements.

Refer to Details 1, 4,5,10, 16-21 for construction details.

Item No. 114: CONNECTION OF UNDERDRAINS TO EXISTING STORM SEWER:

This item includes any modifications to an existing storm sewer or structure to allow for the connection underdrain system to the existing storm sewer system. Payment shall be made per connection.

Item No. 115: ENGINEERED SOIL MIX:

This item includes the material and installation of engineered soil, defined as ‘Engineered Soil Mix’ in the “Amended Soil and Mulch” specification, sec. 02922 . See specification for general description, materials, and construction requirements.

Item No. 116: IMPERMEABLE GEOMEMBRANE LINER:

Installation of an impermeable geomembrane as a water barrier in subsurface applications. Membrane shall be a 30-mil minimum thickness geomembrane fabricated of linear low density polyethylene (LLDPE), high density polyethylene (HDPE), flexible polypropylene, polyvinyl chloride (PVC), or other geomembrane material approved by the Owner’s representative.

Item No. 117: SHREDDED HARDWOOD MULCH:

Double or triple shredded, aged hardwood mulch, installed on planting beds or bioretention cells. See the “Amended Soil and Mulch” specification, sec. 02922 for general description, materials, and construction requirements.

Item No. 118: RIVER COBBLE, 4 TO 5 INCH IN DIAMETER:

Ungrouted River cobble installed as mulch or energy dissipation as shown on plans.

Item No. 119: PLANTINGS OTHER THAN TREES:

This items covers material and installation of herbaceous perennials and woody shrubs. Plantings shall be as specified on plans, with no substitution of species or size without written authorization from owner. Installed plants shall be priced as material cost (not including delivery) multiplied by a markup factor that will be specified by the bidder on the bid sheet. Eg. If material cost is \$10 for a particular plant, and markup factor specified by bidder is ‘2’, then cost will be \$20.

See Georgia Standards & Specifications, Section 893 for general description, materials, and construction requirements.

Item No. 120: CONCRETE PLANTER WALL:

This concrete planter wall is for use around stormwater planters within the right-of-way, per detail No. 19. Price includes all material and labor, including any required base course, reinforcing bars, and dowling into adjacent sidewalk or other hardscape, where required.

See “Stormwater Planters” specification sec. 02949 for general description, materials, and construction requirements.

Item No. 121: GEOTEXTILE:

This item includes material and installation of geotextile where required as a separation or filtration layer within green infrastructure systems. See included “Geotextiles” specification, sec. 02371 for general description, materials, and construction requirements

Item No. 122: PERMEABLE INTERLOCKING CONCRETE PAVERS:

This item covers the installation of pervious pavers over a prepared base/ drainage course. The preparation and installation of the base course will be paid for under separate bid items. Included in this item are all materials and labor for the installation of a bedding course of #89 stone, installation of the pavers per design, and the filling of the paver joints with # 89 stone.

See included “Permeable Interlocking Concrete Pavers” specification, sec. 02796 for general description, materials, and construction requirements.

See Detail No. 10 for construction detail

Item No. 123: 6 INCH PERVIOUS CONCRETE PAVING:

This item covers the installation of a 6 inch pervious concrete slab over a prepared base/ drainage course. The preparation and installation of the base course will be paid for under separate bid items. Included in this item are all materials and labor for the installation of the pervious concrete per the design.

See included “Pervious Concrete Paving” specification, sec. 02798 for general description, materials, and construction requirements.

Item No. 124: MONITORING WELL: 1 INCH PERFORATED PVC WITH WATER VALVE BOX AND COVER:

This item covers the installation of a monitoring well installed in a green infrastructure facility. Well will composed of a 1” perforated PVC pipe extending from the top of the drainage layer (in Paving) or soil (in bioretention) to at least one foot below the top of subgrade at the base of the facility. Pipe shall be surrounded with at least 2 inches of #57 stone and capped with a COA Typical 4”-6” Valve Box with cover, City Standard Detail No. WR-G_VB002 and No. WR-G_VB003

Item No. 125: COA STANDARD DROP INLET YARD INLET:

This work will consist of installing a standard drop inlet yard inlet in accordance with the plans, standard details or as directed by the engineer, in order to accomplish the plan intent. Work under this item shall include, but is not limited to, furnishing all casting necessary to make pipe connections regardless of skew, and for all materials, forms, and the disposal of surplus material. Work may include demolishing an existing structure and installing new structure in the same location. Depth of structure under this item shall not exceed 10 vertical feet. Refer to City Standard Detail No. SW-G-DI002

Brick and mortar used for this purpose shall meet the requirements of Section 02513.

Measurement of this work shall be by the unit for each structure, in place, complete, and accepted.

Item No. 126: DOMED IRON GRATE FOR CATCH BASIN:

Material and installation of a domed cast-iron grate and frame for COA Standard Drop Inlet Yard Inlet

Item No. 127: 1 ½” RIGID STEEL CONDUIT:

This item includes the installation of 1 ½ inch diameter rigid steel conduit under roadway or soil. Price includes all fittings and connections with monitoring wells, equipment boxes or vaults.

See Georgia Standards & Specifications, Section 923 for general description, materials, and construction requirements.

Item No. 128 THROUGH 130: REPAIR OR REPLACEMENT OF VEHICLE LOOP DETECTORS:

This work will consist of repairing or replacing of existing vehicle loop detectors in accordance to GDOT standards, details and Special Provisions 647 and 925. Work shall include, but not be limited to, the removal of any mangled detector wire embedded in the roadway surface, pre-marking the location of the replacement loop detector, re-saw cutting the new pavement and the installation of the loop detector wire, including splicing to the loop lead-in cable.

+++ END OF SECTION 01025 +++

**SECTION 01040
COORDINATION**

PART 1 GENERAL

1.01 SUMMARY

- A. Coordinate execution of the Work with subcontractors and the Engineer as required to maintain operation of the existing facilities and satisfactory progress of the Work.
- B. Requirements of this Section will be in addition to those stated in the General Conditions.
- C. The Engineer may require a written explanation of the Contractor's plan for accomplishing separate phases of the Work.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 CUTTING AND PATCHING

- A. Carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Engineer.
- B. Do not cut or alter the work of any subcontractor, except with the written consent of the subcontractor whose work is to be cut or altered, or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness or incompetence of the Contractor or any of its subcontractors, shall be done by, or at the expense of, the Contractor and shall be the responsibility of the Contractor.

3.02 COORDINATION

- A. The Contractor shall consult with the Engineer on a daily basis while performing demolition, excavation, or any other alteration activity. No water or sewer function, utility or structure shall be altered, shut off or removed unless approved in advance, and in writing, by the Engineer. The Contractor shall give the Engineer at least 48 hours advanced notice, in writing, of the need to alter, shut off or remove such function.
- B. Coordinate the Work with the Engineer and revise daily activities if needed so as to not adversely affect system operations. Such revisions in the proposed work schedule will be accomplished with no additional compensation to the Contractor.

3.03 OWNER'S RESPONSIBILITIES

- A. All existing water system valves shall be located, uncovered as necessary and operated by the Owner.

3.04 PROTECTION AND RESTORATION OF WORK AREA

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is completed.
 - 1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.
 - 2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
 - 3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.
 - 4. The Engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.
- B. Man-made Improvements: Protect, or remove and replace with the Engineer's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.
- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Engineer. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.

- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.
- F. Swamps and Other Wetlands
 - 1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.
 - 2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.
 - 3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.
 - 4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.
- G. Refer to Section 02920, Site Restoration

3.05 WATER FOR CONSTRUCTION PURPOSES

- A. All water required for construction shall be furnished by the Owner. It shall be available by connecting to the Owner's water system at a point approved by the Engineer. There shall be installed in every connection to the Owner's water supply, an water meter with backflow preventer meeting the requirements of the City. The Contractor shall meter all water usage. The Contractor shall notify the City one week in advance prior to connecting to the water system.
- B. A total of the metered water used shall be submitted to the Engineer with each monthly application for payment

3.06 EXISTING UTILITIES AND OBSTRUCTIONS

- A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available. The Contractor shall call the Utilities Protection Center (UPC) (800-282-7411) as required by Georgia Law (O.C.G.A. Sections 25-9-1 through 25-9-13) and shall call all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.
- B. Existing Utility Locations: The following steps shall be exercised to avoid interruption of

existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation, that a valid utility location exists at the point of excavation.
2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.
4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Engineer an updated copy of the log bi-weekly, or more frequently if required.

C. Conflict with Existing Utilities

1. **Horizontal Conflict:** Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Engineer. Where such relocation of the water main is denied by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.
2. **Vertical Conflict:** Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Engineer. Where such relocation of the water main is denied by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.

- D. **Electronic Locator:** The Contractor shall have available, at all times, an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. Should neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.
 2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete thickness to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.
 3. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.
- F. Work shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures, utilities or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve the Contractor for laying and joining different or additional items where required or when directed by the Engineer.

3.07 PIPE DISTRIBUTION

- A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.
- B. Distribution and stringing of pipe along the route will be limited to the total length which will be installed in one work day/work shift. The Owner reserves the right to reduce the distance in residential and commercial areas based on the effects of the pipe distribution on the adjacent property owners.
- C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.
- D. No distributed pipe shall be placed inside drainage ditches.
- E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.08 CONSTRUCTION OPERATIONS

- A. Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.
- B. Construction operations shall be limited to 400 feet along the water main route, including clean-up and utility exploration.
- C. The Contractor shall insure that all work areas and roadways are free from excess excavated material, debris, mud, soil, rocks etc. at the end of each work day. Contractor shall be responsible for sweeping all areas at the end of each work day.

3.09 CONNECTIONS TO WORK BY OTHERS

- A. As shown on the Drawings, pipelines constructed under this Contract are to be connected to pipelines to be constructed by others.
- B. Pipelines built under this Contract will be connected to pipelines constructed by others by removing the plugs and making the connection.
- C. If the pipelines have not been constructed by others, the pipeline (under this Contract) shall be laid to the required line and grade, terminated with a plugged connection at the location indicated on the Drawings and then backfilled. The connection point shall be located by survey methods for future reference and construction tie-in.

+++ END OF SECTION 01040 +++

SECTION 01045
CUTTING AND PATCHING

PART 1 GENERAL

1.01 SCOPE

- A. The work under this section includes, but is not necessarily limited to, cutting and patching work as indicated on the drawings or as directed by the engineer, herein specified and as necessary for proper and complete performance of the work.
- B. Requirements for cutting and patching may be described in various sections of these specifications.
- C. Execute cutting, including excavating and filling, or patching of work required to:
 - 1. Make several parts fit properly.
 - 2. Uncover work to provide for installation of ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of the contract documents.
 - 5. Remove samples of the installed work as specified for testing.
 - 6. Install specified work in existing construction.
- D. In addition to contract requirements, upon written instruction of the engineer:
 - 1. Uncover work to provide for the engineer's observation of covered work.
 - 2. Remove samples of the installed materials for testing.
 - 3. Remove work to provide for alteration of existing work.
- E. Protection of Work
 - 1. Do not endanger any work by cutting or altering the work or any part of it.
 - 2. Do not cut or alter the work of another contractor without written consent of the engineer.

1.02 SUBMITTALS

- A. Prior to cutting which affects the structural safety of the project or the work of another contractor, submit a written notice to the engineer requesting consent to proceed with cutting. The notice shall include:
 - 1. Identification of project
 - 2. Description of defective work
 - 3. Necessity for cutting
 - 4. Effect on other work or on the structural integrity of the project.
 - 5. Description of the work including:
 - a. Scope of cutting and patching
 - b. Subcontractor and trades to execute work
 - c. Products proposed to be used
 - d. Extent of refinishing
 - 6. Alternatives to cutting and patching.
 - 7. Designation of party responsible for the cost of cutting and patching.
- B. Cost Estimate: Prior to cutting and patching performed on instruction of the engineer, submit a cost estimate.
- C. Should conditions of the work or the schedule necessitate alternative materials or methods, submit a written recommendation to the engineer that includes:
 - 1. Compelling conditions for alternative materials or methods
 - 2. Recommended alternative materials or methods
 - 3. Submittals as required for substitutions
- D. Uncovered Work: Submit written notice to the engineer designating the time that the work will be uncovered for the engineer's observation.

1.03 PAYMENT FOR COST

- A. Costs caused by ill work or work not conforming to the contract documents, including costs for additional services of the engineer, shall be paid for by the contractor.

- B. Costs for work done on the instructions of the engineer, which is not shown on the drawings or specified, other than for defective or non-conforming work, will be paid for in accordance with the general conditions.

PART 2 PRODUCTS

2.01 MATERIALS

All products and materials shall conform to the requirements of the specifications for the type of work being performed, except where no products are specified in these specifications for the item being replaced; then the products and materials shall be of an equivalent type, quality, thickness and width of the item removed.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of the work, including elements subject to movement or damage during cutting and patching, or excavating and backfilling.
- B. After uncovering work, inspect conditions affecting the installation of new products.

3.02 PREPARATION

- A. Provide shoring, bracing and support as required to maintain structural integrity of the project.
- B. Provide protection for other portions of the project and provide protection from the elements.

3.03 PERFORMANCE

- A. Execute fitting and adjustments of products to provide finished installation that complies with specified tolerances and finishes.
- B. Execute cutting and demolition by means that will prevent damage to other work and will provide proper surfaces to receive installation of repairs and new work.
- C. Execute excavating and backfilling as specified in the technical specifications.
- D. Restore work which has been cut or removed and install new products to provide completed work in accordance with the requirements of the contract documents.
- E. Refinish entire surfaces as necessary to provide an even finish. Continuous surfaces shall be refinished to the nearest intersection and assemblies shall be entirely refinished.

+++ **END OF SECTION 01045** +++

**SECTION 01055
CONSTRUCTION STAKING**

PART 1 GENERAL

1.01 SCOPE

- A. Construction staking shall include all of the surveying work required to layout the work and control the location of the finished project. The contractor shall have the full responsibility for constructing the project to the correct horizontal and vertical alignment, as shown on the drawings, as specified, or as ordered by the engineer. The contractor shall assume all costs associated with rectifying work constructed in the wrong location.
- B. From the information shown on the drawings and the information to be provided as indicated under project conditions below, the contractor shall:
 - 1. be responsible for setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the project;
 - 2. safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re-establishing same if disturbed;
 - 3. stake out the permanent and temporary easements or the limits of construction to ensure that the work is not deviating from the indicated limits;
 - 4. be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.
- C. Baselines shall be defined as the line to which the location of the work is referenced, i.e., edge of pavement, road centerline, property line, right-of-way or survey line.
- D. Record drawing surveys shall be performed in accordance with Section 01720 of these specifications.

1.02 PROJECT CONDITIONS

- A. The drawings provide the location and/or coordinates of principal components of the project. The alignment of some components of the project may be indicated in the specifications. The engineer may order changes to the location of some of the components of the project or provide clarification to questions regarding the correct alignment.

- B. The survey points, control points, and baseline to be provided to the contractor shall be limited to only that information which can be found on the project site by the contractor.

1.03 QUALITY ASSURANCE

- A. The contractor shall furnish documentation, prepared by a surveyor currently registered in the State of Georgia, that staking is being done to the horizontal and vertical alignment shown in the contract documents. This requires that the contractor hire, at the contractor's own expense, a currently registered surveyor, acceptable to the City, to provide ongoing construction staking or confirmation of such.
- B. Any deviations from the drawings shall be confirmed by the engineer prior to construction of that portion of the project.

1.04 SIDEWALKS

- A. Staking Precision: The precision of construction staking shall match the precision of a components location indicated on the drawings. Staking of utilities shall be done in accordance with generally accepted practice for the type of utility.
- B. Paved Surfaces: The contractor shall establish a reference point for establishing and verifying the paving subgrade and finished grade elevations. Any variance with plan grades shall be identified by the contractor and confirmed by the engineer prior to constructing the base.

+++ END OF SECTION 01055 +++

SECTION 01060
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

- A. Permits and Responsibilities: The contractor shall, without additional expense to the City, be responsible for obtaining all necessary licenses and permits, including building permits, and for complying with any applicable federal, state, county and municipal laws, codes and regulations, in connection with the prosecution of the work.
- B. The contractor shall take proper safety and health precautions to protect the work, the workers, the public and the property of others.
- C. The contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the work, except for any completed unit of construction thereof, which may heretofore have been accepted.

+ + + **END OF SECTION 01060** + + +

**SECTION 01200
PROJECT MEETINGS**

PART 1 GENERAL

1.01 SCOPE

- A. Work under this section includes all scheduling and administering of pre-construction and progress meetings as herein specified and necessary for the proper and complete performance of this work.
- B. Scheduling and Administration by the City of Atlanta Project Manager.
 - 1. Prepare agenda.
 - 2. Make physical arrangements for the meetings.
 - 3. Preside at meetings.
 - 4. Record minutes and include significant proceedings and decisions.
 - 5. Distribute copies of the minutes to participants.

1.02 PRECONSTRUCTION CONFERENCE

- A. The City of Atlanta Project Manager shall schedule the preconstruction conference prior to the issuance of a Work Order.
- B. Representatives of the following parties are to be in attendance at the meeting:
 - 1. City of Atlanta Project Manager.
 - 2. Engineer.
 - 3. Contractor and superintendent.
 - 4. Major subcontractors.
 - 5. Representatives of governmental or regulatory agencies when appropriate.
- C. The agenda for the preconstruction conference shall consist of the following at a minimum:
 - 1. Distribute and discuss a list of major subcontractors and a tentative construction schedule.

2. Critical work sequencing.
3. Designation of responsible personnel and emergency telephone numbers.
4. Processing of field decisions and change orders.
5. Adequacy of distribution of contract documents.
6. Schedule and submittal of shop drawings, product data and samples.
7. Pay request format, submittal cutoff date, pay date and retainage.
8. Procedures for maintaining record documents.
9. Use of premises, including office and storage areas and City's requirements.
10. Major equipment deliveries and priorities.
11. Safety and first aid procedures.
12. Security procedures.
13. Housekeeping procedures.
14. Work hours.

1.03 PROJECT COORDINATION MEETINGS

- A. Schedule regular bi-weekly meetings as directed by the City of Atlanta Project Manager.
- B. Hold called meetings as the progress of the work dictates.
- C. The meetings shall be held at the location requested by the City of Atlanta Project Manager.
- D. Representatives of the following parties are to be in attendance at the meetings:
 1. City of Atlanta Project Manager
 2. Engineer.
 3. Contractor and superintendent.

4. Major subcontractors as pertinent to the agenda.
 5. City's representative as appropriate.
 6. Representatives of governmental or other regulatory agencies as appropriate.
- E. The minimum agenda for progress meetings shall consist of the following:
1. Review and approve minutes of previous meetings.
 2. Review work progress since last meeting.
 3. Note field observations, problems and decisions.
 4. Identify problems, which impede planned progress.
 5. Review off-site fabrication problems.
 6. Review contractor's corrective measures and procedures to regain plan schedule.
 7. Review contractor's revision to the construction schedule as outlined in the Supplementary Conditions.
 8. Review submittal schedule; expedite as required to maintain schedule.
 9. Maintenance of quality and work standards.
 10. Review changes proposed by City for their effect on the construction schedule and completion date.
 11. Complete other current business.

+++ END OF SECTION 01200 +++

SECTION 01310
BAR CHART CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 SCOPE

- A. The work under this section includes preparing, furnishing, distributing, and periodic updating of the construction schedules as specified herein.
- B. The purpose of the schedule is to demonstrate that the contractor can complete the overall project within the contract time and meet all required interim milestones.

1.02 SUBMITTALS

- A. Overall Project Schedule (OPS)
 - 1. Submit the schedule within 10 days after date of the Notice to Proceed.
 - 2. The engineer will review the schedule and return it within 10 days after receipt.
 - 3. If required, resubmit within 10 days after receipt of a returned copy.
- B. Near Term Schedule (NTS)
 - 1. Submit the first near term schedule within 10 days of the Notice to Proceed.
 - 2. The engineer will review the schedule and return it within 10 days after receipt.
- C. Submit an update of the OPS and NTS with each progress payment request.
- D. Submit the number of copies required by the contractor, plus four copies to be retained by the engineer.

1.03 APPROVAL

Approval of the contractor's detailed construction program and revisions thereto shall in no way relieve the contractor of any of contractor's duties and obligations under the contract. Approval is limited to the format of the schedule and does not in any way indicate approval of, or concurrence with, the contractor's means, methods and ability to carry out the work.

1.04 OVERALL PROJECT SCHEDULE (OPS)

- A. The contractor shall submit to the City for approval a detailed overall project schedule of the contractor's proposed operations for the duration of the project. The OPS shall be in the form of a Gantt/bar chart.
- B. Gantt/Bar Chart Schedule
 - 1. Each activity with a duration of five or more days shall be identified by a separate bar. Activities with a duration of more than 20 days shall be sub-divided into separate activities.
 - 2. The schedule shall include activities for shop drawing preparation and review, fabrication, delivery, and installation of major or critical path materials and equipment items.
 - 3. The schedule shall show the proposed start and completion date for each activity. A separate listing of activity start and stop dates and working day requirements shall be provided unless the information is shown in text form on the Gantt/bar chart.
 - 4. The schedule shall identify the notice to proceed date, the contract completion date, major milestone dates, and a critical path.
 - 5. The schedule shall be printed on a maximum 11 x 17-inch size paper. If the OPS needs to be shown on multiple sheets, a simplified, one page, summary bar chart showing the entire project shall be provided.
 - 6. The schedule shall have a horizontal time scale based on calendar days and shall identify the Monday of each week.
 - 7. The schedule shall show the precedence relationship for each activity.

1.05 NEAR TERM SCHEDULE (NTS)

- A. The contractor shall develop and refine a detailed Near Term Schedule showing the day to day activities with committed completion dates, which must be performed during the upcoming 30 day period. The detailed schedule shall represent the contractor's best approach to the work, which must be accomplished to maintain progress consistent with the overall project schedule.
- B. The near term schedule shall be in the form of Gantt/bar chart and shall include a written narrative description of all activities to be performed and describe corrective action to be taken for items that are behind schedule.

1.06 UPDATING

- A. Show all changes occurring since previous submission of the updated schedule.
- B. Indicate progress of each activity and show actual completion dates.
- C. The contractor shall be prepared to provide a narrative report at the project coordination meetings. The report shall include the following:
 - 1. A description of the overall project status and comparison to the OPS.
 - 2. Identify activities, which are behind schedule and describe corrective action to be taken.
 - 3. A description of changes or revisions to the project and their effect on the OPS.
 - 4. A description of the Near Term Schedule of the activities to be completed during the next 30 days. The report shall include a description of all activities requiring participation by the engineer and/or City.

+++ END OF SECTION 01310 +++

**SECTION 01320
CONSTRUCTION PHOTOGRAPHS**

PART 1 GENERAL

1.01 SCOPE

- A. The contractor shall be prepared, upon request from the City, to furnish all equipment and labor materials required to provide the City with construction photographs of the project.
- B. Negatives or original electronic copy shall become the property of the City and none of the photographs herein shall be published without express permission of the City.

1.02 PRE AND POST CONSTRUCTION PHOTOGRAPHS

- A. Prior to the beginning of any work, the contractor shall take project photographs of the work area to record existing conditions.
- B. Following completion of the work, another recording shall be made showing the same areas and features as in the pre-construction photographs.
- C. All conditions, which might later be subject to disagreement, shall be shown in sufficient detail to provide a basis for decisions.
- D. The pre-construction photographs shall be submitted to the engineer within 25 calendar days after the date of receipt by the contractor of Notice to Proceed. Post-construction photographs shall be provided prior to final acceptance of the project.

1.03 PROGRESS PHOTOGRAPHS

- A. Photographs shall be taken to record the general progress of the project during each pay period. Photographs shall be representative of the primary work being performed at that time.
- B. The photographs shall include the date and time marking of the recording. All photographs shall be labeled on a tab connected to the bottom of the photo to indicate date and description of work shown.
- C. A minimum of 10 photographs shall be submitted with each request for payment. The view selection will be as agreed to with the engineer. Two prints of each photograph shall be submitted.

1.04 SUBMITTALS

- A. Photographs shall be submitted in plastic sleeves pre-punched for a 3-ring binder. Negatives shall be submitted in polyethylene preservers, 8-1/2 x 11-inches in size, equal to Print File Archival Preservers, Style No. 35-7B.

- B. Construction photographs shall be submitted with each payment request. Failure to include photographs may be cause for rejection of the payment request.

+ + + END OF SECTION 01320 + + +

SECTION 01340
SHOP DRAWINGS, PROJECT DATA AND SAMPLES

PART 1 GENERAL

1.01 SCOPE

- A. The work under this section includes submittal to the engineer of shop drawings, product data and samples required by the various sections of these specifications.
- B. Submittal Contents: The submittal contents required are specified in each section.
- C. Definitions: Submittals are categorized as follows:
 - 1. Product Data
 - a. Product data includes standard printed information on materials, products and systems, not specially prepared for this project, other than the designation of selections from among available choices printed therein.
 - b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the project. Include supplier's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements, which have been checked, and special coordination requirements.
 - 2. Samples
 - a. Samples include both fabricated and un-fabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or, where indicated, for more detailed testing and analysis.
 - b. Provide units identical with final condition of proposed materials or products for the work. Include "range" samples, not less than three units, where unavoidable variations must be expected, and describe or identify variations between units of each set. Provide full set of optional samples where the engineer's selection is required. Prepare samples to match the engineer's sample where indicated. Include information with each sample to show generic description, source or product name and supplier, limitations and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture and "kind" by the engineer. Engineer will note "test" samples, except as otherwise indicated, for other requirements, which are the exclusive responsibility of the contractor.

3. Miscellaneous submittals related directly to the work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the work but not processed as shop drawings, product data or samples.

1.02 SPECIFIC CATEGORY REQUIREMENTS

- A. General: Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal. Submittals shall contain:
 1. The date of submittal and the dates of any previous submittals.
 2. The project title.
 3. Numerical submittal numbers, starting with 1.0, 2.0, etc. Revisions to be numbered 1.1, 1.2, etc.
 4. The Names of:
 - a. Contractor
 - b. Supplier
 - c. Supplier
 5. Identification of the product, with the specification section number, permanent equipment tag numbers and applicable drawing no.
 6. Field dimensions, clearly identified as such.
 7. Relation to adjacent or critical features of the work or materials.
 8. Applicable standards, such as ASTM or federal specification numbers.
 9. Notification to the engineer in writing, at time of submissions, of any deviations on the submittals from requirements of the contract documents.
 10. Identification of revisions on resubmittals.
 11. An 8 x 3-inch blank space for contractor and engineer stamps.

12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with requirements of the work and of contract documents.
13. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of the item for which review is requested crossed out.

1.03 ROUTING OF SUBMITTALS

- A. Submittals and routine correspondence shall be routed as follows:
 1. Supplier to contractor (through representative if applicable)
 2. Contractor to City of Atlanta Project Manager

PART 2 PRODUCTS

2.01 SHOP DRAWINGS

- A. Unless otherwise specifically directed by the City of Atlanta Project Manager , make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the work.
- B. Submit all shop assembly drawings, larger than 11 x 17-inches, in the form of one reproducible transparency with two opaque prints or bluelines.
- C. Submit all shop drawings, 11 x 17-inches and smaller, in the form of six opaque prints or bluelines.
- D. One reproducible for all submittals larger than 11 x 17-inches and no more than three prints of other submittals will be returned to the contractor.

2.02 SUPPLIER'S LITERATURE

- A. Where content of submitted literature from suppliers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the engineer's review.
- B. Submit the number of copies which are required to be returned (not to exceed three) plus three copies, which will be retained by the engineer.

2.03 SAMPLES

- A. Samples shall illustrate materials, equipment or workmanship and established standards by which completed work is judged.
- B. Unless otherwise specifically directed by the engineer, all samples shall be of the precise article proposed to be furnished.
- C. Submit all samples in the quantity, which is required to be returned, plus one sample, which will be retained by the engineer.

2.04 COLORS

- A. Unless the precise color and pattern is specifically described in the contract documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the engineer for review and selection.
- B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

PART 3 EXECUTION

3.01 CONTRACTOR'S COORDINATION OF SUBMITTALS

- A. Prior to submittal for the engineer's review, the contractor shall use all means necessary to fully coordinate all material, including the following procedures:
 - 1. Determine and verify all field dimensions and conditions, catalog numbers and similar data.
 - 2. Coordinate as required with all trades and all public agencies involved.
 - 3. Submit a written statement of review and compliance with the requirements of all applicable technical specifications as well as the requirements of this section.
 - 4. Clearly indicate in a letter or memorandum on the supplier's or fabricator's letterhead, all deviations from the contract documents.
- B. Each and every copy of the shop drawings and data shall bear the contractor's stamp showing that they have been so checked. Shop drawings submitted to the engineer without the contractor's stamp will be returned to the contractor for conformance with this requirement.

- C. The City may back charge the contractor for costs associated with having to review a particular shop drawing, product data or sample more than two times to receive a "No Exceptions Taken" mark.
- D. Grouping of Submittals
 - 1. Unless otherwise specifically permitted by the engineer, make all submittals in groups containing all associated items.
 - 2. 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 the shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to the engineer along with contractor's comments as to compliance, non-compliance or features requiring special attention.
- E. Schedule of Submittals: Within 30 days of contract award and prior to any shop drawing submittal, the contractor shall submit a schedule showing the estimated date of submittal and the desired approval date for each shop drawing anticipated. A reasonable period shall be scheduled for review and comments. Time lost due to unacceptable submittals shall be the contractor's responsibility and some time allowance for resubmittal shall be provided. The schedule shall provide for submittal of items, which relate to one another to be submitted concurrently.

3.02 TIMING OF SUBMITTALS

- A. 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.
- B. In scheduling, allow sufficient time for the engineer's review following the receipt of the submittal.

3.03 REVIEWED SHOP DRAWINGS

- A. Engineer Review
 - 1. Allow a minimum of 30 days for the engineer's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The engineer will advise the contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow a minimum of two weeks for reprocessing each submittal. Advise the engineer on each

submittal as to whether processing time is critical to progress of the work, and therefore the work would be expedited if processing time could be foreshortened.

2. Acceptable submittals will be marked "No Exceptions Taken." A minimum of three copies will be retained by the engineer for the engineer's and the City's use and the remaining copies will be returned to the contractor.
 3. Submittals requiring minor corrections before the product is acceptable will be marked "Make Corrections Noted." The contractor may order, fabricate and ship the items included in the submittals, provided the indicated corrections are made. Drawings must be resubmitted for review and marked "No Exceptions Taken" prior to installation or use of products.
 4. Submittals marked "Amend and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.
 5. The "Rejected - See Remarks" notation is used to indicate products, which are not acceptable. Upon return of a submittal so marked, the contractor shall repeat the initial review procedure utilizing acceptable products.
 6. Only two copies of items marked "Amend and Resubmit" and "Rejected - See Remarks" will be reviewed and marked. One copy will be retained by the engineer and the other copy with all remaining unmarked copies will be returned to the contractor for resubmittal.
- B. No work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" notation. The contractor shall maintain at the job site a complete set of shop drawings bearing the engineer's stamp.
- C. Substitutions: In the event the contractor obtains the engineer's approval for the use of products other than those which are listed first in the contract documents, the contractor shall, at the contractor's own expense and using methods approved by the engineer, make any changes to structures, piping and electrical work that may be necessary to accommodate these products.
- D. Use of the "No Exceptions Taken" notation on shop drawings or other submittals is general and shall not relieve the contractor of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the contract documents. The engineer's review shall not relieve the contractor of responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the project and compliance with the information given in the contract documents. The contractor is responsible for dimensions to be confirmed and correlated at the job site. The contractor is also

responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

3.04 RESUBMISSION REQUIREMENTS

- A. Shop Drawings
 - 1. Revise initial drawings as required and resubmit as specified for initial submittal, with the resubmittal number shown.
 - 2. Indicate on drawings all changes, which have been made other than those, requested by the engineer.
- B. Project Data and Samples: Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

+++ END OF SECTION 01340 +++

SECTION 01400
QUALITY ASSURANCE/QUALITY CONTROL

PART 1 GENERAL

1.01 SCOPE

- A. This section includes requirements for the implementation of the Contractor's quality assurance and quality control program.

1.02 SITE INVESTIGATION AND CONTROL

- A. Contractor shall check and verify all dimensions and conditions in the field continuously during construction. Contractor shall be solely responsible for any inaccuracies built into the Work due to Contractor's and subcontractor's failure to comply with this requirement.
- B. Contractor shall inspect related and appurtenant Work and report in writing to the Engineer any conditions that will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all Site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor solely and entirely at Contractor's expense.

1.03 INSPECTION OF THE WORK

- A. All work performed by the Contractor and subcontractors shall be inspected by the Contractor and non-conforming Work and any safety hazards in the work area shall be noted and promptly corrected. The Contractor is responsible for the Work to be performed safely and in conformance to the Contract Documents.
- B. The Work shall be conducted under the general observation of the Engineer and is subject to inspection by representatives of the City acting on behalf of the City to ensure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop, or field inspection, as required. The Engineer or any inspector(s) shall be permitted access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.
- C. The presence of the Engineer, or any inspector(s), however, shall not relieve the Contractor of the responsibility for the proper execution of the Work in accordance with all requirements of the Contract Documents. Compliance is the responsibility of the Contractor. No act or omission on the part of the Engineer, or any inspector(s) shall be construed as relieving Contractor of this responsibility. Inspection of Work later determined to be non-conforming shall not be cause or excuse for acceptance of the non-conforming Work. The City may accept non-conforming Work when adequate compensation is offered and it is in the City's best interest as determined by the City.

- D. All materials and articles furnished by the Contractor or subcontractors shall be subject to rigid documented inspection, by qualified personnel, and no materials or articles shall be used in the Work until they have been inspected and accepted by the Contractor's Quality Control representative and the Engineer or other designated representative. No Work shall be backfilled, buried, cast in concrete, covered, or otherwise hidden until it has been inspected. Any Work covered in the absence of inspection shall be subject to uncovering. Where uninspected Work cannot be easily uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal, and reconstruction under proper inspection at the Contractor's expense.
- E. All materials, equipment and/or articles furnished to the Contractor by the City shall be subject to rigid inspection by the Contractor's Quality Control representative before being used or placed by the Contractor. The Contractor shall inform the Engineer, in writing, of the results of said inspections within one working day after completion of inspection. In the event the Contractor believes any material or articles provided by the City to be of insufficient quality for use in the Work, the Contractor shall immediately notify the Engineer.

1.04 TIME OF INSPECTION AND TESTS

- A. Samples and test specimens required under these Specifications shall be furnished and prepared for testing in ample time for the completion of the necessary tests and analyses before said articles or materials are to be used. The Contractor shall furnish and prepare all required test specimens at Contractor's own expense.
- B. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide, or otherwise cover any Work under this Contract, the Engineer shall be notified not less than three work days in advance to request inspection before beginning any such Work of covering. Failure of the Contractor to notify the Engineer at least three work days in advance of any such inspections shall be reasonable cause for the Engineer to order a sufficient delay in the Contractor's schedule to allow time for such inspection. The costs of any remedial or corrective work required, and all costs of such delays, including its impact on other portions of the Work, shall be borne by the Contractor.

1.05 SAMPLING AND TESTING

- A. The Contractor shall retain and pay for an independent materials testing agency approved by the Engineer and the City of Atlanta as required by the General Conditions. This independent testing agency will develop and submit a testing plan for quality assurance on each type of work activity. The testing agency will document the processes and procedures utilized to verify and maintain quality work. When not otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the most current standards, as applicable to the class and nature of the article or materials considered. However, the Engineer reserves the right to use any generally accepted system of inspection which, in the opinion of the Engineer, will ensure the Engineer that the quality of the workmanship is in full accord with the Contract Documents.

- B. The City reserves the right to abbreviate, modify the frequency of or waive tests or quality assurance measures, but waiver of any specific testing or other quality assurance measure, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial work, shall not be construed as a waiver of any technical or qualitative requirements of the Contract Documents.
- C. Notwithstanding the existence of such waiver, the City shall reserve the right to make independent investigations and tests as specified in the following paragraph and failure of any portion of the Work to meet any of the qualitative requirements of the Contract Documents, shall be reasonable cause for the City to require the removal or correction and reconstruction of any such Work.
- D. In addition to any other inspection or quality assurance provisions that may be specified, the City shall have the right to independently select, test, and analyze, at the expense of the City, additional test specimens of any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests or analyses made by the Contractor to determine compliance with the applicable specifications for the materials so tested or analyzed provided that wherever any portion of the Work is discovered, as a result of such independent testing or investigation by the Engineer, which fails to meet the requirements of the Contract Documents, all costs of such independent inspection and investigation and all costs of removal, correction, reconstruction, or repair of any such Work shall be borne by the Contractor.

1.06 CONTRACTOR'S QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

- A. The Contractor shall establish and execute a Quality Assurance/Quality Control (QA/QC) program for the services that are being procured from the Contractor. The program shall provide the Contractor with adequate measures for verification and conformance to defined requirements by the Contractor's personnel and subcontractors (including fabricators and suppliers). This program shall be described in a Plan responsive to this Section. It shall utilize the services of an independent testing agency/company that is industry certified to provide quality assurance and compliance with the standards specified.
- B. The Contractor shall furnish the Engineer a project specific QA/QC Plan. The Plan shall contain a comprehensive account of Contractor's QA/QC procedures as applicable to this job. The Contractor shall furnish for review by the Engineer, no later than 14 days after receipt of notice to proceed, the QA/QC plan proposed to be implemented. The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. Construction will be permitted to begin only after acceptance of the QA/QC Plan. The detailed requirements for this Plan are delineated in the following paragraphs. No payments will be made to the Contractor until the QA/QC Plan is fully accepted by the

Engineer.

- C. The QA/QC Plan shall describe and define the personnel requirements described herein. The Contractor shall employ a full time on-site QA/QC Manager to manage, address and resolve all quality control issues.
 - 1. The QA/QC Manager shall be as identified by the Contractor and approved by the City. The QA/QC Manager shall have a minimum of five (5) years of construction experience in pipe line installation. The QA/QC Manager shall be onsite at all times while work is being performed by the contractor, to remedy and demonstrate that work is being performed properly and to make multiple observations of all Work in progress. This individual shall be dedicated solely to QA/QC activities and shall have no supervisory or managerial responsibility over the work force. The QA/QC Manager shall not be assigned any other duties or roles by the Contractor.
 - 2. The Contractor shall provide additional personnel who are assigned to assist the QA/QC Manager as required to fulfill the requirements of the QA/QC Plan. The Contractor shall provide a copy of the letter to the QA/QC Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the QA/QC Manager, including authority to stop work which is not in compliance with the contract. The QA/QC Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Engineer.
- D. The Contractor's QA/QC program shall ensure the achievement of adequate quality throughout all applicable areas of the Project. A customized QA/QC Plan shall be developed that discusses each type of work that the Contractor is responsible for within the Project. The QA/QC Plan shall describe the program and include procedures, work instructions and records and a description of the quality control organization.
 - 1. The description of the quality control organization shall include a chart showing lines of authority staffing plan and acknowledgment that the QA/QC staff shall implement the system for all aspects of the work specified. The staffing plan shall identify the name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a QA/QC function including the QA/QC Manager.
 - 2. In addition, the Plan shall describe methods relating to areas that require special testing and procedures as noted in the specifications.
- E. Identification and Control of Items and Materials: Procedures to ensure that items or materials that have been accepted at the site are properly used and installed shall be described in the QA/QC Plan.
- F. The procedures shall provide for proper identification and storage, and prevent the use of

incorrect or defective materials.

G. Inspection and Tests: The Contractor shall have written procedures defining a program for control of inspections performed and these procedures shall be described in the QA/QC Plan.

1. Inspections and tests shall be performed and documented by qualified individuals. At a minimum, "qualified" shall mean having performed similar QA/QC functions on similar type projects for a minimum of five (5) years and possession of industry standards certification and license. Records of personnel experience, training and qualifications shall be submitted to the Engineer for review and approval.
2. The Contractor shall maintain and provide to the Engineer, within two working days of completion of each inspection and test, adequate records of all such inspections and tests. Inspection and test results shall be documented and evaluated to ensure that requirements have been satisfied.
3. Procedures shall include:
 - a. Specific instructions defining procedures for observing all Work in process and comparing this Work with the Contract requirements (organized by specification section).
 - b. Maintaining and providing daily QA/QC inspection reports. Such reports shall, at a minimum, include the following:
 - i. Dated list of Item(s) inspected
 - ii. Location of the test sample(s)
 - iii. Logs, detailed locational drawings and confirmation reports
 - iv. Quality characteristics in compliance
 - v. Quality characteristics not in compliance
 - vi. Corrective/remedial actions taken
 - vii. Statement of certification
 - viii. QC Manager's signature
 - c. Specific instructions for recording all observations and requirements for demonstrating through the reports that the Work observed was in compliance or a deficiency was noted and action to be taken.
 - d. Procedures to preclude the covering of deficient or rejected Work.
 - e. Procedures for halting or rejecting Work.
 - f. Procedures for resolution of differences between the QA/QC representative(s) and the production representative(s).
 - g. Method of documenting QA/QC process and results including:
 - i. Automatic exception reporting
 - ii. Resolution tracking
 - iii. Quality Confirmation Test reports
 - iv. Sample retention index and storage
4. The QA/QC Plan shall identify all contractual hold/inspection points as well as any

Contractor imposed hold/inspections points.

5. The QA/QC Plan shall include procedures to provide verification and control of all testing provided by the Contractor including:
 - a. Individual test records containing the following information:
 - i. Item tested –item number and description
 - ii. Test results
 - iii. Test designation
 - iv. Test work sheet including location sample was obtained
 - v. Acceptance or rejection
 - vi. Date sample was obtained
 - vii. Retest information, if applicable
 - viii. Control requirements
 - ix. Tester signature
 - x. Testing QC staff initials
 - b. Maintaining and providing to the Engineer daily testing records. Such records shall, at a minimum, contain the following:
 - i. Dated list of Item(s) inspected
 - ii. Location of the test sample(s)
 - iii. Logs, detailed location drawings and confirmation reports
 - iv. Quality characteristics in compliance
 - v. Quality characteristics not in compliance
 - vi. Corrective/remedial actions taken
 - vii. Statement of certification
 - c. QC Manager's signature providing for location maps/drawings (i.e. lift drawings, laying schedules, etc.) for all tests performed or location of Work covered by the tests.
 - d. Maintaining copies of all test results.
 - e. Ensuring Engineer receives independent copy of all tests.
 - f. Ensuring testing lab(s) are functioning independently and in accordance with the specifications.
 - g. Ensuring re-tests are properly taken and documented.
- H. Control of Measuring and Test Equipment: Measuring and/or testing instruments shall be adequately maintained, calibrated, certified and adjusted to maintain accuracy within prescribed limits. Calibration shall be performed at specified periods against valid standards traceable to nationally recognized standards and documented.
- I. Supplier Quality Assurance: The QA/QC Plan shall include procedures to ensure that procured products and services conform to the requirements of the Specifications. Requirements of these procedures shall be applied, as appropriate, to subcontractors and suppliers. QA/QC inspections and certifications shall not be deferred to the Contractor's subcontractors or suppliers.
- J. Deficient, Defective and Non-conforming Work and Corrective Action

1. The QA/QC Plan shall include procedures for handling of deficiencies and non-conformances. Deficiencies and non-conformances are defined as documentation, drawings, material, and equipment or Work not conforming to the specified requirements or procedures. The procedures shall prevent non-conformances by identification, documentation, evaluation, separation, disposition and corrective action to prevent recurrence. Conditions having adverse effects on quality shall be promptly identified and reported to the senior level management. The cause of conditions adverse to quality shall be determined and documented and measures implemented to prevent recurrence. In addition, at a minimum, this procedure shall address:
 - a. Personnel responsible for identifying deficient and non-complying items within the work.
 - b. How and by whom deficient and non-compliant items are documented “in the field”.
 - c. The personnel and process utilized for logging deficient and non-compliant work at the end of each day onto a Deficiency Log.
 - d. Tracking processes and tracking documentation for Deficient and Non-Compliant items.
 - e. Personnel responsible for achieving resolution of outstanding deficiencies.
 - f. Once resolved, how are the resolutions documented and by whom.

K. Special Processes And Personnel Qualifications

1. The QA/QC Plan shall include detailed procedures for the performance and control of special process (e.g. welding, soldering, heat treating, cleaning, plating, nondestructive examination, etc.).
2. Personnel performing special process tasks shall have the experience, training and certifications commensurate with the scope, complexity, or nature of the activity. They shall be approved by the Engineer before the start of Work on the Project.

L. Audits

1. The Contractor’s QA/QC program shall provide for documented audits to verify that QA/QC procedures are being fully implemented by the Contractor as well as its subcontractors. Audit records shall be made available to the Engineer upon request.
2. The Contractor shall provide to the City, a quarterly report indicating any outstanding and unresolved exceptions to the QA/QC program or contract documents. The report will include documentation on any standards modifications, corrections, failed tests and a review of field procedures and checks and balances effectiveness.

M. Documented Control/Quality Records

1. The Contractor shall establish methods for control of Contract Documents that describe how Drawings and Specifications are received and distributed to assure the correct issue of the document being used. The methods shall also describe how as-built data are documented and furnished to the Engineer.
 2. The Contractor shall maintain evidence of activities affecting quality, including operating logs, records of inspections and tests, audit reports, material analyses, personnel qualification and certification records, procedures, and document review records.
 3. Quality records shall be maintained in a manner that provides for timely retrieval, and traceability. Quality records shall be protected from deterioration, damage, and destruction. The Contractor shall maintain an automated exceptions list of any non-conforming or defective or substandard work.
 4. The Contractor shall provide a list with specific records as specified in the Contract Documents which will be furnished to the Engineer at the completion of activities and in conjunction with logs and location drawings.
- N. Acceptance of QA/QC Plan: The Engineer's review and acceptance of the Contractor's QA/QC Plan shall not relieve the Contractor from any of its obligations for the performance of the Work. The Contractor's QA/QC staffing is subject to the Engineer's review and continued acceptance. The City, at its sole option, without cause, may direct the Contractor to remove and replace the QA/QC representative. No Work covered by the QA/QC Plan shall start until the Engineer's acceptance of Contractor's QA/QC plan has been obtained.
- O. The Engineer may perform independent quality assurance audits to verify that actions specified in Contractor's QA/QC Plan have been implemented. No Engineer audit finding or report shall in any way relieve Contractor from any requirements of this Contract.

1.07 TESTING SERVICES

- A. All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing firm acceptable to Engineer. The testing firm's laboratory shall be staffed with experienced technicians, properly equipped and fully qualified to perform the tests in accordance with the specified standards. All standard quality assurance testing and installation verification testing will be at the expense of the Contractor.
- B. Testing, when required, will be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).
- C. The Engineer shall have the right to inspect work performed by the independent testing laboratory both at the project and at the laboratory. This shall include inspection of the

manual, equipment calibrations, proficiency sample performance, etc.).

- D. Testing services provided by the City, if any, are for the sole benefit of the City; however, test results shall be available to the Contractor. Testing necessary to satisfy Contractor's internal quality control procedures shall be the sole responsibility of Contractor.

E. Testing Services Provided by the Contractor

1. Unless otherwise specified, and in conjunction with, all other specified testing requirements, the Contractor shall provide the following testing services, and submit a detailed testing plan for each along with proposed forms for Engineer's review:
2. Moisture-density and relative density tests on embankment, fill, and backfill materials.
3. In-place field density test on embankments, fills and backfill.
4. QC testing of all precast and/or pre-stressed concrete
5. All other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work
6. In addition, the following QC tests shall be performed by the Contractor:
 - a. Holiday testing of pipeline and all other coatings systems applied to surfaces as required by the Engineer
 - b. Slumps, air bucket tests, compression tests and other confirmation tests
 - c. Air testing of field-welded joints for steel pipe or pipe cylinders and fabricated specials.
 - d. All testing and inspection of welding work including, but not limited to, welding procedure qualifications, welder operator qualifications, all work performed by the certified welding inspector, all appropriate nondestructive testing of welds and all repair and retest of weld defects.
7. Testing, including sampling, shall be performed by the Contractor's testing firm's laboratory personnel, in the manner and frequency indicated in the Specifications. The Engineer shall have the right to stipulate the location of the confirmation tests. The Contractor shall provide preliminary representative samples of materials to be tested, to the testing firm's laboratory, in required quantities.
8. The testing firm's laboratory shall perform all laboratory tests within a reasonable time consistent with the specified standards and will furnish a written report of each test.
9. Where such inspection and testing are to be conducted by an independent laboratory

agency, the sample or samples shall be selected by such laboratory or agency or the Engineer and shipped to the laboratory by the Contractor at Contractor's expense.

10. Notify laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.

F. Transmittal of Test Reports:

1. Written reports of tests and engineering data furnished by Contractor for Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings. Final transmittal of all Project testing records will be required as a final close-out submittal for the release of retainage.
2. Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in progress of the Work.

+++ **END OF SECTION 01400** +++

SECTION 01410
TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SCOPE

- A. This section includes testing which the City may require, beyond that testing required of the supplier, to determine if materials provided for the project meet the requirements of these specifications.
- B. This work also includes all testing required by the City to verify work performed by the contractor is in accordance with the requirements of these specifications, i.e., concrete strength and slump testing, soil compaction, etc.
- C. This work does not include materials testing required in various sections of these specifications to be performed by the supplier, e.g., testing of pipe.
- D. The testing laboratory or laboratories will be selected by the City. The testing laboratory or laboratories will work for the City.

1.02 PAYMENT FOR TESTING SERVICES

- A. The cost of testing services required by the contract to be provided by the contractor shall be paid for by the City through the cash allowance, i.e., concrete testing, soil compaction, and asphalt testing.
- B. The cost of additional testing services not specifically required in the specifications, but requested by the City or engineer, shall be paid for by the City through the cash allowance.
- C. The cost of material testing described in various sections of these specifications or as required in referenced standards to be provided by a material supplier, shall be included in the price bid for that item and shall not be paid for by the City.
- D. The cost of retesting any item that fails to meet the requirements of these specifications shall be paid for by the contractor. Retesting shall be performed by the testing laboratory working for the City.

1.03 LABORATORY DUTIES

- A. Cooperate with the city, engineer and contractor.
- B. Provide qualified personnel promptly on notice.

- C. Perform specified inspections, sampling and testing of materials.
 - 1. Comply with specified standards, ASTM, other recognized authorities, and as specified.
 - 2. Ascertain compliance with requirements of the contract documents.
- D. Promptly notify the engineer and contractor of irregularity or deficiency of work, which are observed during performance of services.
- E. Promptly submit three copies (two copies to the engineer and one copy to the contractor) of report of inspections and tests in addition to those additional copies required by the contractor with the following information included:
 - 1. Date issued
 - 2. Project title and number
 - 3. Testing laboratory name and address
 - 4. Name and signature of inspector
 - 5. Date of inspection or sampling
 - 6. Record of temperature and weather
 - 7. Date of test
 - 8. Identification of product and specification section
 - 9. Location of project
 - 10. Type of inspection or test
 - 11. Results of test
 - 12. Observations regarding compliance with the contract documents
- F. Perform additional services as required.
- G. The laboratory is not authorized to release, revoke, alter or enlarge on requirements of the contract documents, or approve or accept any portion of the work.

1.04 CONTRACTOR RESPONSIBILITIES

- A. Cooperate with laboratory personnel, provide access to work and/or supplier's requirements.
- B. Provide to the laboratory, representative samples, in required quantities, of materials to be tested.
- C. Furnish copies of mill test reports.
- D. Furnish required labor and facilities to:
 - 1. Provide access to work to be tested;
 - 2. Obtain and handle samples at the site;
 - 3. Facilitate inspections and tests;
 - 4. Build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.
- E. Notify the laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.
- F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such laboratory or agency, or the engineer, and shipped to the laboratory by the contractor at contractor's expense.
- G. Copies of all correspondence between the contractor and testing agencies shall be provided to the engineer.

1.05 QUALITY ASSURANCE

Testing shall be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).

1.06 PRODUCT HANDLING

Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in the progress of the work.

1.07 FURNISHING MATERIALS

The contractor shall be responsible for furnishing all materials necessary for testing.

1.08 CODE COMPLIANCE TESTING

Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for by the contractor, unless otherwise provided in the contract documents.

1.09 CONTRACTOR'S CONVENIENCE TESTING

Inspection or testing performed exclusively for the contractor's convenience shall be the sole responsibility of the contractor.

1.10 SCHEDULES FOR TESTING

A. Establishing Schedule

1. The contractor shall, by advance discussion with the testing laboratory selected by the City, determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.
2. Provide all required time within the construction schedule.

B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

C. When the testing laboratory is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the work, all extra costs for testing attributable to the delay will be back-charged to the contractor and shall not be borne by the City.

1.11 TAKING SPECIMENS

Unless otherwise provided in the contract documents, all specimens and samples for tests will be taken by the testing laboratory or the engineer.

1.12 TRANSPORTING SAMPLES

The contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

+++ END OF SECTION 01410 +++

**SECTION 01540
JOB SITE SECURITY**

PART 1 GENERAL

1.01 BARRICADES, LIGHTS AND SIGNALS

- A. The contractor shall furnish and erect such barricades, fences, lights and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the work as necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any work under construction.

- B. The contractor will be held responsible for all damage to the work due to failure of barricades, signs and lights; and whenever evidence is found of such damage, the contractor shall immediately remove the damaged portion and replace it at contractor's cost and expense. The contractor's responsibility for the maintenance of barricades, signs and lights shall not cease until the project has been accepted by the City.

+ + + **END OF SECTION 01540** + + +

**SECTION 01550
TRAFFIC REGULATION**

PART 1 GENERAL

1.01 SCOPE

- A. The work specified in this section includes the provision of products, permits, services, procedures and personnel by the Contractor to effect traffic control during the Work.
- B. (Not Used)

1.02 TRAFFIC CONTROL MANAGER

- A. The Contractor shall designate a qualified individual as the Traffic Control Manager (TCM) who shall be responsible for selecting, installing and maintaining all traffic control devices in accordance with the Drawings and Specifications and the Manual of Uniform Traffic Control Devices (MUTCD).
- B. A written resume documenting the experience and credentials of the TCM shall be submitted and accepted by the Engineer prior to beginning any work that involves traffic control.
- C. The TCM shall be available on a twenty-four (24) hour basis to perform his duties. If the work requires traffic control activities to be performed during the daylight and nighttime hours it may be necessary for the Contractor to designate alternate TCMs. An alternate TCM must meet the same requirements and qualifications as the primary TCM and be accepted by the Engineer prior to beginning any traffic control duties.
- D. The Traffic Control Manager's traffic control responsibilities shall have priority over all other assigned duties.
- E. As the representative of the Contractor, the TCM shall have full authority to act on behalf of the Contractor in administering the Traffic Control Plan. The TCM shall have appropriate training in safe traffic control practices in accordance with Part VI of the MUTCD. In addition to the TCM all other individuals making decisions regarding traffic control shall meet the training requirements of the Part VI of the MUTCD.
- F. The TCMs shall supervise the initial installation of traffic control devices. The Engineer prior to the beginning of construction will review the initial installation. Modifications to traffic control devices as required by sequence of operations or staged construction shall be reviewed by the TCMs.

PART 2 PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

- A. The Contractor shall provide post-mounted and wall-mounted traffic control and informational signs as specified and required by local jurisdictions.
- B. The Contractor shall provide automatic traffic control signals as approved by local jurisdictions.
- C. The Contractor shall provide traffic cones, drums and flashing lights as approved by local jurisdictions.
- D. The Contractor shall provide City of Atlanta police officers and certified flaggers and flagger's equipment as required by GDOT.

PART 3 EXECUTION

3.01 PERMITS

- A. The Contractor shall obtain permits from authorities having jurisdiction over road closures before closing any road. The Contractor shall use forms provided by authorities having jurisdiction (City of Atlanta Division of Traffic and Transportation, GDOT, etc). Refer to Section 01060, Regulatory Requirements.
- B. Permit applications shall indicate the time (in days), length (in feet), the number of lanes, and the purpose of the closure.
- C. All permits are approved for operations during off-peak hours 9:00 a.m. to 4:00 p.m. unless special approval is received.
- D. Operations between the hours of 6:00 p.m. and 10:00 p.m. and Saturdays and Sundays must be approved by the City
- E. Full street closure permits require ninety-six (96) hours advance notice prior to street closure. The following additional information is required prior to approval:
 - 1. The recommended detour route with signage and Traffic Management Plan as per the Manual of Uniform Traffic Control Devices (MUTCD).
 - 2. A copy of the resident and/or business notification letters about the closure. The residents/businesses located between the detour route must be notified about the closure at least five (5) business days prior to the proposed closure.
- F. The City of Atlanta Division of Traffic and Transportation will return full street closure permit applications to the Contractor with a cover letter to the Fire Chief, Chief of Police,

Grady Memorial Hospital, MARTA and the Atlanta Board of Education. The Contractor shall have received the permit application and cover letter at least seventy-two (72) hours before commencing street closure activities.

- G. Lane closure permits require a minimum of forty-eight (48) hour notice prior to lane closure. The Contractor shall continuously maintain the safety of the traveling public during lane closures in accordance with the requirements of the MUTCD and as stipulated by public officers.
- H. The City of Atlanta Division of Traffic and Transportation will return the lane closure applications to the Contractor with a cover letter with copies to the Fire Chief, Chief of Police, Grady Memorial Hospital, MARTA and the Atlanta Board of Education. The Contractor shall have received the permit application and cover letter at least seventy-two (72) hours before commencing lane closure activities.

3.02 PREPARATION OF TRAFFIC CONTROL PLANS

- A. The Maintenance of Traffic drawings included with the Contract Documents shall only be considered as a guide and are not intended to contain all the traffic regulation details that may be required by the specifications, permitting agencies and the MUTCD. The Contractor shall develop detailed staging and traffic control plans for performing specific areas of the Work including but not limited to all requirements for certified flaggers, additional traffic control devices, traffic shifts, detours, paces, lane closures or other activities that disrupt traffic flow. The Contractor shall submit these plans in accordance with the Specifications to receive final approvals from permitting agencies and provide any and all required traffic control devices as required by both the permitting agencies and these specifications at no additional cost to the City.
- B. (Not Used)

3.03 CONSTRUCTION PARKING CONTROL

- A. The Contractor shall control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and City's operations.
- B. The Contractor shall monitor parking of construction personnel's vehicles in existing facilities and maintain vehicular access to and through parking areas.
- C. The Contractor shall prevent parking on or adjacent to access roads or in non-designated areas.

3.04 MAINTENANCE OF TRAFFIC

- A. Whenever and wherever, in the Engineer's opinion, traffic is sufficiently congested or public safety is endangered, the Contractor shall furnish uniformed officers to direct traffic and to keep traffic off the highway area affected by construction operations.

- B. When the Contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of Work that is otherwise provided for on the Drawings and these Specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to safely accommodate traffic. The Contractor shall furnish, erect and maintain barricades, warning signs, flaggers, and other traffic control devices in conformity with the requirements of the Georgia Department of Transportation and other local jurisdictions.
- C. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary to ingress into and egress from abutting property or intersecting roads, streets, or highways. The Contractor shall maintain traffic in accordance with any traffic control plans furnished with and made a part of the plan assembly.
- D. The Contractor shall make his own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of traffic as specified in this section.
- E. Unless specified on the Drawings or in these Specifications and subject to the approval of the City, the cost of maintaining traffic specified in this section shall be included under Bid Item, Traffic Regulation.

3.05 UNIFORMED POLICE OFFICER FOR TRAFFIC CONTROL

- A. The Contractor shall provide uniformed City of Atlanta police officers to regulate traffic when construction operations are ongoing:
 - 1. In all signalized intersections
 - 2. In streets designated as “collector” streets
 - 3. In all full street closings
 - 4. In GDOT right of ways
- B. Officers will be currently employed by the City of Atlanta, be in full uniform and have full arrest power while working.
- C. Officers will be employed and paid by the Contractor.
- D. It is the officers' responsibility to assist in the direction of traffic within the construction site.

3.06 FLAGGERS FOR TRAFFIC CONTROL

- A. The Contractor shall provide Georgia Department of Transportation (GDOT) certified trained and equipped flaggers to regulate traffic when construction operations or traffic encroach on public traffic lanes.
- B. (Not Used)

3.07 FLASHING LIGHTS

- A. The Contractor shall use flashing lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- B. (Not Used)

3.08 HAUL ROUTES

- A. The Contractor shall consult with authorities and establish public thoroughfares to be used for haul routes and site access and obtain a haul route permit as specified in Section 01060, Regulatory Requirements.
- B. The Contractor shall confine construction traffic to designated haul routes.
- C. The Contractor shall provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.09 ROAD CLOSURES ON CITY STREETS AND ROADS

- A. No street or road shall be closed without the permission of the Owner of any street or road and the fire department having jurisdiction. Prior to closing a street, road or highway, signs shall be posted for a minimum of seven (7) days prior to actual closing, forewarning of the imminent closing. The City shall determine the information to be placed upon the signs by the Contractor. Where traffic is diverted from the Work, the Contractor shall provide all materials and perform all work for the construction and maintenance of all required temporary roadways, structures, barricades, signs and signalization.
- B. To obtain approval to close a road or street maintained by the City, the Contractor shall proceed as follows:
 - 1. The Contractor shall obtain approval of his traffic plan from the Engineer unless a traffic plan approved by the Engineer is included in the Drawings. The traffic plan must be in accordance with the requirements of the Georgia Department of Transportation and the City of Atlanta.
 - 2. The Contractor shall obtain a utility permit.

3. The Contractor shall apply in writing to the City and obtain a permit to close the road on a specific date. Routine permit approval by the City requires from one (1) to two (2) weeks depending on when the application is received.
4. The Contractor shall obtain a permit from the City before posting closure signs. Signs must be posted for seven (7) days prior to the first day of closure. Signs shall be acceptable to the Engineer.
5. Emergency road closures will be handled by the Engineer.

3.10 PROCEDURES FOR TRAFFIC DETOUR ROUTE PLAN

- A. The Contractor shall provide a sketch map showing his traffic detour route plan to the Engineer. The sketch map need not be drawn to scale but should resemble, as closely as possible, the actual location. The sketch map shall be drawn in a manner so as to provide emergency agencies a better understanding of the detour for quick response. The sketch map shall include directional arrows showing the flow of traffic.
- B. "Road Closed Ahead" signs shall be erected before the start point of the detour indicating the name of the street closed.
- C. Detour signs with appropriate directional arrows shall be erected at every intersection along the detour route until the end of the detour, when the traffic is back to the original street.
- D. The Contractor shall erect an "End Detour" sign at the end of the detour.
- E. Each detour and "End Detour" sign shall be accompanied by an accessory plate indicating the name of the street being detoured.
- F. The Contractor shall apply appropriate traffic control measures in accordance with the requirements of the MUTCD and the City of Atlanta Department of Public Works.

3.11 BARRICADES AND WARNING SIGNS

- A. The Contractor shall furnish, erect, and maintain all barricades and warning signs for hazards necessary to protect the public and the Work. When used during periods of darkness, such barricades, warning signs and hazard markings shall be suitably illuminated or reflectorized.
- B. For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights, and other traffic control devices in conformity with the requirements of the Georgia Department of Transportation and the City of Atlanta Department of Public Works.

- C. The Contractor shall furnish and erect all barricades and warning signs for hazards prior to commencing Work which requires such erection and shall maintain the barricades and warning signs for hazards until their dismantling is directed by the Engineer.

3.12 REMOVAL

- A. The Contractor shall remove equipment and devices when no longer required and repair damage caused by installation.
- B. (Not Used)

3.13 RIGHT OF WAY MANUAL

- A. Included at the end of this Section are copies of the title page and pages 42 through and including page 52 from the City's Right-of Way Manual. These pages include Appendices A, B and C which indicate street designations and Appendix D which covers restrictions for working within the City's right of way. These restrictions shall also apply to GDOT right of ways.
- B. (Not Used)

+++ END OF SECTION 01550 +++

**SECTION 01562
DUST CONTROL**

PART 1 GENERAL

1.01 SCOPE

Limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control, subject to the approval of the City. As a minimum, this may require the use of a water wagon twice a day to suppress dusty conditions.

1.02 PROTECTION OF ADJACENT PROPERTY

- A. The Contractor shall visit the site and note the buildings, landscaping, roads, parking areas and other facilities near the work site that may be damaged by their operations. The contractor shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from contractor's operations.

- B. Protect all existing facilities (indoors or out) from damage by dust, fumes, spray or spills (indoors or out). Protect motors, bearings, electrical gear, instrumentation and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting or containment.

+ + + **END OF SECTION 01562** + + +

**SECTION 01569
SAFETY ON PROJECTS**

PART 1 GENERAL

1.01 SCOPE

- A. The contractor shall be responsible for conducting all work in a safe manner and shall take reasonable precautions to ensure the safety and protection of workers, property and the general public. The contractor's responsibility for protection is described in article 15 of the general conditions.

- B. All construction shall be conducted in accordance with the latest applicable requirements for part 1926 of the Occupational Safety and Health Act, Safety and Health Regulations for Construction, section 107 of the Contract Work Hours and Safety Standards Act, as well as any other local, state or federal safety codes and regulations.

- C. The contractor shall designate a trained and qualified employee who is to be responsible for ensuring that the work is performed safely and in conformance with all applicable regulations.

- D. The contractor shall determine the safety hazards involved in prosecuting the work and the precautions necessary to conduct the work safely.

- E. The contractor shall bear all risks associated with performing the work and shall fully indemnify and hold harmless the City and engineer.

+ + + **END OF SECTION 01569** + + +

SECTION 01580
PROJECT IDENTIFICATION SIGNS

PART 1 GENERAL

1.01 SCOPE

- A. The work under this section shall include the furnishing of a minimum of one painted sign of not less than 32 square feet in area, with painted graphic content for each project site that includes:
1. Project title
 2. City's name
 3. Names of governmental units participating in the project
 4. Engineer's name
 5. Names and titles of other parties to be directed by the engineer

1.02 DESIGN

The contractor shall provide a scale drawing showing the graphic design, style of lettering and colors corresponding to the sketch included with this section, to the engineer for approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.
- B. Sign Surfaces: Exterior soft wood plywood with medium density overlay, standard large sizes to minimize joints.
- C. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.
- D. Rough Hardware: Galvanized.
- E. Paint: Exterior quality, equal to Tnemec.

PART 3 EXECUTION

3.01 ERECTION

Erect the sign on the site in a high visibility location, adjacent to the project as approved by the engineer. The sign shall be erected prior to starting physical work and removed within two (2) weeks following acceptance of the work.

3.02 MAINTENANCE

Contractor shall maintain the project sign in good condition during the project contract period.

+++ END OF SECTION 01580 +++

SECTION 01610
TRANSPORTATION AND HANDLING

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall provide transportation of all equipment, materials and products furnished under these Contract Documents to the Work site. In addition, the Contractor shall provide preparation for shipment, loading, unloading, handling and preparation for installation and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the Work.
- B. All equipment, materials and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the City prior to being incorporated into the Work.

1.02 TRANSPORTATION

- A. All equipment shall be suitably boxed, crated or otherwise protected during transportation.
- B. Where equipment will be installed using existing cranes or hoisting equipment, the Contractor shall ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment.
- C. Small items and appurtenances such as gauges, valves, switches, instruments and probes which could be damaged during shipment shall be removed from the equipment prior to shipment, packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

1.03 HANDLING

- A. All equipment, materials and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.
- B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment. Shafts and operating mechanisms shall not be used as lifting points. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice.
- C. Under no circumstances shall equipment or products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.
- D. Slings and chains shall be padded as required to prevent damage to protective coatings

and finishes.

PART 2 PRODUCTS

(NOT APPLICABLE)

PART 3 EXECUTION

(NOT APPLICABLE)

+++ END OF SECTION 01610 +++

**SECTION 01611
STORAGE AND PROTECTION**

PART 1 GENERAL

1.01 SCOPE

- A. The work under this section includes, but is not necessarily limited to, the furnishing of all labor, tools and materials necessary to properly store and protect all materials, equipment, products and the like, as necessary for the proper and complete performance of the work.

- B. The contractor shall store materials, supplies and equipment at the site in such orderly fashion and in such locations as approved by the engineer that will not unduly interfere with the progress of the work or the work of any other contractors, or the activities of City personnel.

1.02 STORAGE AND PROTECTION

- A. Storage
 - 1. Maintain ample way for foot traffic at all times, except as otherwise approved by the engineer.
 - 2. All property damaged by reason of storing of material shall be properly replaced at no additional cost to the City.
 - 3. Packaged materials shall be delivered in original unopened containers and so stored until ready for use.
 - 4. All materials shall meet the requirements of these specifications at the time that they are used in the work.
 - 5. Store products in accordance with supplier's instructions.

- B. Protection
 - 1. Use all means necessary to protect the materials, equipment and products of every section before, during and after installation and to protect the installed work and materials of all other trades.
 - 2. All materials shall be delivered, stored and handled to prevent the inclusion of foreign materials and damage by water, breakage, vandalism or other causes.

3. Substantially constructed weathertight storage sheds, with raised floors, shall be provided and maintained as may be required to adequately protect those materials and products stored on the site which may require protection from damage by the elements.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary for the approval of the engineer and at no additional cost to the City.
- D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks.
- F. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

1.03 EXTENDED STORAGE

In the event that certain items of major equipment such as air compressors, pumps and mechanical aerators have to be stored for an extended period of time, the contractor shall provide satisfactory long-term storage facilities, which are acceptable to the engineer. The contractor shall provide all lubricants and exercising necessary or recommended by the supplier to properly maintain and protect the equipment during the period of extended storage.

+++ END OF SECTION 01611 +++

**SECTION 01630
SUBSTITUTIONS AND OPTIONS**

PART 1 GENERAL

1.01 SCOPE

This section outlines the restrictions and requirements for substitutions, product and supplier options, and construction method options.

1.02 DEFINITIONS

- A. For the purposes of these contract documents, a "substitute item" shall be defined as one of the following:
 - 1. A product or supplier offered as a replacement to a specified product or supplier.
 - 2. A product or supplier offered in addition to a specified product or supplier.
- B. For the purposes of these contract documents, a "substitute construction method" shall be defined as one of the following:
 - 1. A mean, method, technique, sequence or procedure of construction offered as a replacement for a specified mean, method, technique, sequence or procedure of construction.
 - 2. A mean, method, technique, sequence or procedure of construction offered in addition to a specified mean, method, technique, sequence or procedure of construction.

1.03 GENERAL

- A. An item or construction method, which is offered where no specific product, supplier, mean, method, technique, sequence or procedure of construction is specified or shown on the drawings, shall not be considered a substitute and shall be at the option of the contractor, subject to the provisions in the contract documents for that item or construction method.
- B. For products specified only by a referenced standard, the contractor may select any product by any supplier, which meets the requirements of the specifications, unless indicated otherwise in the contract documents.
- C. If the supplier is named on the drawings or in the specifications as an acceptable supplier, products of that supplier meeting all requirements of the specifications and drawings are acceptable.

- D. Whenever the engineer's design is based on a specific product of a particular supplier, that supplier will be shown on the drawings and/or listed first in the list of approved suppliers in the specifications. Any bidder intending to furnish products of other than the first listed supplier, or furnish substitute items, shall:
 - 1. verify that the item being furnished will fit in the space allowed, perform the same functions and have the same capabilities as the item specified;
 - 2. include in its bid the cost of all accessory items, which may be required by the other listed substitute product;
 - 3. include the cost of any architectural, structural, mechanical, piping, electrical or other modifications required; and
 - 4. include the cost of required additional work by the engineer, if any, to accommodate the item.

- E. Whenever a product specification includes minimum experience requirements which the supplier selected by the contractor cannot meet, the supplier shall furnish the City with a cash deposit, or bond acceptable to the City in an amount equal to the cost of the product, which shall remain in effect until the experience requirement has been met.

1.04 APPROVALS

- A. Approval, of a substitution as an acceptable supplier, of the engineer is dependent on determination that the product offered:
 - 1. is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based; and
 - 2. will require no major modifications to structures, electrical systems, control systems or piping systems.

1.05 SUBSTITUTIONS AND OPTIONS

- A. No substitutions will be considered for the suppliers listed in the bid.

- B. After Notice to Proceed
 - 1. Substitute items will be considered only if the term "equal to" precedes the names of acceptable suppliers in the specification.

 - 2. Where items are specified by referenced standard or specified as indicated in Article 1.03, paragraph A. above, such items shall be submitted to the engineer for review.

1. The contractor shall submit shop drawings on the substitute item for the engineer's review in accordance with the section 01340.

+++ END OF SECTION 01630 +++

SECTION 01710 CLEANING

PART 1 GENERAL

1.01 SCOPE

This section covers the general cleaning, which the contractor shall be required to perform both during construction and before final acceptance of the project, unless otherwise shown on the drawings or specified elsewhere in these specifications.

1.02 QUALITY ASSURANCE

- A. Daily, and more often if necessary, conduct inspections verifying that requirements of cleanliness are being met.
- B. In addition to the standards described in this section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.03 HAZARDOUS MATERIAL AND WASTE

- A. The contractor shall handle hazardous waste and materials in accordance with applicable local, state, and federal regulations. Waste shall also be disposed of in approved landfills as applicable.
- B. The contractor shall prevent accumulation of wastes, which create hazardous conditions.
- C. Burning or burying rubbish and waste materials on the site shall not be allowed.
- D. Disposal of hazardous wastes or materials into sanitary or storm sewers shall not be allowed.

1.04 DISPOSAL OF SURPLUS MATERIALS

- A. The contractor shall legally dispose all surplus materials and equipment from demolition and shall provide suitable off-site disposal site, or utilize a site designated by the City.
- B. Clean up all refuse, rubbish, scrap materials, and debris caused by the Contractor's operations, to the end that at all times the site of the work shall present a neat, orderly and workmanlike appearance. No items shall be left or discarded elsewhere on the site, or any other City sites. Items that are to be discarded shall be removed to approved dump areas.

- C. Remove all surplus material, false work, temporary structures, including foundations thereof, plants of any description and debris of every nature resulting from the Contractor's operations, and put the site in a neat, orderly conditions before final payment. Such final cleanup work shall be performed within the time specified for completion of work, with such exceptions as may be approved in writing by the engineer. Unless otherwise provided in the specifications, contractor shall clean any portion of work for which a separate time for completion is specified and the site thereof to the above standards within the specified time, with such exceptions as may be approved in writing by the engineer.

- D. The disposal of all excavated material or spoil not required for use in the permanent work shall be the responsibility of the contractor. the Contractor's shall remove excess excavated material or spoil from the site of the work and dispose of the same in a legal manner at no additional cost to the City. Burning of debris on site will not be allowed.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

Provide required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

Use only the cleaning materials, methods and equipment, which are compatible with the surface being cleaned, as recommended by the supplier of the material or as approved by the engineer.

PART 3 EXECUTION

3.01 PROGRESS CLEANING

- A. General
 - 1. Do not allow the accumulation of scrap, debris, waste material and other items not required for construction of this work.
 - 2. At least each week, and more often if necessary, completely remove all scrap, debris and waste material from the job site.
 - 3. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Restack materials stored on site weekly.
3. At all times maintain the site in a neat and orderly condition, which meets the approval of the engineer.
4. Daily, on lane/road closures or as required by the engineer, remove dirt and other waste created by construction activities from public roads before reopening to traffic, by means of vacuum truck or other approved method by the engineer

3.02 FINAL CLEANING

- A. Definitions: Unless otherwise specifically specified, "clean" for the purpose of this Article shall be interpreted as the level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.
- B. General: Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in 3.01 above.
- C. Site: Unless otherwise specifically directed by the engineer, pressure wash all sidewalks within the site and all paved areas directly adjacent to the site; rake clean other surfaces of the grounds. Completely remove all resultant debris.
- D. Post-Construction Cleanup: All evidence of temporary construction facilities, haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, as directed by the engineer.
- E. Restoration of Landscape Damage: Any landscape feature damaged by the contractor shall be restored as nearly as possible to its original condition at the contractor's expense. The engineer will decide what method of restoration shall be used.
- F. Timing: Schedule final cleaning as approved by the engineer to enable the City to accept the project.

3.03 CLEANING DURING CITY'S OCCUPANCY

Should the City occupy the work or any portion thereof prior to its completion by the contractor and acceptance by the City, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the engineer in accordance with the conditions of the contract documents.

+++ END OF SECTION 01710 +++

SECTION 01720
Record Documents

PART 1 – GENERAL

1.01 SCOPE

- A. The work under this Section includes, but is not necessarily limited to, the compiling, maintaining, recording, and submitting of project record documents as herein specified.
- B. Record documents include, but are not limited to:
1. Drawings
 2. Specifications
 3. Change orders and other modifications to the Contract
 4. Engineer field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums
 5. Reviewed shop drawings, product data and samples
 6. Test records
 7. As-built drawings and/or maps, indicating the locations and types of work performed (manhole asset ID numbers clearly shown where appropriate). Position survey coordinates, top of manhole and invert elevations shall be indicated on the drawing for all manholes and/or sewers which are newly constructed, replaced or adjusted to grade. Where service laterals are rehabilitated or replaced (whether partial or complete to property line) indicate approximate location on drawing, as well as method of rehabilitation/repair. As-built pipe diameters and materials shall also be indicated.
 8. Map corrections - printed map marked up illustrating the approximate position of any unmapped manholes and sewers discovered (no survey required).
 9. Geographic Information System (GIS) data – updated GIS data set indicating the as-built position and attributes for all replaced and rehabilitated sewer mains, manholes and lateral piping.
- C. The Contractor shall maintain a current set of Record Drawings and GIS data on the Project site throughout the Contract Time.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Storage:
 - 1. Store documents and samples in the Contractor's field office, apart from documents used for construction
 - 2. Provide files and racks for storage of documents
 - 3. Provide locked cabinet or secure storage space for storage of samples
- B. File documents and samples in accordance with format of these Specifications
- C. Maintenance:
 - 1. Maintain documents in a clean, dry, legible condition and in good order.
 - 2. Do not use record documents for construction purposes.
 - 3. Maintain one copy of all record documents at the site.
- D. Make documents and samples available at all times for inspection by Engineer.
- E. Failure to maintain the Record Documents in a satisfactory manner may be cause for withholding payment.

1.03 QUALITY ASSURANCE

- A. Unless noted otherwise, Record Drawings and corresponding GIS data shall provide dimensions, distances, coordinates to the nearest 0.1 foot in North American Datum of 1983 (1986 adjustment) Georgia State Plane West 1002 System format. All coordinate values shall be provided as grid coordinates in US Survey Feet.
- B. Unless noted otherwise, Record Drawings and corresponding GIS data shall provide elevations to the nearest 0.01 foot referenced to the North American Vertical Datum of 1988 (NAVD88) format. All coordinate values shall be provided as grid coordinates in US Survey Feet.
- C. GPS data shall be collected using eGPS Solutions or equivalent internet-based real time GPS network. The network shall provide continuous error correction and accuracy which meets or exceeds the requirements of Section 1.07 Data Accuracy.
- D. Any transformation or adjustment necessary to reproject surveyed coordinates to the Reference Coordinate System will be the responsibility of the Contractor.

- E. The Contractor shall employ a Professional Land Surveyor (PLS) licensed in the State of Georgia to prepare the Record Drawings from a post-construction, field survey of all manholes or sewers newly constructed, replaced or otherwise adjusted in position or elevation. Additionally, the Contractor shall submit the corresponding GIS data accordingly to indicate the as-built condition and GIS data attributes of these structures and pipelines. Replacement methods include open cut, pipe-bursting, push-bursting and horizontal directional drilling. Lining, point repairs, abandonment and removal of sewer mains or manholes is considered rehabilitation work. A post construction survey is not required for these types of rehabilitation; however, the GIS data attributes shall be updated to indicate the physical as-built condition.

1.04 DATA ACCURACY

- A. High Resolution: For all sanitary sewer structures, the equipment and means used by Contractor must generate the position of points with a minimum accuracy of three (3) centimeters horizontal and three (3) centimeters vertical. To determine the accuracy obtained, Contractor's GPS system will be calibrated daily against a known point (monuments) prior to beginning work and when the work is completed. The Contractor shall submit a report to the Engineer certifying calibration was accomplished and indicating the reference system. Data delivered to the Engineer arising from the GPS survey shall be certified by a Professional Land Surveyor. When the GPS equipment cannot be set directly on the point, conventional surveying methods will be used to establish the position to the stated level of accuracy.
- B. Calibration shall be carried out at least on a daily basis in accordance with the GPS equipment manufacturer's instructions. Additional calibrations may be required during the course of the working day for large fluctuations of temperature and/or humidity, also in accordance with the manufacturer's instructions and tolerances. The Contractor shall submit a report to the Engineer certifying calibration was accomplished and indicating the reference system.

1.05 INTERFERENCE

- A. A GPS position is required for all newly constructed, replaced or adjusted sanitary point structures regardless of the overhead conditions or other nearby obstructions which may interfere with satellite signals, at no additional cost. In the event coverage conditions do not allow all positions to be obtained by setting directly over the point, rangefinders or other conventional surveying methods may be used to obtain the position of the point(s).

1.06 RECORDING

- A. Label each document "PROJECT RECORD" in neat, large printed letters.

B. Recording:

1. Record information concurrently with construction progress.
2. Do not conceal any work until required information is recorded.

1.07 RECORD DRAWINGS

A. Record Drawings shall be reproducible, shall have a title block indicating that the drawings are Record Drawings, the name of the company preparing the Record Drawings, and the date the Record Drawings were prepared. The Contractor will be provided paper sepias of the Drawings, or it may elect to provide reproducible drawings via another method. Reproducible shall be defined as being translucent so as to allow a blueline print to be produced.

B. Legibly mark drawings to record actual construction, including:

1. All Construction:

- a. Changes of dimension, diameter, or material and detail
- b. Location and type of work performed on each manhole or sewer segment (indicate asset ID numbers)
- c. Changes made by Requests for Information (RFI), field order, clarification memorandums or by change order
- d. Details not on original Drawings
- e. The distance (length) between manhole covers on pipe segments where work was performed.

2. Structures:

- a. Position coordinates, as well as invert and top elevations of manholes where manholes or sewers have been newly constructed, replaced or adjusted/raised to grade.

1.08 SPECIFICATIONS

A. Legibly mark each section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed

2. Changes made by Requests for Information (RFI), field order, clarification memorandums, or by change order

1.09 GIS DATA

- A. Coordinate and attribute data shall be provided in both electronic and hard copy format at the completion of each sewer-shed, but not less than monthly. The hard copy data must be submitted for approval by the Engineer. Electronic data will not be accepted without hard copy data. Each submittal must be numbered according to the numbering system approved by the Engineer prior to the first submittal.
- B. The hard copy data shall include a cover letter and printed spreadsheet that corresponds to the electronic data submitted. If the survey work is performed by a subcontractor, the cover letter shall provide certification of data accuracy by a Professional Land Surveyor (PLS) licensed in the State of Georgia. If the survey work is performed by the prime Contractor, the cover letter shall provide certification of data accuracy by a Professional Land Surveyor (PLS) licensed in any State in the United States of America. The hard copy data must be bound, with the PLS seal placed on the cover letter; OR, the hard copy data may be submitted unbound, with the PLS seal placed on each and every sheet of unbound data submitted.
- C. The attached GPS Certification Form shall be signed and sealed by a Registered Land Surveyor in Georgia and submitted for each sewershed.
- D. The electronic data table submittal shall include four completed worksheets to form a workbook in Microsoft Excel format containing position survey data and physical attributes of the replacement and rehabilitation work. All pipe material, pipe shape and pipe liner code values shall be approved by the Engineer prior to the first submittal. Numerical value measurement data precision shall be 1/1000 or three decimal places. Each data worksheet shall include individual data records arranged in template formats and header values conforming to examples provided below;

Manhole Replacement or Rehabilitation Worksheet:

PointGISID	X_Coord_US	Y_Coord_US	Z_Elev_US	REHAB_MET H	Comments	Install Date
23040113201	2204663.500	1349506.320	859.950	Replace MH Frame and Cover	Replaced Vented Cover & Installed Solid Cover	mm/dd/yyyy

Pipeline Rehabilitation Worksheet (Use for sewer main open cut replacement, pipe-bursting, push-bursting, horizontal directional drilling or lining):

PipeGISID	PipeDia	PipeWidth	PipeHeight	PipeGuage	PipeShape	PipeUSDpth
23040113201T23040116501	12.000	0.000	0.000	1.125	C	8.600

Cont'd

PipeMatl	X_Coord_US	Y_Coord_US	Z_Elev_US	US Pipe Elev	X_Coord_DS	Y_Coord_DS	Z
PE	2204663.500	1349506.320	859.950	851.350	2204313.580	1349469.870	

Cont'd

DS Pipe Elev	Length	Slope	REHAB_MET H	COMMENTS	Install Date	Scope Status
848.510	351.813	0.008072	PB		mm/dd/yyyy	Original Scope completed as designed

Point Repair Rehabilitation Worksheet:

PipeGISID	PipeDia	PipeWidth	PipeHeight	PipeGuage	PipeShape	PipeMatl
23040113201T23040116501	12.000	0.000	0.000	1.125	C	VC
23040113301T23040113401	0.000	8.000	10.000	0.000	C	CO

Cont'd

REHAB_METHOD	DISTFRMUSMH	PR_LENGTH	PR_MATERIAL	COMMENTS	Install Date
External	12.700	4.500	VC		mm/dd/yyyy
Internal	13.000	6.000	PVC		mm/dd/yyyy

Lateral Rehabilitation Worksheet:

PipeGISID	Address	ZIP	Pipe Material	DISTFRMUSMH	Clock Pos	REHAB METHOD	New CO	Comments	Install Date	Scope Status
23040113201T23040116501	31 Honou r Circle, NE	303 05	PV C	189.0 00	9.00 0	REP	N		mm/d d/yyy y	Work added to original scope
23040113301T23040113401	400 Atlanta Avenu e, SW	303 09	CP P	13.00 0	3.00 0	Lining	Y		mm/d d/yyy y	Origina l scope complet ed as designe d
13040113901T13044011801	230 Peacht ree Street, NE	303 03	CP P	89.00 0	9.00 0	Top Hat	N		mm/d d/yyy y	Origina l scope complet ed as designe d

1.08 SUBMITTAL

- A. At work assignment or contract closeout (whichever comes first), the Contractor shall submit two copies of Record Documents to the Engineer.
- B. The submittal shall include a transmittal letter, in duplicate, containing:
 - 1. date
 - 2. project title and number
 - 3. contractor's name and address
 - 4. title and number of each record document and
 - 5. signature of Contractor or Contractor's authorized representative.
- C. Additionally, the Contractor shall edit the digital PDF(s) files furnished for each sewershed to include all changes based upon actual field conditions. The Contractor shall submit marked up map(s) showing the position of unmapped and incorrectly positioned manhole(s) and/or pipelines discovered during the work. All map(s) shall be marked up with red text and delivered to the Engineer upon the completion of each sewershed. Supplemental sketches shall also be provided in red text, as necessary to clearly depict the actual site conditions including, but not limited to congested areas and established access roads. A legend shall be added to the title block indicating the symbology, color coding and descriptions. The date, the words "As-Built" and company name shall also be included in the title block.

END OF SECTION

ATTACHMENT A



GPS CERTIFICATION FORM

The purpose of this form is to provide the City of Atlanta with additional GPS/Survey information necessary to maintain the GIS system. This form should be completed for each sewershed and submitted with the Certified GPS.

Name of Sewershed:	Contractor Name:	Surveyor Name:
	Contact Number:	Contact Number:
Brief description of survey equipment used: (Manufacturer, Model No., Age)		
Reference Coordinate System used		
a. Horizontal		
• Datum _____		
• Adjustment _____		
• Coordinate System _____		
• Unit of Measure _____		
b. Vertical		
• Datum _____		
• Geoid Model _____		
• Unit of Measure _____		
c. Geodetic monuments used or name of network RTK service _____		
d. Scale factors for Conventional Survey _____		
e. If calibration or transformation was applied, list parameters _____		
f. Are coordinates Grid or Ground? _____		

Signature and Seal of Surveyor

Date

+++END OF SECTION+++

SECTION 02125
TEMPORARY AND PERMANENT EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SCOPE

- A. Work under this section includes furnishing all labor, materials, equipment and incidentals required to install and maintain temporary and permanent erosion and sedimentation controls as shown on the Drawings and as specified herein. Work under this Section also includes the subsequent removal of temporary erosion and sedimentation controls at completion of the project.
- B. Temporary and permanent erosion and sedimentation controls include mulching and grassing of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits. Acceptable limits are as established by the Georgia Environmental Protection Division (EPD) and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction.
- C. The temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum requirements. The Contractor shall notify the Engineer of any changes and/or additions to the erosion and sedimentation control measures necessary to accommodate the Contractor's means and methods of operation. Any additional erosion and sedimentation control measures required by the Contractor's means and methods of operation will be installed by the Contractor at no additional cost to the City.
- D. The Contractor shall be solely responsible for the control of erosion and sediment production within the Project area. The Contractor shall install controls that will ensure that storm water and drainage from the disturbed area of the Project site will be filtered or otherwise managed to minimize impacts on receiving waters and/or existing storm drains. Discharged waters shall be free of soil particles and shall meet all applicable permit turbidity requirements.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

- A. The Contractor shall designate a worksite erosion control supervisor. The supervisor shall have the responsibility and authority to coordinate all equipment, personnel and materials needed to maintain project site erosion and sediment control in accordance with the management practices and standards established in the Manual for Erosion

and Sediment Control in Georgia and the Drawings and Specifications.

- B. Within 15 days after receipt of the Notice to Proceed, the Contractor shall submit the name and contact data for the designated erosion control supervisor. The supervisor shall be an individual with an active minimum Level 1 certification as issued by the Georgia Soil and Water Conservation Commission.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Silt fence: Silt fence shall be as detailed on the Drawings and shall meet the requirements of Section 171 – Silt Fence of the GDOT Department of Transportation Standard Specifications.
 - 1. Silt fence fabric shall conform to GDOT Standard Specification Section 881.2.07.
 - 2. Silt fencing shall conform to GDOT Standard Specification Section 894.
 - 3. Silt fence posts and bracing shall conform to GDOT Standard Specification Section 862.
- B. Hay bales shall be clean, seed-free cereal hay type, rectangular in shape.
- C. Woven wire fence backing shall be ½-inch, galvanized steel, chicken-wire mesh.
- D. Filter stone shall be crushed rock conforming to Georgia Department of Transportation Table 800.01, Size Number 57.
- E. Concrete block shall be hollow, non-loadbearing type.
- F. Concrete shall be 3000 psi in accordance with Section 03300, Cast-in-Place Concrete.
- G. Plywood shall be ¾-inch thick exterior type.

2.02 RIP RAP

- A. Use only one method throughout the Project.
- B. Stone Rip Rap shall consist of sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or greater. Rip rap shall have less than 66 percent wear when tested in accordance with AASHTO T-96. Unless shown on the Drawings or specified otherwise, stone rip-rap shall be type 3.
 - 1. Type 1 Rip Rap: The largest pieces shall have a maximum approximate volume of two cubic feet. At least 35 percent of the mass shall be comprised of pieces which weigh 125 pounds or more. The remainder shall be well graded down to

the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Standard Specification Section 805 - Stone Dumped Rip Rap, Type 1.

2. Type 3 Rip Rap: The largest pieces shall have a maximum approximate volume of one cubic foot. At least 35 percent of the mass shall be comprised of pieces which weigh 15 pounds or more. The remainder shall be well graded down to the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Standard Specification Section 805 - Stone Dumped Rip Rap, Type 3.

2.03 FILTER FABRIC

- A. Filter fabric for use under rip-rap shall meet the requirements of GDOT Standard Specification Section 881.2.05 for plastic filter fabric.

2.04 CONSTRUCTION EXIT STONE

- A. Stone shall be sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Aggregate size shall be in accordance with the National Stone Association Size R-2 (1.5 to 3.5-inch stone) or Type 3 Riprap as specified in paragraph 2.02 of this Section.

2.05 GRASS

- A. Permanent grass shall be of the same type that existed prior to construction.

2.06 WATER

- A. Water shall be free of excess and harmful chemicals, organisms and substances which may be harmful to plant growth or obnoxious to traffic. Salt or brackish water shall not be used.
- B. Water shall be furnished by the Contractor.

2.07 EROSION CONTROL FABRIC

- A. Erosion control fabric shall be equal to Futerra Erosion Control Blanket manufactured by Profile Products LLC. Fabric shall be a non-woven erosion control/vegetation blanket comprised of wood fiber and crimped, interlocking synthetic fibers laminated by an accelerated photodegradable polypropylene netting. Fabric shall be 100% bio-degradable and photo-degradable within 10 months of installation.

PART 3 EXECUTION

3.01 GENERAL

A. Basic Principles

1. Conduct the earthwork and excavation activities in such a manner to fit the topography, soil type and condition.
2. Minimize the disturbed area and the duration of exposure to erosion elements.
3. Stabilize disturbed areas immediately.
4. Safely convey run-off from the site to a stable outlet.
5. Retain sediment on site that is generated on site.
6. Minimize encroachment upon watercourses.

B. Temporary Erosion and Sedimentation Control: Temporary erosion and sedimentation control procedures shall be directed toward:

1. Preventing soil erosion at the source.
2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.
3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.

C. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of waterways and to prevent erosion of the Project site.

3.02 SEDIMENTATION AND EROSION CONTROL MEASURES

- A. Temporary and permanent erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site. If, in the opinion of the Engineer, the Contractor's temporary erosion and sedimentation control measures are inadequate, the Contractor shall provide additional maintenance for existing measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.
- B. All erosion and sedimentation control devices and structures shall be inspected by the Contractor at least once a week and immediately prior to and after each rainfall occurrence. Any device or structure found to be damaged shall be repaired or replaced by the end of the day. Sediment ponds shall be cleaned out prior to the silt reaching the height or elevation shown on the Drawings.

- C. All erosion and sedimentation control measures and devices shall be constructed and installed as shown on the Drawings or specified herein and maintained until adequate permanent disturbed area stabilization has been provided or permanent pavement has been installed and accepted by the Engineer. After adequate permanent stabilization has been provided or permanent pavement has been installed and accepted by the Engineer, all temporary erosion and sedimentation control structures and devices shall be removed.

3.03 SEDIMENT CONTROL

A. Construction Exit

1. Construction exit(s) shall be placed as shown on the Drawings and as directed by the Engineer. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk or parking area.
2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris. The plastic filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint. The stone shall be placed with its top elevation conforming to the surrounding roadway elevations. The stone shall be dropped no more than three feet during construction.
3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Engineer.
4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public right-of-way or paved surfaces has ceased and as directed by the Engineer.

B. Sediment Barriers

1. Sediment barriers shall include, but are not necessarily limited to, silt fences, hay bales, rock check dams and inlet sediment traps and any device which prevents sediment from exiting the disturbed area.
2. Silt fences, hay bales and rock check dams shall not be used in any flowing stream, creek or river.
3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Engineer.
4. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one half of the original height of the barrier or as

directed by the Engineer. Torn, damaged, destroyed or washed out barriers shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the Engineer.

5. Sediment Barrier Removal
 - a. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover or permanent pavement has been installed and the sediment barrier is no longer required as directed by the Engineer.
 - b. Accumulated sediment shall be removed from the barrier and removed from the site.
 - c. All non biodegradable parts of the barrier shall be disposed of properly. The hay bales may be spread evenly across disturbed areas as a mulching material.
 - d. The disturbed area created by barrier removal shall be permanently stabilized.

3.04 EROSION CONTROL

A. Grassing

1. Grassing shall be as specified in paragraph 3.05 of this Section
2. Temporary Stabilization: Temporary stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Temporary stabilization shall be provided to any area which will not receive permanent stabilization within the next 14 calendar days. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.
3. Permanent Stabilization
 - a. Permanent stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Permanent stabilization shall be provided to all areas of land disturbance within seven calendar days of the completion of land disturbance for any area greater than 0.25 acre. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.
 - b. Grass or sod removed or damaged in residential areas shall be replanted with the same variety within seven calendar days of the completion of work in any area.
 - c. Where permanent stabilization cannot be immediately established because of an inappropriate season, the Contractor shall provide temporary stabilization. The Contractor shall return to the site at the appropriate season to provide permanent stabilization in areas that received only temporary stabilization.

B. Erosion Control Blanket

1. Erosion control blankets shall be applied to sloped areas as indicated on the Drawings and where in excess of 2 to 1 slope. Blankets shall be laid on finished grades that have been seeded, insuring good contact with the soil. Soil surface shall be smooth and free of rocks, roots, debris and other obstructions.
2. Secure blankets with biodegradable staples or stakes at the top of slopes in a 6-inch deep x 6-inch wide anchoring trench. Secure blankets with staples or stakes per the manufacturer's recommendations, increasing the spacing at overlapping edges. Blankets shall be overlapped by a minimum of 8-inches. Provide a 6-inch deep x 6-inch wide anchoring trench at the toe of the slope or shoreline.

3.05 GRASSING

A. General

1. Refer to Section 02933, Seeding for detailed specifications on permanent seeding.
 2. When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched in an effort to restore to a protected condition.
 3. Specified permanent grassing shall be performed at the first appropriate season following establishment of final grading in each section of the site.
 4. All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein for seeding, fertilizing, mulching, etc.
 5. Permanent grassing shall be of a perennial species.
- B.** Grassing activities shall comply with Section 02933, Seeding and the Manual for Erosion and Sediment Control in Georgia, specifically for the selection of species, planting dates and application rates for seeding, fertilizer and mulching. Where permanent vegetative cover (grassing) cannot be immediately established (due to season or other circumstances) the Contractor shall provide temporary vegetative or mulch cover.

3.06 RIP-RAP

- A.** Unless shown otherwise on the Drawings, rip-rap shall be placed at all points where banks of streams or drainage ditches are disturbed by excavation, or at all points where their natural vegetation is removed. Carefully compact backfill and place rip

rap to prevent subsequent settlement and erosion. This requirement applies equally to construction alongside a stream or drainage ditch as well as crossing a stream or drainage ditch.

- B. When trenching across a creek, place rip-rap a distance of 10 feet upstream and 10 feet downstream from the top of the trench excavation. Place rip rap across creek bottom, across creek banks and extend rip-rap placement five feet beyond the top of each creek bank.
- C. Preparation of Foundations
 - 1. The ground surface upon which the rip rap is to be placed shall be brought in close conformity to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers.
 - 2. Unless at creek banks or otherwise shown or specified, rip-rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip-rap is placed, the toe ditch shall be backfilled.
- D. Placement of Filter Fabric
 - 1. The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions and debris. The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed so that the upstream strip overlaps the downstream strip. The fabric shall be placed loosely so as to give and therefore avoid stretching and tearing during placement of the stones.
 - 2. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals or other contaminants. Any contaminated fabric or any fabric damaged during its installation or during placement of rip-rap shall be removed and replaced with uncontaminated and undamaged fabric at no expense to the City.
- E. Placement of Rip-Rap
 - 1. The rip-rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric. Rip-rap

shall be placed with its top elevation conforming to the finished grades or the natural slope of the stream bank and stream bottom.

2. The stones shall be dropped no more than 3 feet during construction.
3. Stone rip-rap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings. The thickness tolerance for the course shall be -6-inches and +12-inches. If the Drawings do not specify a thickness, the course shall be placed to a thickness of not less than 18-inches.

3.07 CLEAN-UP

- A. Remove and dispose of all excess erosion and sedimentation control devices and materials when no longer needed or at the completion of construction as directed by the Engineer.

+++ END OF SECTION 02125 +++

SECTION 02140 DEWATERING

PART 1 - GENERAL

1.01 SCOPE:

- A. Construct all permanent Work in areas free from water. Design, construct and maintain all dikes, levees, cofferdams and diversion and drainage channels as necessary to maintain the areas free from water and to protect the areas to be occupied by permanent work from water damage. Remove temporary works after they have served their purpose.
- B. The Contractor shall be responsible for the stability of all temporary and permanent slopes, grades, foundations, materials and structures during the course of the Contract. Repair and replace all slopes, grades, foundations, materials and structures damaged by water, both surface and sub-surface, to the lines, grades and conditions existing prior to the damage at no additional cost to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 CARE OF WATER:

- A. Except where the excavated materials are designated as materials for permanent work, material from required excavation may be used for dikes, levees, cofferdams and other temporary backfill.
- B. Furnish, install, maintain and operate necessary pumping and other equipment for dewatering the various parts of the Work and for maintaining the foundation and other parts free from water as required for constructing each part of the Work.
- C. Install all drainage ditches, sumps and pumps to control excessive seepage on excavated slopes, to drain isolated zones with perched water tables, and to drain impervious surfaces at final excavation elevation.
- D. After they have served their purpose, remove all temporary protective work at a satisfactory time and in a satisfactory manner. All diversion channels and other temporary excavations in areas where the compacted fill or other structures will be constructed shall be cleaned out, backfilled and processed under the same Specifications as those governing the compacted fill.
- E. When the temporary works will not adversely affect any item of permanent work or the planned usage of the Project, the Contractor may be permitted to leave such temporary works in place. In such instances, breaching of dikes, levees and cofferdams may be required.

3.02 DEWATERING

- A. By the use of well points, pumps, tile drains or other approved methods, the Contractor shall prevent the accumulation of water in excavated areas. Should water accumulate, it shall be promptly removed.
- B. Excavations shall be continuously dewatered to maintain a ground water level no higher than 2 feet below the lowest point in the excavation.
- C. Piezometric observation wells shall be required, to monitor the ground water level, to insure proper dewatering prior to excavation below the static water table. The number of wells required will vary depending on the size and depth of structures.
- D. No separate payment will be made for dewatering required to accomplish the work.

+++ END OF SECTION 02140 +++

**SECTION 02150
SHEETING, SHORING AND BRACING**

PART I GENERAL

1.01 SCOPE

A. This section specifies requirements for sheeting, shoring, and bracing of trenches and excavations greater than 5 feet in depth. Where shoring, sheeting, bracing or other supports are necessary, they shall be furnished, placed, maintained, and except as specified otherwise, removed by the Contractor.

B. Design Requirements:

1. The design, planning, installation and removal, if required, of all sheeting, shoring, lagging, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.
2. The Contractor shall design sheeting, shoring, and bracing in accordance with the OSHA Safety and Health Standards as well as state and local requirements.
3. Horizontal strutting below the barrel of a pipe and the use of pipe as support are not acceptable.
4. When the construction sequence of structures requires the transfer of bracing to the completed portions of any new structure or to any existing structure, the Contractor shall provide the Engineer with a complete design analysis of the expected impact of that bracing on the structure. This action shall in no way absolve the Contractor of responsibility of damage resulting from said bracing.

1.02 REFERENCES

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
OSHA 2207	OSHA Safety and Health Standards, Revised 1987

1.03 SUBMITTALS

A. Prior to starting any excavation work requiring sheeting, shoring, and bracing, the Contractor shall submit his plans for trench and excavation support systems to the Engineer as working drawings in accordance with the requirements of the General Conditions. No provisions of the above requirements shall be construed as relieving the

Contractor of his overall responsibility and liability for the work. In addition, the following specific information shall be provided:

- B. Certification of Compliance, properly identified with project name and project location, with the requirements specified herein. The Certification shall state that the sheet, shoring, and bracing has been designed in accordance with the prevailing Codes/Standards by a Professional Engineer registered in the State of Georgia with the Engineer's seal appearing on the certification. Calculations shall not be submitted unless specifically requested by the Engineer.

PART 2 PRODUCTS

(NOT APPLICABLE)

PART 3 EXECUTION

3.01 GENERAL

- A. The construction of sheeting, shoring, and bracing shall not disturb the state of soil adjacent to the trench and below the excavation bottom.
- B. Trench sheeting below the top of a pipe shall be left in place.
- C. Excavation shall not be started until the design for support systems has been accepted by the Engineer.

+++ END OF SECTION 02150 +++

**SECTION 02200
EARTHWORK**

PART 1 – GENERAL

1.01 SCOPE

- A. The work under this Section includes earthwork and related operations, including, but not limited to; excavating all classes of material encountered; trenching; handling; storage; transportation; and disposal of all excavated and unsuitable material; construction of fills and embankments; backfilling around structures; backfilling all pits; compacting; all sheeting; shoring and bracing; preparation of subgrades; surfacing and grading; and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the Work.
- B. The Contractor shall provide all services, labor, materials, and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing complete Work as shown on the Drawings or specified in these Contract Documents.
- C. Related Work specified elsewhere:
 - 1. Section 02140 Dewatering
 - 2. Section 02225 – Trench Excavation and Backfill

1.02 GENERAL

- A. Safety: Comply with local regulations and with provisions of the “Manual of Accident Prevention in Construction” of the Associated General Contractors of America, Inc. Occupational Safety and Health Act (OSHA) and all other applicable safety regulations.
- B. The elevations shown on the Drawings as existing are taken from the best available data and are intended to give reasonable information about the existing elevations. The Contractor shall verify conditions to determine the exact quantities of excavation and fill required.
- C. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.
- D. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the City. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material at no cost to the City.

- E. The Contractor shall control grading in a manner to prevent water running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can flow uninterrupted in existing open ditches or channels; other surface drains; or temporary drains.
- F. No classification of excavated materials will be made, except for rock excavation. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the Work, regardless of the type, character, composition or condition thereof.
- G. The soil testing will be performed by the Contractor's testing laboratory. As a minimum at least one density test shall be performed for every 5,000 square feet of fill area and every two feet of fill lift.
- H. Should the Owner choose to conduct its own testing, the Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests. The cost of all retests made necessary by the failure of materials supplied by the Contractor, his agents or subcontractors, to conform to the requirements of these Contract Documents shall be paid by the Contractor. Contractor shall provide at least 24 hours advance notice of earthwork operations to the Testing Laboratory. Testing Laboratory shall provide reports to the Engineer with copies to the Contractor certifying (and sealed by a Registered Georgia Engineer) that earthwork is in conformance with the plans and specifications. The Testing laboratory shall witness the placement of all fill, unless otherwise directed by the Engineer.
- I. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Engineer.
- J. Stockpile Areas: Provided there is space available, stockpiling material may be on site.

1.03 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

- A. Copies of permits obtained by the Contractor for the work.
- B. Test results, certification of compliance, source and samples for all imported materials.
- C. Samples of fill materials to be used. Samples shall be submitted 2 weeks in advance of use and shall consist of 0.5 cubic feet of each type of material.

D. Test reports for compaction.

1.04 QUALITY ASSURANCE

Reference Standards. Comply with all Federal, State and local laws or ordinances, as well as all applicable codes, standards, regulations and/or regulatory agency requirements including the partial listing below:

- A. ASTM C136-84a, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D1556-82, Test Method for Density of Soils in Place by the Sand Cone Method.
- C. ASTM D1557-78, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.5-kg) Rammer and 18-in. (457-mm Drop).
- D. ASTM D3107-88, Test Method for Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).

PART 2 – PRODUCTS

2.01 MATERIALS

A. Earthwork Materials

1. Controlled Fill:

- a. Proposed fill soils shall be laboratory tested prior to construction use to determine their suitability. All fill material shall be subject to the approval of the Engineer.
- b. Notification: For approval of imported fill material, notify the Engineer and Testing Laboratory at least three (3) weeks in advance of intention to import material, designate the proposed borrow area, and permit the Testing Laboratory to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material. Test results shall be submitted to the Engineer for approval. All fill shall be free of organic matter or debris, have a low to moderate plasticity, ($PI \leq 15$) uniform composition, and be free of rock fragments greater than three inches in dimension. Soils selected for use as fill material shall also have a standard Proctor (ASTM D 698) maximum dry density of at least 90 pounds per cubic foot.
- c. All on-site fill material shall be soil exclusive of organic matter, frozen lumps or other deleterious substances.

d. It shall contain no rocks or earth clumps over 3-inches maximum in dimension.

2. Structural Fill and Structural Backfill:

- a. Select on site materials may be suitable. Testing and recommendation of suitability shall be made by the Testing Laboratory and submitted by the Contractor to the Engineer for approval.
- b. Imported material shall be sand, uniformly graded crushed rock or other select material recommended by the Testing Laboratory and submitted by the Contractor to the Engineer for approval.
- c. Crushed Rock: Crushed rock used for bedding and drainage stone shall conform to the Georgia Department of Transportation Standard Specifications for construction of Road and Bridges, Section 800 for No. 57 Stone.

3. Coarse Aggregate: Coarse aggregate shall conform to the Georgia Department of Transportation Standard Specifications of Transportation Systems construction of Road and Bridges, Section 800 for No. 57 Stone, Group II, and shall have the following gradation:

Sieve size	Percent Passing	
1-½ inch	100	-
1 inch	95	100
¾ inch	-	-
½ inch	25	60
3/8 inch	-	-
#4	0	10
#8	0	5

4. Top Soil: Dark organic weed free loam.

B. Sheeting, Bracing and Timbering: The Contractor shall furnish, place and maintain all sheeting, bracing and timbering required to properly support trenches and other excavations in open cut and to prevent all movement of the soil, pavement, structures, or utilities outside of the trench or pit.

1. General:

- a. All cofferdams, sheeting, bracing and timbering shall be designed, sealed and signed by a registered Professional Engineer in the State of Georgia at the Contractor's

expense. A copy of the drawings and design computations shall be submitted to the Engineer for the project files.

- b. Sheeting, bracing and timbering shall be so placed as to allow the Work to be constructed to the lines and grades shown on the Drawings.
- c. If at any time the method being used by the Contractor for supporting any material or structure in or adjacent to any excavation is not reasonably safe the Engineer may require and the Contractor shall provide additional bracing and support necessary to furnish the added degree of safety. The Contractor shall provide such added bracing and support by such method as Contractor may elect to use, but the taking of such added precautions shall in no way relieve the Contractor of sole and final responsibility for the safety of lives, work and structures.
- d. All sheeting and shoring in contact with the concrete or masonry shall remain in place. The sheeting or shoring above the structure may remain in place or be cut off. No sheeting shall be left in place within three feet below the ground surface.
- e. There shall be no payment for sheeting, bracing, and timbering left in place.

2. Timber:

- a. Timber may be substituted for steel sheet piling when approved by the Engineer. Timber for shoring, sheeting or bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations.
- b. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the work and adjacent property. Leave sheeting in place when it cannot be safely removed. Cut off sheeting left in place below the finished ground surface by three feet.

3. Steel Sheet Piling:

Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral or vertical

movement at all times. In addition to the drawings and computations, the Contractor shall provide closure and sealing details between sheet piling and existing facilities, as well as method of excavation within sheet piling to the Engineer for review before commencing with construction operations. Contractor shall be responsible for all damage to existing utilities and structures resulting from installation of sheet piling. Damage to existing utilities and/or structures resulting from installation of sheet piling shall be repaired at the Contractor's expense.

- C. Other Materials: All other materials not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the prior approval of the Engineer.
- D. Stockpile area: The stockpile area shown on the drawings, or as directed by the Engineer, shall be used to stockpile soil material for backfilling around structures and to stockpile needed topsoil.

PART 3 – EXECUTION

3.01 GENERAL

- A. Benching of Slopes: When the embankment is to be placed and compacted on hillsides, or when new embankment is to be compacted against existing embankments, or when the embankment is to be built ½ width at a time, the slopes that are steeper than 4:1 as measured at right angles to the embankment shall be continuously benched over those areas as the work is brought up in layers. Benching shall be of sufficient width to permit the operation of placing and compacting equipment. Each successive cut shall begin at the intersection of the original ground and the vertical side of the previous cut. Material thus cut shall be recompacted along with the new embankment material. Proof roll subgrade prior to placement of fill material.
- B. Topsoil:
 - 1. Remove all topsoil to a depth at which subsoil is encountered, from all areas, which are to be cut to lower grades or filled.
 - 2. Topsoil to be used for finish grading may be stored on the site. It shall be piled properly, sloped to drain and covered.
- C. Bracing and Sheeting:
 - 1. Furnish, install, and maintain all sheeting, bracing, and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth, which could in any way injure the work, adjacent property, or workmen.

2. Properly support all trenches for duct bank installation so as to conform to all pertinent rules and regulations and these Specifications. All trenches deeper than 5 feet shall be shored unless cut to the angle of repose of the excavated soils.
3. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the work and adjacent property.
4. Do not leave any sheeting or bracing in the trench or excavation after completion of the work, unless approved or instructed by the Engineer. The cost of removing sheeting or bracing shall be at the Contractor's expense.
5. All sheeting and shoring in contact with concrete or masonry shall remain in place. The sheeting and shoring above the structure may remain or be cut off. No sheeting or shoring left in place shall be within three feet below the ground surface.

D. Obstructions:

1. Remove and dispose of all trees, stumps, roots, boulders, pavement, pipes and the like, as required for the performance of the work.
2. Exercise care in excavating around catch basins, inlets, manholes, piping, duct banks, underground vaults, etc.
3. Avoid removing or loosening castings or pushing dirt into structures.
4. Damaged or displaced castings shall be repaired and replaced, and dirt entering the structures during the performance of the work shall be removed at no additional cost to the City.

E. Utilities to be Abandoned:

1. When pipes, conduits, sewers or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged and sealed as indicated on the Drawings.
2. Abandoned structures such as manholes, catch basins or chambers shall be entirely removed unless otherwise specified or indicated on the Drawings.
3. All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation and stored on the site at a location as directed by the Engineer.
4. All salvageable materials will remain the property of the City unless otherwise indicated by the Engineer.

F. Extra Earth Excavation:

In case soft material, which, in the opinion of the Engineer is not suitable, is encountered in the bottom of a trench or underneath a structure, the soft material shall be removed and replaced with structural fill or coarse aggregate.

G. Cutting Paved Surfaces and Similar Improvements:

1. Remove existing pavement as necessary for installing utilities and appurtenances or as otherwise shown on the Drawings.
2. Before removing any pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks to match the width of the trench.
3. Sawcut the asphalt pavement along the marks before breaking away from the part of pavement that should remain.
4. Do not pull pavement with machines until completely broken and separated from pavement to remain.
5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement. Refer to Section 02700 for replacement of damaged or removed pavement.

NOTE: No additional payment will be made for removing and replacing damaged adjacent pavement.

6. Remove and replace sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.
7. The Contractor may tunnel under curbs that are encountered. Remove and replace any curb disturbed by construction to the nearest undisturbed joint.

H. Dewatering:

1. The proposed dewatering plan shall be submitted by the Contractor to the Engineer for approval at least ten (10) working days prior to the beginning of any excavation.
2. Furnish, install, maintain and operate necessary pumping and other equipment for dewatering the various parts of the Work and for maintaining the foundation and other parts free from water as required for constructing each part of the Work.
3. By the use of well points, pumps, tile drains or other approved methods, the Contractor shall prevent the accumulation of water in excavated areas. Should water accumulate, it shall be promptly removed.

4. Excavations shall be continuously dewatered to maintain a ground water level no higher than 3 feet below the lowest point in the excavation.
5. Piezometric observation wells shall be required, to monitor the ground water level, to insure proper dewatering prior to excavation below the static water table. The number of wells required will vary depending on the size and depth of structures and shall be included in the plan.
6. The cost for all dewatering and discharge shall be at the Contractor's expense and shall be considered incidental.

3.02 EXCAVATION

A. Method:

1. All excavation shall be by open cut from the surface except as indicated on the Drawings.
2. All excavations for appurtenances and structures shall be made in such manner and to such depth and width as will give ample room for building the structures and for bracing, sheeting, and supporting the sides of the excavation, for pumping and draining groundwater and wastewater which may be encountered, and for the removal from the trench of all materials excavated.
3. Water shall not be allowed to accumulate in excavations. Contractor shall provide sufficient temporary pumping to assure that surface and ground waters do not saturate foundation soils.
4. Take special care so that soil below the bottom of the structure to be built is left undisturbed.

B. Grades:

1. Excavate to lines and grades indicated on the Drawings.
2. Where excavation grades are not indicated on the Drawings, excavate as required to accommodate installation.

C. Disposal of Excavated Material:

1. Remove and legally dispose of all excavated material not needed to complete filling, backfilling, and grading.
2. Dispose of excess excavated material at locations secured by the Contractor and in accordance with all requirements of federal, state, county and municipal regulations.

No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property except by written consent of the property owner. In no case shall any material be left on the Project site, or be buried in embankments or trenches on the Project site. With recommendation of the Testing Laboratory and approval by the Engineer, demolished, crushed concrete may be acceptable for use in fill areas.

3. Excavated materials shall be placed adjacent to the work to be used for backfilling as required.
4. Excavated materials shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and to not cause any drainage problem. Excavated material shall be placed so as to not damage existing landscape or man-made improvements. Surcharging of any bank is not allowed.

D. Rock Excavation:

1. Rock excavation shall mean rock requiring drilling and blasting that occupies an original volume of at least one (1) cubic yard. Rock shall be considered as material which cannot be removed with a crawler tractor equal to a D-8 Caterpillar, equipped with a single-tooth ripper or by an excavator trackhoe equal to a Caterpillar 225 rated with a $\frac{3}{4}$ cubic yard capacity with a bucket curling pullout capacity of 25,000 pounds.
2. Where rock is encountered within excavation for structures, it shall be excavated to the lines and grades indicated on the Drawings or as otherwise directed by the Engineer. The Contractor shall be responsible for obtaining any blasting permits required.
3. If excess excavation is made or the material becomes disturbed so as to require removal below final subgrade elevations or beyond the prescribed limits, the resulting space shall be refilled with Class B concrete in accordance with Section 03300, Cast-in-Place Concrete.

3.03 EXCAVATING FOR STRUCTURES

A. Excavation:

1. All excavation is unclassified and shall be included in the Contractor's Base Bid.
2. Excavation shall include all substances to be excavated. Excavation for structures shall be to limits not less than 2 feet outside wall lines, to allow for formwork and inspection.

3. Where rock excavation is carried below grade the Contractor shall backfill to grade using concrete or structural fill.
 4. Where unsuitable material is encountered excavate material to a depth acceptable to the Engineer and fill with compacted structural fill as required.
- B. Excavation for Foundations: Footings and slabs on grades shall rest on undisturbed earth, rock or compacted materials to insure proper bearing.
1. Unsuitable Foundation Material
 - a. Any material in the opinion of the Engineer which is unsuitable for foundation shall be removed and replaced with coarse aggregate or structural fill material as directed by the Engineer.
 - b. No determination of unsuitability will be made until all requirements for dewatering are satisfactorily met.
 2. Foundation in Rock: Foundations for a structure shall be on similar materials. Should excavation for a foundation be partially in rock, the Contractor shall undercut that portion of the rock 12-inches and bring the excavation to grade with compacted crushed stone.

C. Construction Observations:

All excavations should be examined by the Engineer prior to reinforcing steel placement to verify that the design bearing pressure is available. All excavations should be clean, level and free of ponded water, mud and loose, frozen or water-softened soils. If it is necessary for an excavation to remain open overnight, or if rain is imminent, a 3-to 4-inch thick "mud mat" of Class B concrete may be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

D. Unsuitable Bearing:

If unsuitable bearing for foundations is encountered at the elevations indicated on the Drawings, the Engineer shall be notified immediately.

3.04 EXCAVATION BELOW GRADE AND REFILL

If the bottom of any excavation is taken out below the limits shown on the Drawings or specified, it shall be refilled to the bottom grade, at the Contractor's expense, except where rock or unsuitable soil is encountered. The refill shall be 6-inch layers of structural fill or other material satisfactory to the Engineer. The type of material to be used shall be the Engineer's option.

3.05 BACKFILL AND FILL PLACEMENT

- A. Compaction of fill shall be accomplished by placing the fill material in horizontal lifts of eight-inches (8") maximum loose thickness and mechanically compacting each lift to at least the specified dry density.
- B. All fill placement shall be witnessed by an experienced soils technician of the Testing Laboratory and fill density and moisture tests for each lift shall be performed to verify that the specified degree of compaction is being achieved.
- C. Prior to placement of any material in embankments, the area within embankment limits shall be stripped of topsoil and all unsuitable materials removed as described under Excavation. Area to receive fill shall then be scarified to a depth of at least 6-inches.
- D. The fill shall be brought to the proposed elevation by placing and compacting only approved fill materials upon a subgrade approved by the Engineer.
- E. Fill materials shall be placed in continuous approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practicable.
- F. The fill shall be placed at a moisture content that corresponds to a +/- 3% of the optimum moisture content, as determined by the standard Proctor moisture-density relationship test.
- G. Compaction:
 - 1. The fill shall be uniformly compacted to a dry density that corresponds to at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the fill soil.
 - 2. The upper twelve-inches (12") of fill beneath the structures and pavement areas shall be compacted to 98% of the standard Proctor maximum dry density.
 - 3. Scarification and recompacting of the upper fill soils immediately prior to the slab-on-grade and/or pavement construction shall be required.
 - 4. Compaction of embankments shall be by sheepfoot rollers with staggered uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the number and spacing of the knobs shall be such that the total weight of the roller and ballast when distributed over the area of one (1) row of knobs shall be 250 psi. Placement and compaction of materials shall extend beyond the final contours sufficiently to insure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer or grader shaping the face of the embankment.

5. The backfill placement in trenches and behind structures shall be uniformly compacted to a dry density that corresponds to at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the fill soil. In confined areas requiring portable compaction equipment the fill material shall be placed in horizontal lifts of four-inches (4") maximum loose thickness.
 6. If tests indicate that density of backfill fill is less than that specified, the area shall be either be recompactd or undercut, filled, and compacted until specified density is achieved.
- H. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend with remaining ground surfaces. All surfaces shall be left smooth and free to drain.
- I. Moisture:
1. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction.
 2. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.
- J. Proofrolling:
1. All areas where pavement or structures are to be built on compacted fill and other areas where indicated on the Drawing, shall be proofrolled to detect soft spots prior to the placement of fill material or construction of foundations.
 2. Proofrolling shall consist of the moving a 20-30 ton loaded dump truck or pneumatic tire roller over the subgrade after the subgrade is shaped. Proofrolling shall be witnessed by the Engineer.
 3. Pneumatic-tired rollers shall have not fewer than four pneumatic tired wheels which shall be of such size and ply that tire pressures can be maintained between 80 and 100 pounds per square inch for 25,000 pound wheel load during rolling operations. Unless otherwise required, rolling shall be done with tires inflated to 90 psi. The roller wheels shall be located abreast in a rigid steel frame. Each wheel shall be loaded with an individual weight box so that each wheel will bear an equal load when traversing uneven ground. The weight boxes shall be suitable for ballast loading such that the load per wheel shall be 25,000 pounds. The spacing of the wheels shall insure that the distance between the nearest edges of adjacent tires shall be not greater than one-half of the tire width of a single tire at the operating pressure for a 25,000 pound wheel load. The roller shall be operated not faster than 5 feet/second.

4. Subgrade shall be proofrolled with 6 passes. Depressions that develop during the proofrolling operation shall be filled with suitable material and those filled areas shall be proofrolled with 6 passes. If, after having been filled and proofrolled, the subgrade still contains depressions, the soil shall be undercut to the full depth of the soft material or 5 feet whichever is less, backfilled, and rolled to achieve a compacted subgrade.
 5. After the proofrolled subgrade has been accepted by the Engineer, the surface of the subgrade shall be finish rolled with a smooth steel wheel roller weighing not less than 10 tons. Finished surface of the subgrade shall be within a tolerance of 0.04 feet at every point.
 6. Conduits, pipes, culverts and underdrains shall be neither disturbed nor damaged by proofrolling operations. Rollers shall neither pass over, nor approach closer than 5 feet to conduits, pipes, culverts and underdrains unless the tops of those facilities are deeper than 3 feet.
- K. During wet or rainy periods, aeration (drying) shall be required to reduce the fill materials to the required moisture condition. During dry periods, water shall be added to achieve the proper moisture content for compaction. Silty soils, which are wet, shall require aeration prior to compaction even during dry periods.

3.06 BACKFILLING AROUND STRUCTURES

A. General:

1. Remove debris from excavations before backfilling.
2. Do not backfill against foundation walls until so instructed by the Engineer
3. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.
4. Do not backfill on only one (1) side of vertically spanning walls unless walls are adequately shored or permanent construction is in place to furnish lateral support on both top and bottom of wall.

3.07 GRADING

A. General:

1. Perform all rough and finish grading required to attain the elevations indicated on the Drawings.
2. Perform rough grading to an accuracy of plus or minus 0.10 feet.

- B. Grading Around Buildings: Control the grading around buildings so the ground is pitched to prevent water from running into the excavated areas of a building or damaging other site features.
- C. Treatment After Completion of Grading:
 - 1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Engineer.
 - 2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.08 EXCESS WATER CONTROL

- A. Unfavorable Weather:
 - 1. Do not place, spread or roll any fill material during unfavorable weather conditions.
 - 2. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.
 - 3. Any inundated area that freezes shall be removed and refilled at the Contractor's expense.
- B. Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collected in depressions.
- C. Pumping, Drainage and Dewatering:
 - 1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the Work.
 - 2. Dewater by means, which will insure dry excavations, preserve final lines and grades, and do not disturb or displace adjacent soil.
 - 3. All pumping and drainage shall be done with no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic or the work of other contractors, and in accordance with all pertinent laws, ordinances, and regulations.
 - 4. Do not overload or obstruct existing drainage facilities.

3.09 SETTLEMENT

- A. The Contractor shall be responsible for all settlement of backfill, fills, and embankments, which may occur within one (1) year after final acceptance of the Work by the City.
- B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within thirty (30) days after receipt of written notice from the Engineer.

3.10 CLEANING

Upon completion of the work of this Section, remove all rubbish, trash and debris resulting from construction operations. Remove surplus equipment and tools. Leave the site in a neat and orderly condition acceptable to the Engineer, and in conformance with the General Conditions of the Contract Documents.

+++END OF SECTION 02200+++

**SECTION 02225
TRENCH EXCAVATION AND BACKFILL**

PART I GENERAL

1.01 SCOPE

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required to perform all excavation and backfill required to complete the work as shown on the Drawings and as specified herein. The work shall include, but not be necessarily limited to, excavation and backfill for pipe and appurtenances, manholes and vaults, backfill and compaction, disposal of surplus and unsuitable material and all related work such as sheeting and bracing and dewatering.
- B. Work shall also include the removal of trees, stumps, brush, debris or other obstacles which remain after clearing and grubbing operations, which may obstruct the work, and the removal of all other materials, including rock, to the extent necessary to install the pipe and appurtenances in conformance with the lines and grades shown on the Drawings and as specified herein.
- C. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface.
- D. The trench is divided into five specific areas:
 - 1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.
 - 2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.
 - 3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.
 - 4. Initial Backfill: The area above the haunching material and below a plane 12-inches above the top of the barrel of the pipe.
 - 5. Final Backfill: The area above a plane 12-inches above the top of the barrel of the pipe.
- E. The choice of method, means, techniques, and equipment rests with the Contractor. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the: type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of man-made improvements to be protected and available easement or right of way.

1.02 QUALITY ASSURANCE

- A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.
1. ASTM C33 – Standard Specification for Concrete Aggregates
 2. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 3. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³)
 4. ASTM D4253 – Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using A Vibratory Table
 5. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
 6. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
 7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft³)
 8. ASTM D2937 – Standard Method for Density of Soil in Place by the Drive-Cylinder Method
- B. Density: All references to "maximum dry density" shall mean the maximum dry density defined by ASTM D698, except that for cohesionless, free draining soils "maximum dry density" shall mean the maximum index density as determined by ASTM D4253. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of ASTM D1556, ASTM D6938 or ASTM D2937.
- C. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory.

1.03 SUBMITTALS

The Contractor shall submit record documents in accordance with the requirements of the General Conditions. The Contractor shall record locations of all pipelines installed referenced to survey benchmarks. The Contractor shall also include the locations of all underground utilities encountered and/or rerouted. The Contractor shall provide dimensions, materials, elevations, inverts and direction of flow. The Contractor shall use GPS technology or conventional survey methods to locate utilities.

1.04 SAFETY

Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P "Excavations" as described in OSHA publication 2226.

1.05 TESTING

- A. Testing shall be performed by an approved independent laboratory.
- B. Compaction testing shall be performed in accordance with the requirements of ASTM D1556 or ASTM D6938.

PART 2 PRODUCTS

2.01 TRENCH FOUNDATION MATERIALS

Crushed Stone: Crushed stone shall be utilized for trench foundation (trench stabilization) and shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

2.02 BEDDING AND HAUNCHING MATERIALS

- A. Water Mains
 - 1. Unless specified otherwise, bedding and haunching materials shall be suitable materials that have been excavated from the trench and have been approved by the Engineer for use as pipe bedding and haunching. Materials shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials.
 - 2. Crushed stone, if utilized for bedding and haunching, shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.
 - 3. The Contractor's attention is directed to Section 02616, paragraph 3.04.
- B. Sewers and Storm Drains: Crushed stone utilized for bedding and haunching shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.
- C. Filter Fabric - Non-Woven Type

1. Filter fabric associated with bedding shall be a UV stabilized, spunbonded, continuous filament, needle-punched, polypropylene, non-woven geotextile.
2. The fabric shall have an equivalent open size (EOS or AOS) of 120 - 70. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Procedure	Average Value	
			Typical	Minimum
Weight	oz/yd ²	ASTM D 3776	8.3	
Thickness	mils	ASTM D 1777	105	
Grab Strength	lbs.	ASTM D 4632	240	210
Grab Elongation	%	ASTM D 4632	>50	50
Tear Strength	lbs.	ASTM D 4533	100	85
Mullen Burst	psi	ASTM D 3786	350	320
Puncture Resistance	lbs.	ASTM D 4833	115	100
Permittivity	sec ⁻¹	ASTM D 4491	1.7	
Water Permeability	cm/sec	ASTM D 4491	0.4	
Water Flow Rate	gpm/ft ²	ASTM D 4491	120	
UV Resistance (500 hrs)	%	ASTM D 4355	>85	
pH			2 - 13	

3. If ordered by the Engineer, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of 10 days during initial pipe installation.
4. Filter fabric shall be equal to Polyfelt TS 700, Trevira 1125 or SuPac 7-MP.

2.03 INITIAL BACKFILL

- A. Initial backfill material shall be crushed stone or earth materials as specified for bedding and haunching materials.

- B. Earth materials utilized for initial backfill shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping.
- C. If materials excavated from the trench are not suitable for use as initial backfill material, provide select material conforming to the requirements of this Section.

2.04 FINAL BACKFILL

- A. Final backfill material shall be general excavated earth materials, shall not contain rock larger than 2-inches at its greatest diameter, cinders, stumps, limbs, man-made wastes and other unsuitable materials.
- B. If materials excavated from the trench are not suitable for use as final backfill material, provide select material conforming to the requirements of this Section.

2.05 SELECT BACKFILL

Select backfill shall be materials that meet the requirements as specified for bedding, haunching, initial backfill or final backfill materials, including compaction requirements.

2.06 CONCRETE

Concrete for bedding, haunching, initial backfill, or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM. Reinforcing steel shall conform to the requirements of ASTM Grade 60.

2.07 FLOWABLE FILL

- A. Controlled strength flowable fill shall be used as trench backfill only when authorized, in writing, by the Engineer.
- B. Controlled low strength flowable fill shall conform to the Georgia Department of Transportation Standard Specifications for Construction of Roads and Bridges – latest edition.
- C. Flowable fill design mix shall be for “excavatable” fill. Design mix shall be submitted to the Engineer for approval in accordance with GDOT Standard Specifications.

2.08 GRANULAR MATERIAL

Granular material, where required for trench backfill, shall be sand, river sand, crushed stone or aggregate, pond screenings, crusher run, recycled concrete, or other angular material. Granular material shall meet gradation requirements for Size No. 57 or finer.

2.09 GRADED AGGREGATE BASE

Graded aggregate base shall be Class “A” meeting the requirements of the Georgia Department of Transportation Specification.

PART 3 EXECUTION

3.01 TRENCH EXCAVATION

- A. Topsoil and grass shall be stripped a minimum of 6-inches over the trench excavation site and stockpiled separately for replacement over finished graded areas.
- B. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes and to the dimensions which provide the proper support and protection of the pipe and other structures and accessories.
- C. Trench Width:
 - 1. The sides of all trenches shall be vertical to a minimum of one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet. The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.
 - 2. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.
 - 3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 12-inches clearance between the rock and any part of the pipe, manhole, vault or other structure.
- D. Trench Depth:
 - 1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the dimensions and elevations shown on the Drawings.
 - 2. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide a clearance below the pipe barrel of 8-inches for pipe 21-inches in diameter and smaller and 12-inches clearance for larger pipe, manholes and other structures. Remove boulders and stones

to provide above minimum clearances between the rock and any part of the pipe, manhole, vault or other structure.

- E. Excavated Materials:
 - 1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Top soil shall be carefully separated and lastly placed in its original location.
 - 2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems.
 - 3. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements and also allow access to valves and hydrants.

3.02 SHEETING, SHORING AND BRACING

- A. Refer to Section 02150, Sheeting, Shoring and Bracing.
- B. Protection of the excavation against caving or settling of the banks shall be the sole responsibility of the Contractor. The Contractor shall protect the sides of his excavation by sheeting and bracing as may be necessary. No actions or instructions by the Engineer shall be regarded as the responsibility for security of the trench or the surrounding areas. The full responsibility remains with the Contractor.
- C. The Contractor shall furnish, put in place and maintain sheeting and bracing required to support the side of the excavation and prevent loss of ground which could damage or delay the work or endanger adjacent structures or vehicular traffic. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
- D. The Contractor shall leave in place to be imbedded in the backfill of the trench, all wood sheeting, bracing and other related items as shown on the Drawings, or which the Engineer may direct him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures, utilities, or property, whether public or private. The Engineer may direct that timber used for sheeting and bracing in the trench be cut off at any specified elevation, after backfilling and tamping has reached this level.
- E. All sheeting and bracing not left in place shall be carefully removed in such

manner as not to endanger the construction of other structures, utilities or property, whether public or private.

- F. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place in the trench sufficient sheeting and bracing to prevent any caving or moving of the ground adjacent to the sides of the trench.
- G. The Contractor shall receive no payment, other than that included in the price to be paid for pipe, for any extra timber used for sheeting, bracing and other related items. The Contractor shall receive no payment for such timber which was used for the convenience of the Contractor.

3.03 TEST PITS

- A. Test pits for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work may be excavated by the Contractor. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as hereinafter specified.
- B. Excavation and backfill of test pits shall be considered work incidental to the project and the cost shall be included in the appropriate bid item.
- C. If, for any reason, a test pit is left open for any period of time, it shall be properly barricaded and lighted by the Contractor.

3.04 ROCK EXCAVATION

- A. Definition of Rock: Any material which, in the opinion of the Engineer, cannot be excavated with conventional excavating equipment, and must be removed by drilling and blasting.
- C. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.
- D. The Contractor shall notify the Engineer prior to any blasting. Additionally, the Contractor shall notify the City and local fire department before any charge is set.
- E. Following review by the Engineer regarding the proximity of permanent buildings and structures to the blasting site, the Engineer may direct the Contractor to employ an independent, qualified specialty sub-contractor, approved by the Engineer, to: monitor the blasting by use of a seismograph; identify the areas where light charges

must be used, conduct pre-blast and post-blast inspections of structures, including photographs or videos; and maintain a detailed written log.

3.05 DEWATERING EXCAVATIONS

- A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.
- B. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.
- C. There shall be sufficient pumping equipment, in good working order, available at all times, to remove any water that accumulates in excavations. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the Work will be prevented. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.
- D. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.
- E. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump. Sump depth shall be at least two feet below the bottom of the trench. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench. Pumps shall be a type such that intermittent flows can be discharged. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.
- F. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks. The casing shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

3.06 TRENCH FOUNDATION AND STABILIZATION

- A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.
- B. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the Engineer may determine that the trench bottom is unsuitable and the Engineer may then order trench stabilization by directing the Contractor to over excavate trench bottom and fill with crushed stone.

- C. Where the replacement of unsuitable material with crushed stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom. Place filter fabric in the bottom of the trench and support the fabric along the trench walls until the trench stabilization, bedding, haunching and pipe have been placed at the proper grade. The ends of the filter fabric shall be overlapped above the pipe.
- D. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 95 percent of the maximum dry density, unless shown or specified otherwise.

3.07 BEDDING AND HAUNCHING

- A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders, or large dirt clods.
- B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe. Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.
- C. At each joint, excavate bell holes of ample depth and width to permit the joint to be
- D. After the pipe section is properly placed, add the haunching material to the specified depth. The haunching material shall be shovel sliced, tamped, chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders, or dirt clods.
- E. Pipe Bedding:
 - 1. The Contractor shall furnish and install pipe on the type and thickness of bedding as shown on the Drawings or as specified by the Engineer.
 - 2. Pipe bedding requirements for service line installations and service line accessories shall be as specified in Section 02668, Service Connections.
- F. Manholes, Vaults and Other Structures: Excavate to a minimum of 12-inches below the planned elevation of the base of the manhole, vault or structure. Place and

compact crushed stone bedding material to the required grade before constructing the manhole, vault or structure.

G. Compaction:

1. Bedding and haunching materials under pipe, manholes, vaults, structures and accessories shall be compacted to a minimum of 95 percent of the maximum dry density, unless shown or specified otherwise.
2. Bedding and haunching materials within the limits of restrained joint pipe shall be compacted to a minimum of 95 percent of the maximum dry density, unless shown or specified otherwise.

3.08 INITIAL BACKFILL

- A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.
- B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 12-inches above the pipe barrel. Layer depths shall be a maximum of 6-inches for pipe 18-inches in diameter and smaller and a maximum of 12-inches for pipe larger than 18-inches in diameter.
- C. Backfill on both sides of the pipe simultaneously to prevent side pressures.
- D. Compact each layer thoroughly with suitable hand tools or tamping equipment.
- E. Initial backfill shall be compacted to a minimum 95 percent of the maximum dry density, unless shown or specified otherwise. Initial backfill within the limits of restrained joint pipe shall be compacted to a minimum 95 percent of the maximum dry density, unless shown or specified otherwise.
- F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section for initial backfill.

3.09 CONCRETE ENCASEMENT FOR PIPELINES

Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 12-inches clearance from the barrel of the pipe. Lay the pipe to line and grade on solid concrete blocks or solid bricks. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 12-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.10 FINAL BACKFILL

- A. Backfill carefully to restore the ground surface to its original condition.
- B. The top 6-inches of backfill shall be topsoil or graded aggregate base material, depending upon the trench location.
- C. Excavated material which is unsuitable for backfilling, and excess material, shall be disposed of in a manner approved by the Engineer. Surplus soil may be neatly distributed and spread over the site, if approved by the Engineer, except that surplus soil shall not be distributed and spread over the site in areas under Corps of Engineers jurisdiction. If such spreading is allowed, the site shall be left in a clean condition and shall not affect pre-construction drainage patterns. Surplus rock from the trenching operations shall be removed from the site.
- D. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.
- E. Pipelines: After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:
 - 1. In 6-inch layers, if using light power tamping equipment, such as a "jumping jack"
 - 2. In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet
- F. Manholes, Vaults and other Structures:
 - 1. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of 2-feet in elevation will be the maximum allowable. Backfill shall not be allowed against walls until they and their supporting slabs, if applicable, have attained sufficient strength. Backfill shall be subject to the approval of the Engineer.
 - 2. In locations where pipes pass through walls, the Contractor shall take the following precautions to consolidate the backfill up to an elevation of at least 2-feet above the bottom of the pipe:
 - a. Place fill in such areas for a distance of not less than 3-feet either side of the centerline of the pipe in level layers not exceeding 6-inches in depth.
 - b. Thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.
 - 3. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against construction loads,

hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

- G. Final backfill shall be compacted to a minimum 95 percent of the maximum dry density, unless specified otherwise. Final backfill underlying pavement and backfill under dirt and gravel roads and within the limits of restrained joint pipe shall be compacted to a minimum 95 percent of the maximum dry density, unless specified otherwise.
- H. Concrete or bituminous asphalt removed during construction shall not be placed in backfill.
- I. The surface of filled areas shall be graded to smooth true lines in conformance with the grades or elevations shown on the Drawings.

3.11 ADDITIONAL MATERIAL

Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material.

3.12 BACKFILL WITHIN RIGHT-OF-WAYS

Compact backfill within the limits of the any right-of-way including the backfill underlying pavement and sidewalks, and backfill under dirt and gravel roads to a minimum 95 percent of the maximum dry density.

3.13 BACKFILL WITHIN GEORGIA DOT RIGHT-OF-WAY

Backfill within the Georgia DOT right-of-way shall meet the requirements stipulated in the "Utility Accommodation Policy and Standards", published by the Georgia Department of Transportation.

3.14 FLOWABLE FILL

- A. Where flowable fill is utilized, excavate the trench to provide a minimum of 6-inches clearance on either side of the pipe barrel. Lay the pipe to line and grade on solid concrete blocks or bricks. In lieu of bedding, haunching and initial backfill, place flowable fill to the full width and depth of the trench.
- B. Flowable fill shall be protected from freezing for a period of 36 hours after placement. Minimum temperature of flowable fill at point of delivery shall be 50 degrees F.

3.15 COMPACTED GRANULAR MATERIAL

Where compacted granular material is required as initial and final backfill material, it shall be placed after bedding and haunching material specified elsewhere has been placed. Compacted granular material shall be compacted to a minimum 95 percent of the maximum dry density.

3.16 TESTING AND INSPECTION

- A. The soils testing laboratory is responsible for compaction tests in accordance with paragraph 1.02 of this Section.
- B. Compaction tests:
 - 1. Compaction tests will be required in existing or proposed streets, sidewalks, driveways and other existing or proposed paved areas at varying depths and at intervals as determined by the Engineer.
 - 2. Minimum requirements for compaction testing shall be a minimum of one (1) test for each 400 feet or less of pipeline and one (1) test at each manhole, vault and other structure unless soil conditions or construction practices, in the opinion of the Engineer, warrant the need for additional tests. One (1) complete compaction test shall consist of individual tests in the same vertical plane over the installed pipe, beginning at a depth of 2-feet above the top of the pipe and at successive two feet vertical increments up to the top of the backfill.
 - 3. The Engineer shall direct where additional compaction tests will be performed along the Project route.
- C. The soils testing laboratory shall be responsible for inspecting and testing stripped site, sub grades and proposed fill materials.
- D. The Contractor's duties relative to testing include:
 - 1. Notifying laboratory of conditions requiring testing.
 - 2. Coordinating with laboratory for field testing.
 - 3. Providing excavation as necessary for laboratory personnel to conduct tests.
 - 4. Paying costs for additional testing performed beyond the required scope.
 - 5. Paying costs for re-testing where initial tests reveal non-conformance with specified requirements.
- E. Inspection

1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill shall be subject to inspection by the Engineer.
 2. Foundations and shallow spread footing foundations shall be inspected by a geotechnical engineer, who shall verify suitable bearing conditions.
- F. Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state and federal authorities having jurisdiction.

+++ END OF SECTION 02225 +++

SECTION 02302 GRANITE CURB

PART 1 GENERAL

1.01 SCOPE

- A. Work under this Section furnishing all labor, materials, equipment and incidentals required to install prefabricated granite curb, curb corners, transition curb and curb inlets as specified herein and as shown on the Drawings.
- B. The Contractor shall also be responsible for removing and replacing existing granite curb as specified herein and as directed by the Engineer.

1.02 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

- 1. 2 samples of finished product granite curb. Samples shall show anticipated color variations of grain structure, inclusions and other visual characteristics.
- 2. No final cutting or finishing shall be done until the sample is approved by the Engineer.

1.03 QUALITY ASSURANCE

Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

- 1. ASTM C170 – Test Method for Compressive Strength Of Dimension Stone
- 2. ASTM C615 – Standard Specification for Granite Dimension Stone
- 3. ASTM C880 – Test Method for Flexural Strength of Dimensional Stone

1.04 DEFECTIVE WORK

Any piece of granite showing manufacturing flaws or imperfections upon receipt on the job site shall be referred to the Engineer for a determination on its suitability for installation. If rejected by the Engineer, it shall be immediately removed from the job site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Granite Curb

1. Stone curb shall be granite and shall comply with ASTM C615.
2. The granite shall be sound, durable and free from cracks or seams which impair its structural integrity and of a smooth splitting and machining character. The granite curb shall be approved granite curb and shall match exactly the existing curbs in color, texture and size.
3. Granite curb shall be not less than 3-feet or more than 8-feet in length, 16-inches in depth and matched width at the top or 6-inches wide.
4. Granite curb shall have a saw finish on the top with no projections or depressions greater than 1/8-inch.
5. The front of curb shall be split face and have a batter finished surface. The granite shall have no projections or depressions greater than 1/4-inch to grade line. The remainder of the face shall be free from projections greater than 1-inch.
6. The back of the curb shall be parallel to the face and shall have no projections or depressions which exceed a batter of 1-inch in 3-inches from the top.
7. The ends for the full width of the stone curb shall be close jointed, square to the top and face. The remainder of the end shall be cut so that there will be a close joint.
8. The bottom of the stones shall be square.

- B. Concrete: Concrete shall be 3000 psi as specified in Section 03300, Cast-In-Place Concrete.

PART 3 EXECUTION

3.01 SETTING GRANITE CURB

- A. Curb trenches shall be opened to their full width and depth well in advance of the setting of the curb. The foundation for the curb shall be concrete. The bottom layer of concrete shall be 6-inches thick. The concrete in front and back of the curb shall be deposited simultaneously to the required height.
- B. Curb shall be set with close joints. The top front edge of the curb shall present an unbroken line and the face a plane surface with a batter of 1 to 12.
- C. The curb at the corners of intersecting joints shall be of the same quality as the curb hereinbefore specified and shall be set in the same manner. On curbs, where drainage

inlets are located, special shaped stones as may be required shall be furnished and set. At wheelchair ramps and wherever required, transition curb shall be furnished and set.

3.02 REMOVING AND REINSTALLING EXISTING GRANITE CURB

- A. In locations where existing granite curb conflicts with pipe installation and hydrant removal and replacement, the Contractor shall remove the existing curb.
- B. The Engineer will determine whether any granite curb that removed is acceptable for reinstallation.
- C. Removed curb approved for reinstallation shall be cleaned and stored by the Contractor until reinstallation.
- D. Reinstallation of curb shall include saw cutting the existing pavement a minimum of 1-inch, removing pavement to subgrade, excavation of base and subgrade as necessary to install the curb, installing the curb and backfilling and compacting the completed installation.
- E. Any curb that is damaged by the Contractor, which renders it unsuitable for reinstallation, as determined by the Engineer, shall be removed from the site and be replaced with new curb by the Contractor at no additional cost to the Owner.

+++ END OF SECTION 02302 +++

**SECTION 02308
HEXAGONAL BLOCK SIDEWALK**

PART 1 GENERAL

1.01 SCOPE

Furnish, install and replace hexagonal block sidewalk as required to complete the Work in accordance with the Specifications and as directed by the Engineer.

1.02 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Five (5) samples of blocks before starting work. Blocks used on the work shall conform to the approved samples in the opinion of the Engineer.

PART 2 PRODUCTS

2.01 BLOCK

- A. Block shall be brown-brown 8-inch asphaltic concrete block of hexagonal shape as manufactured by Hastings Pavement Co., Inc. or equal. The hexagonal block shall be 2-inches thick.
- B. Block shall be composed approximately of 6% high melting point oxidized asphalt and 94% graded crushed rock aggregate and mineral filler. The mix shall be compressed to 4,000 lbs. per square inch at a temperature of 300 degrees F by high-speed hydraulic presses.

2.02 CONCRETE BASE

The concrete base shall be 3000 psi concrete as specified in Section 03300, Cast-In-Place Concrete.

2.03 BITUMINOUS SETTING BED

- A. Asphalt cement to be used in the bituminous setting bed shall conform to ASTM Designation D3381. The viscosity grade shall be A.C. 10 or A.C. 20.
- B. The fine aggregate to be used in the bituminous setting bed shall be clean, hard sand with durable particles and free from adherent coating, lumps of clay, alkali salts, and organic matter. It shall be uniformly graded from coarse to fine and all passing the No. 4

sieve and meet the gradation requirements when tested in accordance with the standard method of test for sieve or screen analysis of fine and coarse aggregates ASTM Designation C136.

- C. The dried fine aggregate shall be combined with hot asphalt cement, and the mix shall be heated to approximately 300 degrees F at an asphalt plant. The approximate proportion of materials shall be seven (7) percent cement asphalt and ninety-three (93) percent fine aggregate. Each ton shall be apportioned by weight in the approximate ratio of 145 lbs. asphalt to 1,855 lbs. sand. The Contractor shall determine the exact proportions to produce the best possible mixture for construction of the bituminous setting bed to meet construction requirements.

2.04 NEOPRENE-MODIFIED ASPHALTIC ADHESIVE

Adhesive shall have the following characteristics:

Mastic (asphalt adhesive)	
Solids (base)	75± 1
Lbs./Gal	8-8.5 Lbs.
Solvent	Varsol (over 100 ⁰ F flash)
Base (2% neoprene, 10% fibers, 88% asphalt)	
Melting Point ASTM D-36	200 ⁰ F min.
Penetration 77 ⁰ F 100 Gram Load 5 Second (.1 mm)	23-27
Ductility ASTM D113-44 @25 ⁰ C 5 cms/per minute	125 cm. min.

2.05 JOINT FILLER

Joint filler shall consist of a mixture of one part portland cement and ten parts sand.

PART 3 EXECUTION

3.01 GENERAL

Backfill and compaction shall be in accordance with Section 02225, Trench Excavation and Backfill

3.02 PREPARATION OF SUBGRADE

The Contractor shall place a 3000 psi concrete base as specified in Section 03300, Cast-In-Place Concrete.

3.03 LAYING BITUMINOUS SETTING BED

- A. To install the setting bed over the base surface, place ¾-inch deep control base directly over the base. If grade must be adjusted, set wood chocks under depth control bars to

proper grade. Set two bars parallel to each other to serve as guides for striking board (12 feet long x 2 inch x 6 inch board). The depth control bars must be set carefully to bring the pavers, when laid to proper grade.

- B. Place bituminous bed between the parallel depth control bars. Pull this bed with the striking board over control bars several times. After each passage, low porous spots must be showered with fresh bituminous material to produce smooth, firm, and even setting bed. As soon as this initial panel is completed, advance the first bar to the next position in readiness for striking the next panel. Fill up any depressions that remain after removing the depth control bars and wood chocks.
- C. The setting bed shall be rolled with a power roller to a nominal depth of $\frac{3}{4}$ -inch while still hot. The thickness shall be adjusted so that when the asphalt block or brick pavers are placed, the top surface of the pavers will be at the required finished grade.
- D. A coating of two percent neoprene-modified asphalt adhesive shall be applied by mopping or squeegeeing or troweling over the top surface of the bituminous setting bed so as to provide a bond under the pavers. If it is troweled, the trowel shall be serrated with serrations not to exceed 1/16-inch.

3.04 LAYING HEXAGONAL BLOCK

- A. After the modified asphalt is applied, the blocks shall be carefully laid with the best face up and shall be laid in straight courses at right angles to the center line.
- B. Joints between blocks shall have a maximum width of $\frac{1}{4}$ -inch.
- C. All blocks shall be clean when placed in the pavement. Blocks which in the opinion of the Engineer are not satisfactorily clean shall be washed before placing.
- D. In no case shall the bituminous bed or the pavement be disturbed or walked on during the laying of the blocks.
- E. After a sufficient number of blocks have been laid, all broken or misshapen blocks shall be marked by the Engineer and removed and replaced by the Contractor.
- F. When all objectionable blocks have been removed from the pavement and all replacements made, the pavement shall be swept clean and shall be tested with straight-edge laid parallel with the center line, and any depression exceeding $\frac{1}{4}$ -inch shall be corrected and brought to proper grade. All blocks disturbed in making replacements or correcting depressions shall be settled into place by ramming, and the filler shall then be applied.
- G. Each section of pavement must be acceptable to the Engineer before the application of joint filler.

3.05 JOINT FILLER

- A. Upon the completion of the work of laying the blocks in each section to the satisfaction of the Engineer, the surface of the blocks shall be swept clean and the joint filled with a mixture of one part portland cement and ten parts sand, thoroughly dry mixed in an approved batch mixer for not less than one and one-half (1 1/2) minutes.
- B. All joints shall be filled the same day as the blocks are laid. Joint filler shall not be applied if the blocks are wet or if the air conditions are such that the filler does not readily enter the joints.
- C. Joint filler shall be well worked into the joints by means of squeegees or other approved devices operating slowly backward and forward. Squeegeeing shall continue until the joints are full. Immediately after the joints are filled, the pavement shall be swept clean.

3.06 REMOVAL AND REPLACEMENT OF HEXAGONAL BLOCK

- A. Existing hexagonal block removed for pipeline installation or hydrant removal and replacement shall be removed to limits as directed by the Engineer.
- B. Existing concrete slab shall be cut with a concrete saw and removed.
- C. After backfill, compaction and preparation of subgrade, pour concrete slab. Slab shall be 3000 psi as specified in Section 03300, Cast-in-Place Concrete.
- D. Replacement construction shall match existing hexagonal block installation to the satisfaction of the Engineer.

+++ END OF SECTION 02308 +++

**SECTION 02310
UNIT PAVERS**

PART 1 GENERAL

1.01 SCOPE

Contractor shall furnish all labor, materials, equipment and incidentals required to provide and install brick pavers and remove and replace brick pavers as required to complete the Work as specified herein and as directed by the Engineer.

1.02 QUALITY ASSURANCE

The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

1. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
3. ASTM C150 - Standard Specification for Portland Cement.
4. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
5. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
6. ASTM C902 - Standard Specification for Pedestrian and Light Traffic Paving Brick.
7. Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council.

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 1. Data for each product specified in this Section.
 2. Documentation as necessary to demonstrate compliance with specified requirements.
 3. Samples for Initial Selection: For each distinct unit paver type indicated, submit full sized unit pavers or sections of pavers showing manufacturer's standard textures, patterns, and colors available.

4. Submit samples indicating manufacturer's standard grout colors available.
 5. Qualifications Statements: Submit statements indicating compliance with qualifications requirements specified under "Quality Assurance."
 6. Maintenance Data: Submit for each product specified in this section. Include cleaning and preventive maintenance instructions.
- B. Manufacturer's Qualifications: Firm regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.
- C. Installer's Qualifications: Firm regularly engaged in installation of products specified in this section, with a minimum of 5 years of experience.
- D. Field-constructed Mock-up:
1. Before beginning installation, construct one mock-up for each required unit paver color, type and pattern; and separate joint treatment indicated.
 2. The accepted mock-up shall establish the quality of materials, workmanship and appearance to be expected in the finished installation.
 3. Location of mock-up shall be as directed by the Engineer.
 4. Approximate dimensions for each mock-up shall be 4-feet x 3-feet, full thickness.
 5. Do not begin paver installation until Engineer has accepted qualities of mock-up.
 6. Keep mock-up intact throughout construction period.
 7. Disassemble and remove mock-up after unit paving work has been completed.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials in a manner to prevent damage and deterioration.
- B. Mortar and Grout Materials: Store off the ground, covered, and dry. Do not permit exposure of materials to open flame. Do not allow liquid materials to freeze.

1.05 PROJECT CONDITIONS

- A. Frozen or Partially-Frozen Materials: Do not install materials which are completely or partially frozen or which are covered or intermixed with frost or ice.

- B. Work Exposed to Frost or Freezing Conditions: Do not install pavers on frozen substrates. Work damaged by frost or freezing must be removed and replaced at the Contractor's expense.
- C. Air Temperatures 40 Degrees F or Lower: Conform to requirements of the International Masonry Industry All-Weather Council's, "Recommended Practices Guide Specifications for Cold Weather Masonry Construction," Use heated materials. Protect finished sections of work.
- D. Hot Weather Limitations: Provide suitable protection when air temperature and humidity levels are capable of causing excessive moisture evaporation from grout and setting beds. If necessary, cool materials before installation.

PART 2 PRODUCTS

2.01 UNIT PAVERS

- A. For each distinct paver: color, type, and pattern, provide materials produced by one manufacturer.
- B. Provide unit pavers free of defects which would impair strength, durability, or appearance.
- C. Provide pavers of uniform coloration, within range specified or approved.
- D. Brick Pavers: Solid pedestrian and light traffic paving brick (ASTM C902), sized as indicated.
 - 1. Class SX.
 - 2. Type I.
 - 3. Application PS.
 - 4. Color and texture of brick pavers shall be as selected by the Engineer to match the existing paver color and texture.

2.02 MORTAR AND GROUT

- A. Portland Cement: Portland cement shall conform to ASTM C150 and shall be non staining.
 - 1. Type I except that Type III may be used during cold weather.
 - 2. Obtain all cement from one manufacturer.

- B. Hydrated Lime: Hydrated lime shall conform to ASTM C207, Type S.
- C. Aggregate: Aggregate shall conform to ASTM C144.
1. Obtain each aggregate from one source.
 2. Uniform quality and color.
 3. For joints narrower than ¼-inch, modify ASTM C144 gradation as follows: 100 percent passing the No. 8 sieve and 95 percent passing the No.16 sieve.
- D. Water: Water shall be non alkaline.
- E. Latex Additive: Acrylic latex, without retarder, formulated for use in mortar setting beds, bond coats, and grouts, with record of satisfactory use.
- F. Mortar and Grout Mixes - General:
1. Do not use additives, including pigments, unless specifically indicated.
 2. Use mechanical batch mixer.
 3. Mix in accordance with ASTM C270, using cement-to-lime proportions.
- G. Setting Mortar for Mortar-Set Paving: ASTM C270, Type M, Proportion Specification.
1. Use as little water as possible when ready for setting of pavers.
 2. Surfaces should be barely moist.
- H. Bond Coat Mix: Cement slurry with latex additive, proportioned according to additive manufacturer's instructions.
- I. Paving Joint Grout for Mortar-Set Paving: 1 part Portland cement, 2 parts aggregate.
1. Use as little water as is necessary to produce a pourable consistency.
 2. Add latex additive as recommended by manufacturer.
- J. Membrane: Polyethylene film, 4 mils thick, complying with ASTM C171.
- K. Steel Welded Wire Fabric: 2-inch by 2-inch - W0.3 X W0.3. Wire fabric shall conform to requirements of ASTM A185 with the exception of requirements for minimum wire size.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive paving and conditions under which unit pavers will be installed.
- B. Verify that related work to be performed before installation of paving has been completed.
- C. Notify the Engineer in writing of any conditions which are not in compliance with requirements.
- D. Correct any unsatisfactory conditions before installing products specified in this section. Commencement of installation indicates acceptance of conditions.

3.02 PREPARATION

Clean unit paver surfaces before setting.

3.03 PAVING

Brick Paving - Pedestrian/Light Vehicular Traffic Application:

- 1. Setting method: Mortar-set.
- 2. Joint width: three-eighth (3/8) - Inches.
- 3. Paver size: four (4)-inches by eight (8) -inches by two and one-fourth inches (2-1/4) - inches thick.

3.04 SETTING PAVERS - GENERAL

- A. Edging: Before beginning installation of unit pavers, provide edging as indicated.
- B. Install unit pavers in accordance with manufacturer's recommendations.
- C. Install full-sized, uncut unit pavers whenever possible.
 - 1. Cut pavers as required to produce indicated configuration and to join neatly with adjacent work.
 - 2. Exposed edges: Cut straight and true.
- D. Provide openings as required to accommodate other work. Close up such openings, after other work is complete, with paving that matches paving already set.
- E. Set pavers accurately, in configurations to match existing pattern with edges and faces

aligned according to established relationships and required tolerances. Provide consistent joints of indicated dimensions.

F. Setting Tolerances:

1. Maximum vertical offset between top of each unit paver and tops of adjacent pavers: 1/16-inch.
2. Maximum variance from finished surface: 1/8-inch in 2-feet and ¼-inch in 10 feet.

3.05 MORTAR-SET PAVING

- A. Concrete subbase: Concrete slab shall be 3000 psi. as specified in Section 03300, Cast-In-Place Concrete.
- B. Concrete sub base preparation: Remove dirt and debris.
- C. Membrane: Place over entire substrate, lapping edges a minimum of 4 inches.
- D. Place welded wire fabric reinforcing; lap edges at least 1 full mesh; support fabric so that, when mortar is installed, reinforcing will be located in center of setting bed depth.
- E. Install setting bed to uniform thickness required for setting of paving to grades indicated.
- F. Before setting, thoroughly wet pavers.
- G. Brick pavers: Do not install if free moisture is present on brick faces.
- H. Install pavers before mortar bed sets; remove mortar that has set. Apply bond coat to setting bed and to bottom of paver just before placing.
- I. Tamp pavers to achieve complete contact with setting bed. Make each paver level immediately, before set of mortar.
- J. Grout joints after setting bed has set.
 1. Fill joints completely; keep grout off of exposed surfaces of pavers.
 2. Tool joints lightly after grout has set.
 3. Keep grout damp for 7 days, except as otherwise indicated by latex additive manufacturer.
- K. Do not allow traffic on paving during installation for 24 hours after completion of joints.

3.06 ADJUSTING AND CLEANING

- A. Remove and replace pavers that:
 - 1. Are discolored, cracked, nicked, or defective in any way.
 - 2. Do not match approved samples.
 - 3. Do not match approved mock-up.
 - 4. Have defective joints.
 - 5. Do not comply with requirements indicated.
- B. Replace pavers in a manner which results in the paving showing no evidence of replacement work.
- C. Clean mortar-set paving as soon as possible, but not sooner than 7 days after completion of work.
 - 1. Do not use cleaning tools or materials which could damage paving.
 - 2. Do not use acid unless approved by unit paver supplier.

3.07 PROTECTION

Protect completed work, and maintain protection until substantial completion.

3.08 REMOVAL AND REPLACEMENT OF UNIT PAVERS

- A. Existing unit pavers removed for pipeline installation and hydrant removal and replacement or damaged by the Contractor shall be removed in rectangular sections the full width of the sidewalk or to limits as directed by the Engineer.
- B. Existing concrete slabs shall be cut with a concrete saw and removed.
- C. After backfill, compaction and preparation of subgrade, pour concrete slab. Slab shall be 3000 psi concrete as specified in Section 03300, Cast-in-Place Concrete.
- D. Replacement construction shall match existing unit paver installation including concrete slab.

+++ END OF SECTION 02310 +++

**SECTION 02371
GREEN INFRASTRUCTURE GEOTEXTILES**

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Section includes furnishing and installation of geotextile for layer separation and filtration in stormwater quality facilities including subsurface drainage and infiltration features as indicated on the Drawings. This section does not include geotextiles for subgrade stabilization.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO M288, Geotextile Specification for Highway Applications
- B. ASTM International:
1. ASTM D 4354, Standard Practice for Sampling of Geosynthetics for Testing
 2. ASTM D 4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
 3. ASTM D 4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 4. ASTM D 4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles
 5. ASTM D 4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
 6. ASTM D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile
 7. ASTM D 4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
 8. ASTM D 6241, Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the Contract Documents.
- B. Submit the following for review and approval prior to shipment of geotextile products to the Site:
 - 1. Manufacturers' descriptive documentation (including material properties sheets) for each product.
 - 2. Sample of each geotextile product.
- C. Submit the following for review and approval at time of shipment of each product:
 - 1. The manufacturers' quality control certifications (including results of source quality control testing of the products as specified in subsection 2.01) to verify that the materials supplied for the project are in compliance with all product specifications in this Section. The certifications shall be signed by a responsible party employed by the manufacturer, such as the QA/QC Manager, Production Manager, or Technical Services Manager. Certifications shall include lot and roll numbers, and corresponding shipping information.

1.04 QUALITY ASSURANCE

- A. Installer's Qualifications: The geotextile installer shall have successfully installed at least 5,000 square feet of geotextile in a similar application on at least two separate projects.
- B. Manufacturer's Qualifications: The manufacturer(s) shall have at least five years experience in the manufacture of geotextiles of the type specified.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Product rolls shall be marked or tagged with manufacturer's name, product identification, lot number, roll number, and roll dimensions.
- B. Procedures for storage and handling of geotextile shall conform to ASTM D 4873 and the manufacturer recommendations, including the following:
 - 1. Continuously and uniformly support rolls on a prepared surface elevated above grade away from traffic areas. Cover rolls with tarp for protection from sun, dirt and other deleterious conditions if the protective wrap around the geotextile is damaged.

2. No hooks, tongs, or other sharp instruments shall be used for handling the geotextile. Geotextile rolls shall not be lifted by use of cables or chains in contact with the products.
- C. Geotextile shall be inspected upon delivery and during installation. Geotextile that is damaged by the Contractor to the extent that it is no longer usable shall be removed from the Site and replaced with new material.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

- A. Quality control testing of each geotextile product shall be performed by the manufacturer prior to shipment in accordance with ASTM D 4354.
- B. For manufacturer's quality control testing of each geotextile product, the sample average test results (weaker principle direction for mechanical tests) for a particular property for any individual roll tested within a lot designated as first quality shall meet or exceed the Minimum Average Roll Value indicated in the manufacturer's certification.

2.02 GEOTEXTILE PRODUCTS

- A. All geotextile products shall be resistant to ultraviolet degradation and biological and chemical environments normally found in soils.
- B. Geotextile to be installed as separation geotextile (such as in subsurface drainage trenches, and between aggregate and soil at other indicated locations) shall be a continuous filament polypropylene nonwoven needle-punched fabric, Survivability Class 1 (as defined in AASHTO M 288), meeting or exceeding the following specifications:

Property	Test Method	Test Value⁽¹⁾
Grab Tensile Strength	ASTM D 4632	202 lb
Grab Tensile Elongation	ASTM D 4632	50 %
Trapezoid Tear Strength	ASTM D 4533	79 lb
Puncture (CBR) Strength	ASTM D 6241	433 lb
Permittivity ⁽²⁾	ASTM D 4491	___ sec ⁻¹
AOS ⁽³⁾	ASTM D 4751	___ mm (max.)
Ultraviolet Resistance (ASTM D 4355	50 %

Property	Test Method	Test Value ⁽¹⁾
% strength retained at 500 hours)		

Notes:

⁽¹⁾ Minimum Average Roll Value (unless otherwise noted) in weakest principal direction

⁽²⁾ Allowable permittivity is to be specified based on grain size analysis of *in situ* subgrade soils in accordance with AASHTO M288. Default values range from 0.02 to 0.5 sec⁻¹.

⁽³⁾ Allowable apparent opening size (AOS) is to be specified based on grain size analysis of *in situ* subgrade soils in accordance with AASHTO M288. Default values range from 0.22 to 0.60 mm.

- C. Geotextile to be installed for subgrade stabilization or for use as part of a permeable pavement system shall be specified as part of the pavement section design.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare subgrade for geotextile as specified in applicable sections and as shown on the Drawings.
- B. Surfaces to receive geotextile shall be free of litter, sharp protrusions, and large stones.

3.02 GEOTEXTILE INSTALLATION

- A. Geotextile shall not be deployed until the required submittals specified in subsection 1.03 are submitted to and approved by the Owner's representative. If the material does not meet project specifications, it shall be removed at no additional cost to the Project.
- B. Geotextile shall be placed where shown on the Drawings, and installed in such a manner that placement of overlying material will not excessively stretch or tear the geotextile. Anchor geotextile as necessary to prevent wind uplift and displacement by other causes.
- C. Place nonwoven geotextile on the prepared sides of trenches and other indicated areas for separation and filtration at the required locations and to the limits indicated on the Drawings.

- D. Overlapping of adjacent panels without seaming will be allowed for installation of geotextile unless otherwise specified. Overlaps of adjacent rolls of geotextile and at the top of gravel backfill shall be approximately one foot.
- E. On curves, the geotextile may be folded or cut to conform to the curves. Folds and overlaps shall be shingled in the direction of construction or downslope, as applicable.
- F. Where indicated, geotextile shall be joined by seaming as specified in the following paragraphs. All seams shall be subject to approval by the Owner's representative.
 - 1. Geotextile required to be seamed shall be overlapped and sewn along the entire length of joints in accordance with manufacturer's recommendations, and sufficient to prevent opening of seams by wind action or soil deployment.
 - 2. Seams shall be continuously sewn, unless otherwise recommended by the manufacturer and approved by the Owner's representative.
 - 3. The minimum distance from the geotextile edge to the stitch line nearest the edge shall be three inches, unless otherwise recommended by the manufacturer.
 - 4. The thread at the end of each seam run shall be tied off to prevent unraveling. Seams shall be on the top side of the geotextile to allow inspection.
 - 5. Discontinuities over six inches in length shall be sewn with an extra line of stitching, with 18 inches of stitch overlap.
- G. Bury the upper edges of geotextile a minimum of six inches below grade at outer edges of installed material.

3.03 PLACEMENT OF COVER MATERIALS

- A. Cover geotextile as soon as possible after installation and approval. Installed geotextile shall not be left exposed for more than 7 days.
- B. At no time, shall construction equipment come into direct contact with the installed geotextile. Damage to geotextile shall be repaired as specified in subsection 3.04 prior to placement of cover material.
- C. Place the required cover material specified in other sections and to the thickness and limits indicated on the Drawings.

- D. At least a 12-inch thick layer of cover material shall be maintained between placement equipment and installed geotextile when spreading the material. Unless otherwise specified, place the material using lightweight tracked equipment which will produce maximum loads not greater than eight pounds per square inch.
- E. Use care in placing the cover material to avoid damaging or displacing geotextile. Any damage to the geotextile caused by the Contractor's activity shall be repaired.

3.04 GEOTEXTILE REPAIR

- A. Holes or tears in the geotextile shall be repaired with a patch of the same material, unless otherwise recommended by the manufacturer and approved by the Owner's representative.
- B. Geotextile patches shall be sized to cover a minimum of two feet beyond the limits of the damaged area in all directions.

+++END OF SECTION 02371+++

SECTION 02491
REHABILITATION OF SANITARY SEWER MANHOLES

PART 1 – GENERAL

1.01 SCOPE

- A. This specification covers the work necessary to expose and raise existing sanitary sewer manholes to grade and to rehabilitate or replace existing sanitary sewer manholes. All work shall be performed only as directed by the Engineer or shown on the task order Drawings. The Work includes:
1. Sealing to exclude infiltration; and/or
 2. Lining of manhole interiors; and/or
 3. Removal and replacement of manholes; and/or
 4. Replacement and/or removal of broken manhole covers and frames, corroded step irons or corroded ladders.
- B. The Contractor is responsible for field verification of location and condition of all manholes.
- C. The Contractor shall provide all labor, materials and equipment required to clean, raise, or rehabilitate the manholes.
- D. The Contractor shall comply with the City's and OSHA requirements for confined space entry.
- E. No manhole cover slabs shall be removed to undertake the work until prior notice has been given to the Engineer.
- F. Before commencing work at existing manholes, a perforated catch bucket (to retain particulate larger than U.S. No. 8 sieve, for subsequent removal), or similar, shall be fitted to the outgoing pipe from the manhole structure. Contractors shall strictly adhere to the requirement that construction debris and waste material be prevented from entering downstream sewers.
- G. The Contractor shall keep accurate records of the location of and nature of the rehabilitation work performed at each manhole as directed by the Engineer. The Contractor shall provide copies to the Engineer as required.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The following references are part of this Specification. In case of conflict between the requirements of this Specification and those of the listed documents, the requirements of this Specification shall prevail. The latest edition of the following references shall be used:

1. ASTM C794 Test Method for Adhesion-in-Peel Elastomeric Joint Sealant
2. ASTM D412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
3. ASTM D882 Test Methods for Tensile Properties of Thin Plastic Sheeting

B. Other ASTM standards as referenced in the Specifications below.

1.03 SUBMITTALS

A. The Contractor shall submit the following information:

1. Written certification by the manhole rehabilitation system manufacturer stating that the applicator is approved to install the rehabilitation system specified. **(At Pre-construction Meeting)**
2. Manhole rehabilitation system manufacturer's literature describing the rehabilitation system components, rehabilitation material utilized, including the materials' physical and chemical characteristics. **(At Pre-construction Meeting)**
3. Experience record of a minimum of sixty (60) manholes rehabilitated within the last three (3) years. **(At Pre-construction Meeting)**
4. Description of installation method including **(At Pre-construction Meeting)**:
 - a. Product Material Safety Data Sheets.
 - b. Maximum pot life, storage life and essential storage requirements of all rehabilitation materials
 - c. Mixing and proportioning requirements (as applicable).

- d. Environmental requirements for application and worker safety including ventilation, humidity, and temperature ranges.
 - e. Application film thickness per coat of activator and mastic (as applicable).
 - f. Curing time, including specific formulation requirements to provide specified setting time for foamed mastic (as applicable)
- B. Methodology, including detail drawing and necessary product data for finishing all anticipated pipe connections to rehabilitated manholes to prevent infiltration and exfiltration (e.g. anticipated pipe connections, including through pipe, side connections and drop connections). In the case of lining, such details shall be provided by the liner manufacturer or approved in writing by the liner manufacturer.

1.04 QUALITY ASSURANCE

- A. Materials and supplies provided shall be the standard products of manufacturers. The standard products of manufacturers other than those specified may be accepted if it is demonstrated that they are equal in composition, durability, and usefulness for the purpose intended. All material components of an installed lining system shall be supplied by a single manufacturer.
- B. The Engineer will inspect the rehabilitated manholes to evaluate the Contractor's work.

1.06 TRIAL TEST AND METHODOLOGY REVIEW

- A. The Contractor shall comply with the following conditions before a manhole rehabilitation technique becomes accepted as a viable option on a repeat basis:
- 1. A successful demonstration of manhole rehabilitation, for a manhole chosen by the Engineer, shall be carried out including type and quality control tests as recommended by the manufacturer and in compliance with industry standards.
 - 2. The trial shall be performed prior to approval for adoption by the Engineer of the manhole rehabilitation technique to prove that the equipment, materials and installation methodology are fully acceptable to meet local conditions. Payment will be made through the applicable unit price for the work.
 - 3. The Contractor shall allow for any further requirement of the Engineer, subsequent to the trial, to modify the equipment, material and/or installation methodology in order to complete the work satisfactorily and meet all testing

standards, including vacuum testing of Rehabilitated Manholes, at no cost to the City.

- B. A representative from the manufacturer of the manhole rehabilitation system shall be present on-site for the entire duration of the trial test and methodology review. The manufacturer's representative shall certify in writing that the system applicator and/or installer has performed the application and/or installation in accordance with the manufacturer's requirements and recommendations.

PART 2 – PRODUCTS

2.01 GENERAL

- A. The installer shall warrant and hold harmless the City and the Engineer against all claims for patent infringement and any loss thereof.
- B. The materials used shall be designed, manufactured and specifically intended for sewer manhole rehabilitation and the specific application in which they are used. The materials shall have a proven history of performance in sewer manhole rehabilitation for a minimum of three (3) years in sewer systems elsewhere nationally, of similar age, groundwater levels and circumstance.
- C. The materials shall be delivered to the job site in original unopened packages and clearly labeled with the manufacturer's identification (brand name), date of manufacture, storage life and printed instructions.
- D. Stored materials shall be protected from weather and excessive heat or cold, and stored in accordance with the manufacturer's instructions. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life recommended by the manufacturer shall be removed from the site.
- E. The Contractor shall dispose of all wastes in accordance with applicable regulations.
- F. At the request of the Engineer, the Contractor shall provide a representative employed by the manufacturer having technical training in any of the specific manhole rehabilitation materials and/or system or technique being applied. The appropriate specialist shall be available for consultation on site within 48 hours notice, at no cost to the City.
- G. All completed rehabilitation work shall be resistant to:
 - 1. Continuous immersion in septic sewage at temperatures up to 85°F
 - 2. Continuous exposure to hydrogen sulfide gas from septic sewage at temperatures up to 85°F

3. Deposits of free sulfur on exposed surfaces
4. Continuous exposure to 10% sulfuric acid at temperatures up to 85°F

Seals shall be tested to withstand all subsequent infiltration, inflow, and exfiltration as specified herein.

PART 2A – MANHOLE INTERIOR RENEWAL

2A.01 MANHOLE SEALING TO EXCLUDE INFILTRATION

A. General:

1. Manholes will be sealed when active leaks are present, and/or will be patched when there is exposed aggregate (concrete manholes) or brick mortar missing (brick manholes) in small isolated areas.
2. The generic chemical sealing materials to be used are listed with the basic properties, performance standards, and mix ratios that are known to give acceptable performance.
3. In every case, mixing and handling of chemical sealing material shall be in accordance with the manufacturer's recommendations.

B. Characteristics of Sealing Chemicals:

1. All chemical sealing materials used in the performance of the work specified must have the following characteristics:
 - a. The chemical sealant must be able to react/perform in the presence of water (groundwater) while being injected, i.e., the sealant must be hydrophilic.
 - b. The cured material must withstand submergence in water without degradation.
 - c. The resultant sealant (grout) formation must prevent, on a continuing basis, the passage of water (infiltration) through manhole and sewer pipe joints.
 - d. The sealant material, after curing, must be flexible as opposed to brittle.
 - e. The sealant formation should be able to withstand freeze/thaw and

wet/dry cycles without adversely affecting sealant properties. Note: This primarily applies to storm sewers, which are shallow and sometimes dry.

- f. The sealant formation must not be biodegradable.
- g. The cured sealant should be chemically stable and resistant to the mild concentrations of acids, alkalis, and organics found in normal sewage.
- h. Packaging of component materials must be compatible with field storage and handling requirements. Packaging must provide for worker safety and minimize spillage during handling.
- i. Mixing of the component materials must be compatible with field operations and not require precise measurements of the ingredients by field personnel.
- j. Clean up must be done without inordinate use of flammable or hazardous chemicals.
- k. Residual sealing materials must be easily removable from the sewer line to prevent reduction or blockage of the sewage flow.

C. Acceptable Chemical Sealing Materials:

- 1. The following is a generic listing of permissible chemical sealing materials currently in use and the basic requirements, properties and characteristics of each.
 - a. Acrylamide base gel sealing material:
 - 1) A minimum of 10% acrylamide base material by weight in the total sealant mix. A higher concentration (%) of acrylamide base material may be used to increase strength or offset dilution during injection.
 - 2) The ability to tolerate some dilution and react in moving water during injection
 - 3) A viscosity of approximately 2 centipoise which can be increased with additives
 - 4) A constant viscosity during the reaction period

- 5) A controllable reaction time from 10 seconds to 1 hour
- 6) A reaction (curing) which produces a homogeneous, chemically stable, non-biodegradable, firm, flexible gel
- 7) The ability to increase mix viscosity, density and gel strength by the use of additives

b. Acrylic base gel chemical sealing material:

- 1) minimum of 10% acrylic base material by volume in the total sealant mix. A higher concentration (%) of acrylic base material may be used to increase strength or offset dilution during injection.
- 2) The ability to tolerate some dilution and react in moving water during injection
- 3) A viscosity of approximately 2 centipoise, which can be increased with additives
- 4) A constant viscosity during the reaction period
- 5) A controllable reaction time from 5 seconds to 6 hours
- 6) A reaction (curing) which produces a homogeneous, chemically stable, non-biodegradable, flexible gel
- 7) The ability to increase mix viscosity, density and gel strength by the use of additives

c. Urethane base gel chemical sealing material:

- 1) One (1) part urethane prepolymer thoroughly mixed with between 5 and 11 parts of water by weight. The recommended mix ratio is 1 part urethane prepolymer to 8 parts of water (11% prepolymer).
- 2) A liquid prepolymer having a solids content of 77% to 83%, specific gravity of 1.04 (8.65 pounds per gallon), and a flash point of 20°F
- 3) A liquid prepolymer having a viscosity of 300 to 1000 centipoise at 70°F that can be pumped through 500 feet of 1/2-inch hose with a 1000 psi head at a flow rate of 1 ounce per second

- 4) The water used to react the prepolymer should have a pH of 5 to 9.
- 5) Gel times shall be as short as practical and as short as two (2) minutes for polyurethane grouts, in accordance with the manufacturer's recommendations. Control of gel times is a critical aspect of successful chemical grouting. Higher water ratios give longer cure times.
- 6) A relatively rapid viscosity increase of the prepolymer/water mix in the first minute. (Viscosity increases from about 10 to 60 centipoise in the first minute for 1 to 8 prepolymer/water ratio at 50°F).
- 7) A reaction (curing) which produces a chemically stable and non-biodegradable, tough, flexible gel.
- 8) The ability to increase mix viscosity, density, gel strength and resistance to shrinkage by the use of additives to the water

d. Urethane base foam chemical sealing material:

- 1) Approximately one part of urethane prepolymer with one part of water by weight (50% prepolymer)
- 2) A liquid prepolymer having a solids content of 82 specific gravity of 1.1 (9.15 pounds per gallon) flash point of 200°F
- 3) A liquid prepolymer having a viscosity of 30 centipoise at 72°F that can be pumped through 50 feet of 1/2-inch hose with a 500 psi head at a flow rate of one ounce per second
- 4) A cure time of 15 minutes at 40°F, 8.2 minutes at 60°F 4.6 minutes at 100°F when the prepolymer is reacting with water only
- 5) A cure time of 5.5 minutes at 40°F, 8.2 minutes at 60°F, 2.6 minutes at 100°F when the prepolymer is reacting with water containing 0.4% accelerator
- 6) During injection; foaming, expansion, and viscosity increase occur.
- 7) Physical properties of the cured foam of approximately 14

pounds per cubic foot density, 80 to 90 psi strength, and 700% to 800% elongation when a mixture of prepolymer and 50% water undergoes a confined test and expands five times its initial liquid volume.

- 8) Acrylamide and acrylic gel grouts maintain a viscosity close to that of water (2 centipoise) during the time between mixing material solution with the activator solution and the formation of a gel. This time period is referred to as the cure time, induction period, or gel time. The low viscosity is advantageous for penetration but makes the grouts susceptible to dilution during the reaction period.
- 9) Urethane gel grout undergoes a viscosity increase during the time between mixing the base material with water and the formation of a gel. This time period is cure time or gel time. The increasing viscosity limits penetration by dilution, particularly by groundwater.

2A.02 PATCHING

- A. Manhole patching work includes re-pointing, filling, and repairing non-leaking holes, cracks, and spalls in concrete and masonry manhole walls, benches and slabs as well as through-flow channel dressing and repair.
- B. The patching material shall consist of a premixed non-shrink cement-based patching material consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating agents, which has been formulated for vertical or overhead use. It shall not contain chlorides, gypsums, plasters, iron particles, aluminum powder, or gas forming agents or promote the corrosion of steel it may come into contact with. Set time (ASTM C-191) shall be less than 30 minutes. One hour compressive strength (ASTM C-109) shall be a minimum of 200 psi and the ultimate compressive strengths (ASTM C-882 Modified) shall be a minimum of 1700 psi.

PART 2B – MANHOLE LINING SYSTEMS

2B.01 EPOXY BASED LINING SYSTEM

- A. Manholes will be lined with epoxy or epoxy mortar when the manholes are subject to high groundwater levels (manholes near lakes/creeks, etc.) resulting in significantly active infiltration (runners and gushers) and/or subject to corrosive environments.

- B. Epoxy lining systems shall be completely watertight and free of any joints or openings other than pipe inlets and the rim opening. The junction of the lining material with the pipe material at the inlets and outlets shall be completely watertight.
- C. Each lining application shall be designed for application over damp (but not wet or active running water) surfaces without degradation of the final product and the bond between the product and the manhole surfaces.
- D. Generally, the entire interior walls of manholes as designated to be rehabilitated shall be lined with epoxy or epoxy mortar liner, as follows:

- 1. The epoxy or epoxy mortar liner shall be used to form a monolithic liner covering all interior surfaces of the manhole, including benches and inverts.
- 2. The finished epoxy based monolithic liner shall conform to the following minimum requirements at 28 days:

PROPERTY	TEST METHOD	RESULTS
Compressive Strength	ASTM C-579	≥ 6,500 psi
Tensile Strength	ASTM C-307	≥ 2,500 psi
Flexural Strength	ASTM C-580	≥ 4,500 psi
Shrinkage	ASTM C-531	< 0.15%
Bond Strength	ASTM D-4541	Concrete failure

- 3. The finished manhole shall be resistant to corrosive conditions common to municipal wastewater and shall prohibit water infiltration.
 - 4. The epoxy based liner shall be suitable for application over damp or dry concrete surfaces.
- E. At a minimum, the manhole rehabilitation epoxy or epoxy mortar liner system (product coating designation) must have received a passing score without receiving an N/E result in any category as documented in the following study:

“EVALUATION OF PROTECTIVE COATINGS FOR CONCRETE”
August, 2002 Update

John A. Redner, Sewerage Departmental Engineer, Randolph P. Hsi, Associate Engineer, Edward J. Esfandi, Senior Engineer, Roger Sydney, Civil Engineer, Robin M. Jones, Associate Engineer, and Donna Won, Senior Engineer

County Sanitation Districts of Los Angeles County, Whittier, California.

- F. Acceptable systems include, but are not limited to, the following:
 - 1. Raven 405 (Raven Lining Systems)
 - 2. Mainstay DS-4 (Madewell Products)
 - 3. Magma Quartz or Belzona 4111 (Belzona Inc.)
 - 4. Sauereisen-210 (Sauereisen)
 - 5. Warren Epoxy Spray or Laminate (Warren Environmental)

2B.02 FIBERGLASS LINING SYSTEM

- A. Manholes will be lined with a cured-in-place fiberglass insert when the manhole interior is structurally deteriorated (concrete or brick manholes), and/or subject to a corrosive environment.
- B. The fiberglass lining system shall consist of a three layer composite, laminate system comprised of one non-permeable synthetic, environmental membrane embedded and bonded between two layers of structural fiberglass woven fabric impregnated with a modified epoxy resin system. The average wall thickness of the fiberglass liner system shall be no less than 0.5-inch unless otherwise allowed, but shall be structurally designed to withstand all structural loads.
- C. The finished fiberglass liner shall conform to the following minimum physical properties:

PROPERTY	TEST METHOD	RESULTS
Max. Flexural Fiber Stress	ASTM D-790	≥ 44,000 psi
Flexural Modulus of Elasticity	ASTM D-790	≥ 1,000,000 psi
Compressive Strength	ASTM D-695	≥ 11,000 psi
Compressive Modulus	ASTM D-695	≥ 900,000 psi
Strength at Break	ASTM D-638	≥ 28,000 psi
% Elongation at Break	ASTM D-638	< 9%
% Elongation at Max. Load	ASTM D-638	< 2%

- D. Acceptable products are equal to Poly-Triplex PTL5-6800 series manufactured by Poly Triplex Technologies, Inc.

2B.03 CEMENTITIOUS LINING SYSTEM

- A. Manholes will be lined with cementitious lining for preventive maintenance when the manhole interior is mildly weathered or aged, and/or subject to minor infiltration (seepers or drippers).
- B. Cementitious lining systems shall be completely watertight and free of any joints or openings other than pipe inlets and the rim opening. The junction of the lining material with the pipe material at the inlets and outlets shall be completely watertight.
- C. Each lining application shall be designed for application over damp (but not wet or active running water) surfaces without degradation of the final product and the bond between the product and the manhole surfaces.
- D. Generally, the entire interior walls of manholes as designated shall be lined with calcium aluminate cementitious liner, as follows:
 - 1. The calcium aluminate cementitious liner shall be used to form a monolithic liner covering all interior surfaces of the manhole, including benches and inverts.
 - 2. The finished cementitious liner shall conform to the following minimum requirements at 28 days:

PROPERTY	TEST METHOD	RESULTS
Compressive Strength	ASTM C-109	≥ 8,000 psi
Tensile Strength	ASTM C-496	≥ 800 psi
Flexural Strength	ASTM C-293	≥ 1,500 psi
Shrinkage (@ 90% R.H.)	ASTM C-490	0%
Bond Strength	ASTM C-882	≥ 2000 psi

- 3. The finished manhole shall be resistant to corrosive conditions common to municipal wastewater and shall prohibit water infiltration.
- E. The cementitious liner mix shall be factory blended requiring only the addition of water at the jobsite. The liner mix shall be suitable for “wet” application by progressive cavity pump type equipment only. Guniting mixes will not be allowed.
- F. The liner applicator must use approved equipment designed and/or approved by the material manufacturer specifically for the application of cementitious liners in manholes. Only low-pressure, progressive cavity pump type equipment for “wet” application will be allowed.
- G. Acceptable systems are those equal to:
 - 1. Strong-Seal® by The Strong Company, Inc.;
 - 2. Sewpercoat® by Lafarge Calcium Aluminates, Inc.;

PART 2C - MANHOLE RAISING/ADJUSTMENT TO GRADE

2C.01 GENERAL

A. Brick

1. Brick shall conform to ASTM C-32 for grade SM. Bricks shall conform to the following dimensions, unless otherwise approved by the Engineer:

	Depth	Width	Length
	(inches)	(inches)	(inches)
Standard Size	2 1/4	3 3/4	8
Allowable Variation	± 1/4	± 1/4	± 1/2

2. All brick shall be new and whole, or uniform standard size and with substantially straight and parallel edges and square corners. Bricks shall be of compact textures, burned hard entirely through, tough and strong, free from injurious cracks and flaws, and shall have a clear ring when struck together. No soft or salmon brick shall be used except at such places, to such extent, and under such conditions as may be approved by the Engineer.

B. Mortar

1. The Contractor shall use mortar meeting the requirements of ASTM C-270 Type S unless directed otherwise by the Engineer.
2. The Contractor shall prepare mortar only in quantities needed for immediate use. Mortar which has been mixed for more than 30 minutes, which has set, or which has been retempered shall not be used.
3. No mortars utilizing latex emulsifiers or plasticizers as a filler are acceptable. No bonding agents are allowed.

C. Cast Iron Adjustment Rings

1. For adjusting lid elevation: Adjusting rings shall be cast iron equal to Series R-1979-H (heavy duty) manufactured by Neenah Foundry.
2. All adjusting rings shall be securely sealed to the casting frame using resilient, flexible, non-hardening, preformed butyl mastic equal to Rub R Nek or EZ Stick. This mastic shall be applied in such a manner that no surface water or ground water inflow can enter the manhole through gaps between the first adjusting ring, between adjusting rings, or between the

last adjusting ring and the manhole frame. Up to two (2) inches of adjusting rings may be installed on a given manhole. No more than two (2) adjusting rings in total shall be used for the final adjustment to grade.

D. Concrete Grade Rings

1. For manhole adjustment to grade: Pre-cast concrete grade rings may be used instead of brick and mortar for adjusting pre-cast concrete manholes to grade. The pre-cast concrete rings shall be installed between the top of the cone and the casting frame. Grade rings shall be pre-cast concrete, as manufactured by Standard Concrete Products (lightweight) or approved equal.
2. All grade rings shall be securely sealed to the bottom of the casting frame and the top of the cone using a resilient, flexible, non-hardening, preformed butyl mastic equal to Rub R Nek or EZ Stick. No less than two beads shall be applied 1/2 inch wide and 3/4 inch high between grade rings when grade rings are stacked. No less than one inch of non-shrink cement based patching material shall be applied to the inside and outside faces of the grade rings when grade rings are stacked.

2C.02 MANHOLE CASTING EMBEDMENT SEALANT TO EXCLUDE RDI/I

A Provide a premium, extruded bituminous tacky rubber sealant in rope form for use on manholes as an embedment material for the frame to adjusting brick/mortar corbel.

B. Sealant shall conform to AASHTO M-198 Type B and SS-S-210 and SS-S-210A.

C. Properties:

1. Chemical Composition:

	SPEC REQUIRED
Hydrocarbon Plastic Content % by wt	ASTM D4 (mod.) 50-70
Inert Mineral Filler % by wt	SS-S-210A 30-50
Volatile Matter % by wt	ASTM D6 3.0 max
2. Physical Properties:

Specific Gravity, 77°F	ASTM D71 1.20-1.35
Ductility, 77°F	ASTM D 113 5.0 min
Softening Point	ASTM D36 320 min
Flash Point, C. 0. C. min	ASTM D92 600 min
Fire Point, C. 0. C. min.	ASTM D92 625 min
Penetration, 77°F (150 gm) 5 sec.	ASTM D217 50 to 120
3. Chemical Resistance:
30-Day Immersion: No visible deterioration

when tested for 30 days in 5% caustic potash, 5% hydrochloric acid, 5% sulfuric acid, or 5% saturated hydrogen sulfide	
Elongation Initial, 77°F	300% min
Two Weeks, Total Water Immersion	300% min
Flow Resistance (one inch wide overhead joint exposed to 135°F for 7 days)	No Flow
Storage Life	Indefinite
Application Temperature Range	10 to 125°F
Service Temperature Range	-20 to 200°F

PART 2D – REPLACEMENT MANHOLE FRAMES AND COVERS

2D.01 GENERAL

- A. New manhole covers and frames shall conform to the requirements of the City’s standard and standard details.
- B. Frames and covers shall be Neenah Foundry, Series R-1700 (heavy duty) or equivalent. Light duty covers shall not be used.
- C. Where manholes are located in flood plains, frames and covers shall be Neenah Foundry, Series R-1700 (heavy duty) or equivalent. Light duty covers shall not be used. The top surface of the frame and covers shall have bolt down lids with a watertight gasket.

2D.02 ELASTOMERIC CORBEL SEAL TO EXCLUDE RDI/I

- A. Provide a frame-to-manhole elastomeric seal consisting of a two component, aliphatic chemical curing, urethane sealant formulated as a high build coating to seal the casting to the manhole corbel. The purpose is to stop infiltration by the application of a corrosion resistant flexible coating to be applied to the inside wall. The corrosion resistant flexible urethane shall be Flex-Seal Utility Sealant as manufactured by Sealing Systems, Inc., Loretto, or approved equal.

B. Minimum Requirements for Flexible Aromatic Urethane Resin Liner Primer:

Hardness	ASTM-D2240 85 Brinell
Elongation	ASTM-D412 400%
Tensile Strength	ASTM-D412 3000 p.s.i.
Adhesive Strength	ASTM-D0903 3 50 lb./in.
Tear Resistance	ASTM-D1004 200 lb./in.

C. Minimum Requirements for Flexible Aromatic Urethane Resin Liner Final Coat:

Hardness	ASTM-D2240 50 Brinell
Elongation	ASTM-D412 750 %
Tensile Strength	ASTM-D412 1100 p.s.i.
Adhesive Strength	ASTM-D0903 175 lb./in.
Tear Resistance	ASTM-DIO04 155 lb./in.

- D. Minimum Final Thickness: 80 mils.

PART 2E – REPLACEMENT MANHOLES

2E.01 GENERAL

- A. New manholes shall conform to the requirements of Section 02730 and the City's standard details.

PART 3 – EXECUTION

3.01 PERFORMANCE REQUIREMENTS

- A. Perform work needed to make manholes structurally sound, improve flow, prevent entrance of inflow or groundwater infiltration, and prevent entrance of soil or debris.
- B. Existing manhole shall be Preconditioned and Cleaned prior to any and all rehabilitation work.

3.02 PROJECT CONDITIONS

- A. Manholes Containing Flow Monitoring Equipment:
1. Drawings may not show locations of flow monitoring equipment. If a manhole contains any mechanical hardware or electrical flow monitoring equipment, immediately notify the Engineer.
 2. Reschedule work in such manholes until equipment has been removed by the City and further instructions are given, at no additional cost.
 3. Do not subject manholes with mechanical hardware or electrical equipment to bypass or diversion pumping.
 4. Damage to installed equipment, due to Contractor's failure to adhere to the above, will be repaired by the City and cost of repairs charged to Contractor.

B. Field Location of Manholes:

1. Manholes may be located within project limits, which are not part of the system being rehabilitated. Properly identify manholes before starting work. No payment will be made for work in manholes not indicated on the Drawings or not directed in writing by the Engineer

3.03 SALVAGE

- A. Manhole covers and frames, as well as adjusting rings from abandoned, broken or adjusted manhole castings remain the property of the City. Deliver salvaged items to City's storage facility or as otherwise directed by the City at the conclusion of the project.

3.04 PROTECTION

- A. Provide barricades and warning lights and signs for excavations created by manhole casting work in accordance with the drawings.
- B. Do not allow sand, debris or runoff to enter sewer system.

3.05 EXCAVATION

- A. Excavate in accordance with City's Standard Specifications and Section 02200.
- B. Perform work in accordance with OSHA standards. Employ a trench safety system, as required for excavations.
- C. Install and operate necessary dewatering and surface water control measures as required.

3.06 FLOW BYPASS AND DIVERSION PUMPING

- A. Install and operate bypass and diversion pumping equipment to maintain sewage flow and to prevent backup or overflow in accordance with Specification Section 02750 – Wastewater Flow Controls.

3.07 LINERS

- A. General. The entire interior walls of manholes as designated on the drawings or instructed by the Engineer to be rehabilitated shall be lined with epoxy/epoxy mortar lining, cementitious lining or fiberglass lining system.
- B. All liners shall be installed in accordance with the manufacturer's written instructions.

3.08 EPOXY LINER

- A. Storage, mixing, application and curing procedures shall conform to the recommendations of the monolithic epoxy or epoxy mortar liner manufacturer. The epoxy or epoxy mortar may be spray, trowel or brush applied onto the interior surfaces of the manhole as recommended by the manufacturer.
- B. Surfaces shall be made free of oil, grease, water and other contaminants prior to application of the epoxy or epoxy mortar liner. An abrasive blast, high-pressure water blast, or acid etching shall be used to obtain a uniform sound substrate with a neutral pH prior to the application of the epoxy liner.
- C. After cleaning and prior to liner installation, all large voids and spalled areas shall be filled and patched with a suitable patching. The patching compound shall conform to the recommendations of the epoxy or epoxy mortar liner manufacturer.
- D. The epoxy or epoxy mortar lining system shall be installed to the manufacturer's recommended thickness and number of coat applications. No sagging of the liner on vertical surfaces shall be acceptable to the Engineer.
- E. The epoxy or epoxy mortar liner shall not be installed on surfaces in direct sunlight or when surfaces are subject to rising temperatures to prevent blistering of materials due to thermal expansion of trapped air or moisture in the substrate.

3.09 FIBERGLASS LINING SYSTEM

- A. After cleaning and prior to liner installation, all large voids and spalled areas shall be filled and patched with a suitable patching compound. The patching compound shall be as recommended by the lining system manufacturer.
- B. The installation of the lining system shall be in strict accordance with the manufacturer's written installation procedures.
- C. After the liner system is installed it shall be cut and trimmed. The completed product shall be a permanent, monolithic, lined and impervious structure shaped to the interior of the existing manhole. The manhole shaft lining systems shall be completely water tight and free of any joints or openings other than pipe inlets, pipe outlets and the rim opening.
- D. All defective areas and imperfections including, but not limited to, poor adhesion, excessive void, and air bubbles shall be repaired in strict conformance with the recommendation of the lining system manufacturer and subject to the approval of the Engineer.

3.10 CEMENTITIOUS LINER

- A. Storage, mixing, application and curing procedures shall conform to the recommendations of the cementitious liner manufacturer. The cementitious liner shall be spray applied using a low-pressure, progressive cavity type pump onto the interior surfaces of the manhole as recommended by the manufacturer. Guniting or “dry” applications will not be allowed.
- B. Surfaces shall be made free of oil, grease, water and other contaminants prior to application of the cementitious liner. An abrasive blast, high-pressure water blast, or acid etching shall be used to obtain a uniform sound substrate with a neutral pH prior to the application of the cementitious liner.
- C. After cleaning and prior to liner application, loose and protruding brick, mortar, or concrete shall be removed and all large voids and spalled areas shall be filled and patched with a suitable patching compound. The patching compound shall conform to the recommendations of the cementitious liner manufacturer.
- D. The cementitious lining system shall be installed to the manufacturer’s recommended thickness and number of coat applications up to one-inch (1”) thickness, but not less than one-half-inch (1/2”) thickness. The finished surface shall then be trowel-finished and/or brush-finished to a relatively smooth finish.
- E. The freshly applied liner shall be protected from high-velocity surface drying or air movement.

3.11 MANHOLE BENCHES/THROUGH-FLOW CHANNELS

- A. Formation of Through-Flow Channel:
 - 1. Remove obstructions and loose materials from benches prior to shaping the through flow channel. Form a smooth, U-shaped channel having a minimum depth of one pipe diameter and channel it across the floor of the manhole using an approved manhole rehabilitation material as specified in Part 2. Control flow to allow sufficient setting time for material used.
 - 2. Form a smooth transition with a reshaped channel and a raised manhole bench to eliminate sharp edges of pipe and concrete bench. Build up and smooth through flow channel of manhole to match flow line of pipe.
 - 3. Make finished benches and through flow channels smooth and without defects which would allow for accumulation of debris.
- B. Remedial Work to Existing Manhole:

1. Exposed reinforcement shall be sand blasted, epoxy primed and protected by a premixed non-shrink cement-based patching material consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating agents, which has been formulated for vertical or overhead use. It shall not contain chlorides, gypsums, plasters, iron particles, aluminum powder, or gas forming agents or promote the corrosion of steel it may come into contact with.

C. Connection of Pipelines to Replacement Manholes:

1. In connecting pipelines to replacement manholes, the Contractor shall ensure that the connections are watertight and that the existing sewers and replacement manholes are not damaged.
2. The Contractor shall ensure that there is no interruption to existing flows during the connection works.
3. The Contractor shall adjust replacement manhole benchings and bases to accommodate existing pipelines to ensure a continuous invert without steps.
4. All connections into manholes shall be designed and installed so as to ensure that groundwater is not permitted to enter the confines of the sewer or manhole. The Contractor shall submit proposals together with any material specification for making fully sealed connections into replacement manholes to the Engineer for approval.

3.12 REPLACEMENT MANHOLE FRAMES AND COVERS

- A. Adjust all manhole frames and covers above or at grade, reset loose frames, and install elastomeric corbel seal.
- B. Where manholes are constructed in paved areas, the frame and cover shall be combined with brick work or cast iron adjustment rings so that the elevation of the top surface of the installed casting cover is flush with the surrounding pavement constructed to the exact slope, crown and grade of the existing adjacent pavement. Manholes in locally low-lying areas, where surface water may collect, may incorporate self-sealing covers or manhole inserts as directed by the Engineer. Inside surface of all manhole cover frames shall incorporate the unique 3-digit manhole number corresponding to the City's GIS identification number. The number shall be stenciled with 1.5-inch high epoxy painted figures on surface prepared to manufacturer's requirements. For example, if the 11-digit manhole number is 23250111401, the number 114 will be stenciled on the inside surface of the frame.

- C. Where manholes are constructed in paved areas in flood plains, the frame and covers shall have bolt down lids with a watertight gasket. The frame and cover shall be combined with brick work or cast iron adjustment rings so that the top surface of the installed casting cover is flush with the surrounding pavement constructed to the exact slope, crown and grade of the existing adjacent pavement. Inside surface of all manhole cover frames shall incorporate the unique 3-digit manhole number corresponding to the City's GIS identification number. The number shall be stenciled with 1.5-inch high epoxy painted figures on surface prepared to manufacturers requirements or as directed by the Engineer.
- D. Where manholes are constructed in non-pavement areas in flood plains or otherwise, the top surface of the frame and covers shall have bolt down lids with a watertight gasket, as directed by the Engineer. Manhole frame and covers in the wooded or un-maintained areas shall be 30-inches above grade when combined with brick work or cast iron adjustment rings. Manholes in grassed areas maintained as lawns etc., shall be adjusted to be flush with the ground unless otherwise directed. The inside surface of all manhole cover frames shall incorporate the unique 3-digit manhole number corresponding to the City's GIS identification number. The number be shall stenciled with 1.5-inch high epoxy painted figures on surface prepared to manufacturers requirements or as directed by the Engineer.

3.13 MANHOLE RAISING/ADJUSTMENT TO GRADE

- A. The Contractor shall utilize maps, surveys, sounding instruments, or information from local residents to determine approximate location of buried manholes. Manholes shall be exposed utilizing hand techniques or by carefully probing with mechanical equipment. Manhole exposure in paved areas shall be accomplished by making a square cut in the surface with sufficient width to allow for the excavation of the material around the manhole to expose it to a depth necessary to facilitate adjustments.
- B. Manhole adjustment to grade is defined as raising the manhole cover (lid) elevation to grade by removing the casting frame, building up the manhole chimney to a maximum of 12 inches, then re-installing the frame and cover. The chimney may be built-up using brick and mortar or pre-cast concrete grade rings conforming to the requirements of this Section. Brick and mortar shall be used for manholes constructed of brick. Concrete grade rings shall be used for manholes constructed of concrete. A maximum adjustment of 12 inches will be allowed using brick and mortar or concrete grade rings between the bottom of the casting frame and the top of the cone section. [Note: The 12-inches maximum is a cumulative limit – any existing brick or concrete in place between the frame and cone shall be included in the measurement of the allowable 12-inches.] Non-shrink mortar shall be applied to create a smooth finish on the interior and exterior prior to backfill. Cast iron adjusting rings may be used for either brick or concrete manholes to raise the cover (lid) at the top of the frame, if necessary for final

adjustment. Up to two (2) inches of cast iron adjusting rings may be installed on a given manhole. No more than two (2) adjusting rings in total shall be used.

- C. Manhole raising to grade is defined as raising the manhole cover (lid) to grade by removing the casting frame, chimney and cone section, then rebuilding the manhole (with new components) up to grade in accordance with the Contract Drawings. Should any part(s) of the manhole below the cone be deemed incompatible with the new manhole components, then the entire manhole shall be removed and replaced to grade.

3.14 ELASTOMERIC CORBEL SEAL TO EXCLUDE RDI/I

- A. The surfaces on which the elastomeric seal is to be installed shall be circular, clean, reasonably smooth and free of any loose material and excessive voids. If the surface is rough or irregular and would not provide an effective seal, it shall be smoothed with an approved microsilica enhanced grout. Any flaw or flaws in the manhole frame such as cracks, pits or protrusions, shall be repaired by filling with concrete or grinding smooth. This type of surface work will need to be done on manholes that have not been lined. Manholes that have been lined should not need any surface work in order to install the seal.
- B. Installation of seal shall be as directed by the manufacturer's installation instructions. A manufacturer's representative will train the Contractor in the proper method of installing the seal and will assist the Contractor with any problems they might encounter installing the seals.
- C. Frame to manhole seals shall be installed in such a manner that will prevent water migration between the manhole frame and manhole structure.
- D. The lower 3 inches on the casting frame and top 3 inches of the corbel must be prepared according to the manufacturer's instructions. The corbel/casting interface area shall receive a thickened flexible urethane to achieve a thickness of 80 mils to 120 mils. The seal shall be applied by spray, brush, or trowel 3 inches above the bottom of the frame, and shall cover the entire area to 3 inches below the lowest of bottom of the frame or lowest adjusting ring.

3.15 INSPECTION AND TESTING OF COMPLETED MANHOLE

- A. After manhole sealing or manhole lining has been completed, the surface of the installed liner shall be cleaned and prepared to permit visual inspection. Visually inspect the manhole in the presence of the Engineer. Check for cleanliness and for elimination of active leaks.

- B. Assist Engineer in verifying installation of lining thickness and sounding. Test points on the manhole wall where directed by the Engineer. Repair verification points prior to final acceptance of payment. The finished surface shall be free of blisters, "runs" or "sags" or other indications of uneven lining thickness. No evidence of visible leaks shall be acceptable. All costs for verification and testing shall be included in the unit price for manhole rehabilitation.
- C. In addition, at the City's request, the Contractor may be required within one year to visually inspect the manholes that were sealed or lined. Any work that has become defective within the one-year period shall be redone by the Contractor at no additional expense to the City.
- D. Vacuum testing is required for all manholes lined. This test must meet all requirements of Section 02730. The Engineer must be present during the test. All costs for vacuum testing shall be included in the unit price for manhole rehabilitation.

3.16 REPLACEMENT OF EXISTING MANHOLE

- A. The Contractor shall replace manholes where shown on the Drawings, or as directed by the Engineer. The Contractor shall dispose of all materials from the removed manholes to a licensed landfill.

3.17 VACUUM TESTING

- A. Rehabilitated and/or replaced pipelines and manholes shall be vacuum tested and/or low air pressure tested to detect possible points of infiltration in accordance with Section 02730. All inlets to the system shall be effectively closed and any residual flow shall be deemed to be infiltration. The attached form shall be used to document the test results.
- B. The Contractor shall include the cost of the vacuum test in the unit prices for rehabilitation or replacement for the purposes of carrying out the vacuum/low-pressure air test and all the foregoing requirements of this paragraph.

PART 4 – WARRANTY

4.01 MATERIAL WARRANTY

- A. A written guarantee of 5 years submitted to the City for the specific project shall be provided by the Manufacturers of the manhole rehabilitation materials.

4.02 WORKMANSHIP WARRANTY

- A. A written guarantee of 2 years minimum shall be provided by the Contractor against any shortcoming in Workmanship.

(This page is intentionally blank)

ATTACHMENT A

MANHOLE LEAKAGE TEST RESULTS

VACUUM-AIR METHOD

(This page is intentionally blank)

MANHOLE LEAKAGE TEST RESULTS

VACUUM-AIR METHOD

Work Order Number: _____ Date: _____

Project Description: _____

Contractor: _____ *Manhole Diameter: _____

Specific Location of Test: _____

Manhole Depth 'A' From Flowline to Top of Cone(feet): _____

Initial Vacuum Gauge Reading: _____ **Must Be 10-inch Hg**

Time Test Must Be Conducted: _____ **In Seconds**

MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS AND DEPTHS			
Depth 'A' (feet)	Minimum Test Times with a 4 ft. Diameter	Minimum Test Times with a 5 ft. Diameter	Minimum Test Times with a 6 ft. Diameter
8	20	28	33
10	25	33	41
12	30	39	49
14	35	48	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

Final Vacuum Gauge Reading: _____ **Inches of Hg**

Is Final Vacuum Gauge Reading greater than or equal to 9" of Hg? **YES** or **NO**

Mark One:

If YES is marked above, the test has

If NO is marked above, the test has

PASSED

FAILED

Inspector's Signature: _____

- A. Per Manufacturer of Vacuum Test Unit. For a 60-inch Manhole Over 30 ft. deep, add 6.5 seconds for each 2-feet over 24-feet. depth to a base time of 78 seconds. Therefore, $(((\text{Depth} - 24)/2) \times 6.5) + 78 = \text{Test Time In Seconds}$.

+++END OF SECTION 02491+++

SECTION 02511
Preconditioning and Cleaning Manholes and Sewers

PART 1 – GENERAL

1.01 SCOPE

A. The objective of preconditioning and cleaning is to maximize sewer and manhole service efficiency and effectiveness. Preconditioning and cleaning involves removal of silt, which is defined as any and all solid or semi-solid materials, including fine and granular material, such as sand, grit, gravel, and rock as well as debris, grease, oil, sludge, slime, or any other loose material or encrustation lodged in the manhole or sewer. Preconditioning and cleaning also involves removal of invading roots, corroded concrete, corroded manhole rungs, corroded ladders, intruding laterals and any other extraneous debris. Two levels of performance concerning preconditioning and cleaning of manholes and sewers shall be adhered to in this contract, as directed:

1. Preconditioning and cleaning as a general level of service; this requires that manholes and sewers shall be considered preconditioned and cleaned if:
 - a. Silt is removed and disposed of to a nominal depth of not more than 10% of the through flow channel in manholes, or sewer between manholes, where the through flow channel or sewer has an equivalent diameter up to and including 24-inches.
 - b. Silt is removed and disposed of to a nominal depth of not more than 5% of the through flow channel in manholes or sewer between manholes, where the through flow channel or sewer has an equivalent diameter greater than 24-inches.
 - c. No surface or appurtenance in manholes including walls, cones, slabs (both intermediate and roof slabs), rungs and benches and drop shafts shall have any remnant of silt, coating, loose bricks, unsound concrete or mortar or loose material.
 - d. All roots, corroded concrete, corroded rungs, corroded ladders and intruding laterals are treated or reduced and cut flush with the interior surface of manholes and sewers, removed and disposed of.

Fulfillment of these requirements (e.g., depth of silt or cleanliness of surface) is to be determined by internal manhole and sewer condition survey or inspection of each manhole and sewer length preconditioned or cleaned as directed.

2. Preconditioning and cleaning prior to rehabilitation and repair; which requires that manholes and sewers shall be considered preconditioned and cleaned if, in addition to the requirements of Section 1.01.A.1 above, all silt has been removed from a minimum of 95% of the through flow channel and sewer cross section. In the case of manholes, all surfaces shall be free of cleaning agents and their reactant products. Fulfillment of these requirements is to be established by internal manhole and sewer condition survey or inspection of each manhole and sewer length preconditioned or cleansed as directed.
- B. The Contractor shall precondition and clean the manholes and sewers selected by the Engineer or specified herein so as to remove all silt, debris, roots, corroded concrete, corroded rungs and ladders, intruding laterals, etc., and dispose of the material at an approved site.
 - C. During preconditioning and cleaning work and all other associated Contractor operations, sewer services shall be maintained at all times. This requirement may be relaxed only with the written approval of the Engineer.
 - D. The manholes and sewers to be preconditioned and cleaned convey sanitary sewage or combined sewage. In many instances such sewers are subject to high flows, either continuously or in a periodically varying cycle, due to rainfall, infiltration, and/or pumping operations. The Contractor shall include in his bid provisions for dealing with such variations, and where necessary, schedule his Work to accommodate such variation in flows.

1.02 REGULATORY REQUIREMENTS

- A. The Work of this Section shall comply with the current versions, with revisions, of the following: OSHA 29 CFR 1910.146 (permit-required confined-space regulations)
- B. All work and testing shall comply with the applicable Federal codes, including Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and applicable state and local codes and standards; and to the extent applicable with the requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

1.03 EXPERIENCED WORKERS

- A. All crew chief(s) responsible for preconditioning and cleaning work shall have a minimum of 3 years previous experience in preconditioning, cleaning and related activities including:
 1. Use of gas safety monitors/detectors/testers
 2. Safe working in confined spaces

3. Utilization of hydraulic pressure jetting/water blasting in sewers and confined spaces
 4. Utilization of root cutters and/or root treatment using chemicals
 5. Utilization of a wide range of cleaning nozzles in widely differing conditions
- B. The Contractor shall provide the Engineer with written documentation that all workers on site meet these experience requirements. This documentation shall include a list of projects on which each individual worked and client name and telephone number for each reference.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION OF THE WORK

3.01 GENERAL

- A. Preconditioning and cleaning works shall be carried out from the downstream access manhole or chamber to the upstream access manhole or chamber and shall entirely comply with the performance requirements defined in the relevant sub-clause of clause 1.01 above.

3.02 WORKING AREA

- A. The working area in which machinery and equipment operates is to be kept to a minimum. Equipment not in use shall be removed from the work site so as to minimize disruption to traffic and the general public.
- B. The working area is to be free from silt and debris when the Contractor leaves the site at the end of each visit.
- C. Open manholes, machinery and standing equipment shall be protected at all times.

3.03 LOCATION

- A. The locations of sewers included in the Work are indicated in the Drawings.

3.04 NOISE CONTROL

- A. All work activities for preconditioning and cleaning sewers and manholes shall comply with the requirements of SC-11.6. The Contractor shall employ the “best practicable means” to minimize and mitigate noise as well as vibration resulting from operations. Mitigation measures shall include the utilization of sound

suppression devices on all equipment and machinery particularly in residential areas and in the near vicinity of hospitals and schools, especially at night.

3.05 FENCING

- A. All unattended open manholes and working areas shall be provided with temporary fencing and/or barriers meeting applicable Federal, State, and City of Atlanta standards and subject to the approval of the Engineer.

3.06 WORKING HOURS

- A. Work hours are per the General Conditions of the Contract Agreement. No work shall be carried out at any other time including Saturday, Sunday and holidays without permission in writing from the Engineer except when the work is unavoidable or necessary for the saving of life or protection of property. In such case the Contractor shall immediately notify the Engineer.
- B. Work on principal highways and major roads shall be restricted to certain hours as directed by the Engineer and/or specified herein. The Contractor will be compensated through the appropriate Task Allowance for additional costs incurred when work hours are restricted.

3.07 SCHEDULING OF WORK

- A. After discussion with the Engineer, the Contractor shall prepare and submit a schedule of work that will meet the requirements of the City and the limitations imposed under the Contract Documents. The Contractor shall follow the approved schedule as specified in the General Conditions of the Contract.

3.08 PROLONGED ABSENCE FROM SITE

- A. If the Contractor will be absent from the work site, or part of the work site, for a prolonged period, he shall inform the Engineer, replace manhole covers, and clear any roadways of his equipment and materials, including temporary traffic control measures he may be using.

3.09 OPERATIONAL REQUIREMENTS

- A. Each preconditioning and cleaning unit and each CCTV/sonar unit shall carry sufficient numbers of guides and rollers such that, when cleaning and inspecting or surveying, all bonds (e.g. metal winch cable) are supported away from sewer and manhole structures.
- B. Each preconditioning and cleaning unit shall carry a range of flow control equipment, as opposed to bypass pumping equipment, for use in controlling the flow

during the work. A minimum of one item of each size of equipment ranging from 4-inch to 24-inch diameter inclusive shall be carried.

- C. The system of silt and debris removal shall be capable of operating in such a way as to minimize the obstruction to sewer flows and preconditioning and cleaning operations.
- D. Basements, homes and all other vulnerable property shall be prevented from being flooded where hydraulic preconditioning and cleaning methods are used to precondition and clean manholes and sewers.
- E. The Contractor shall make his own arrangements for the secure “off road” overnight parking of his vehicles and cleaning equipment and shall comply with all relevant statutory traffic regulations and local laws.

3.10 HANDLING AND DISPOSAL OF REMOVED MATERIAL

- A. The Contractor shall remove all silt, debris, detritus, etc. resulting from all manhole and sewer preconditioning and cleaning activities at least once each working day. Such material shall be caught and collected in a suitable trap, weir, or dam within the manhole or chamber being preconditioned and cleaned and/or at the downstream manhole of the sewer segment being preconditioned and cleaned. The Contractor shall ensure that the capture method or methods used effectively prevent silt migration downstream. Descriptions of such methods, including details of the equipment used, shall be provided to the Engineer on request.
- B. All material removed from sewers and manholes shall be deposited in suitable closed watertight containers such that the total amount removed can be easily measured if required. The Contractor is to give the Engineer such assistance as may be necessary in carrying out this measurement work.
- C. The type and capacity of containers to be employed for the holding and transport of the removed materials shall be determined by the Contractor. The Contractor shall not accumulate or store debris, silt, and/or liquid waste or sludge on site. Under no circumstances shall sewage, silt or solids be dumped onto the ground surface, ditches, catch basins or storm drains.
- D. The Contractor’s work procedures shall be such that sewer preconditioning and cleaning work is not delayed by a lack of an empty container in which to deposit the materials removed from the sewer.
- E. The Contractor is advised that it may not always be possible for the container to be positioned immediately adjacent to the manhole from which materials are being removed and that “double handling” of the materials may be necessary. The Contractor shall provide for such “double handling” to be carried out safely and efficiently at no additional cost to the City.

- F. The Contractor must make his own arrangements for the proper disposal of materials removed from the sewer. The disposal site must be licensed to accept such materials and must be approved by the Engineer prior to commencement of the work. The Contractor shall be responsible for obtaining all necessary disposal permits and for complying with all state and City regulations for handling silt laden sewage.
- G. All costs associated with disposal permitting and silt handling must be included in the Contractor's rates for work.
- H. The containers for the disposal of materials removed from sewers and manholes shall be routed through an approved weigh station and a copy of each weight ticket submitted to the Engineer. Such tickets shall be used to determine the quantities of materials removed.

3.12 WATER SUPPLY

- A. Prior to the commencement of work, the Contractor shall locate all hydrants from which water may be obtained.
- B. The Contractor is responsible for making his own arrangements for obtaining water for the work, and he shall comply with all local conditions regarding the use of construction and flushing water. Such arrangements shall be approved by the Engineer prior to commencement of work.
- C. All details of the point of water connection, backflow protection, conveyance methods, draw-off rates, times and all local conditions regarding the use of water shall be approved by the Engineer prior to commencement of work. All equipment, labor, and material required for obtaining water for the work shall be provided by the Contractor.
- D. The Contractor shall provide constant attendance when water is being drawn off any hydrant.
- E. The Contractor must ensure that a 12-inch minimum air gap is maintained at the supply point on desilting/cleaning/jetting equipment or any other receiving apparatus.
- F. The use of any standpipe or hydrant, which has not been approved by the Engineer, is expressly forbidden.

3.13 TRAVEL

- A. The cost of all travel required in the completion of the specified work shall be included in the Contractor's rates for work.

- B. The cost of travel required for the completion of extra work for which unit costs are not included in the Contract shall be at rates documented in writing by the Contractor.

3.14 SUPERVISION

- A. A responsible representative of the Contractor shall be present on the site of the work, or other location approved by the Engineer, to provide supervision of the work. At all times, and especially when a change of work location is underway, the Contractor's representative shall keep the Engineer continuously aware of the location, progress, planned execution of the work, and problems encountered.

3.15 COMMUNICATION

- A. The Contractor's on-site representative directly responsible for the work shall be immediately reachable at any time during the normal working day and shall immediately respond to all questions and directions by the Engineer.
- B. Adequate means of communication by telephone, portable radio, or other electronic means of communication must be maintained at all times as part of the routine work methodology and in case of an emergency, between all points of activity along the length of the sewer being preconditioned and cleaned.

3.16 DAMAGE TO MANHOLES OR SEWERS CAUSED BY CONTRACTOR

- A. The Contractor shall use special care in his work methods and take all necessary precautions against improper use of the preconditioning and cleaning equipment to avoid damaging the sewer and/or manholes being preconditioned and cleaned. If in the Engineer's opinion, the Contractor's work has caused damage to the manhole or sewer, the Contractor shall repair the damage to the complete satisfaction of the Engineer at no additional cost to the City.

3.17 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

- A. It shall be the responsibility of the Contractor to schedule and perform his Work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.
- B. In the event that the Contractor Work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the designated Engineer in a timely manner, all in accordance with the City's Emergency Response Plan.

- C. Contractor will indemnify and hold harmless the City for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the City in defending such fines and claims

PART 4A – GENERAL TECHNICAL EQUIPMENT SPECIFICATION - SEWERS

4A.01 GENERAL

- A. The Contractor shall certify that sufficient cleaning units can be provided, including standby units in the event of breakdown, in order to complete the work within the contract period. Further, the Contractor shall certify that standby or back-up equipment can be delivered to the site within 48 hours in the event of equipment breakdown.
- B. The cleaning unit(s) shall be capable of operating routinely, up to a minimum of 500-feet from the point of access to the sewer.
- C. Each cleaning unit shall carry a mobile telephone to facilitate communication with the Engineer and to comply with relevant safety requirements defined in the safe working procedures approved by the Engineer for the execution of the work.

4A.02 CCTV AND SONAR INSPECTION/SURVEY UNITS

All CCTV and sonar survey units shall be approved by the Engineer prior to use.

4A.03 WINCHING EQUIPMENT

- A. Winching equipment shall be sufficient for the purposes of attaining the degree of cleanliness specified in Section 1.01A
- B. The Contractor shall provide conventional power winching equipment and all associated equipment, including winching buckets, balls, breakers, kites, scooters, scrapers, tires, tools and safety apparatus. Complete details of equipment proposed for use in preconditioning and cleaning shall be provided to the Engineer before work commences.
- C. Dredging of sewers shall be undertaken by passing various sized buckets, balls, breakers, kites, scooters, scrapers, tires etc, through the sewers to physically remove accumulated silt, sludge and other debris. Where conditions dictate, power boring equipment and/or winching equipment shall be used to loosen the silt prior to its removal. All necessary equipment including cables, lines, and tools must be available at all times as required.

- D. The equipment shall be capable of operating efficiently and effectively in the sizes of sewers and depth included in the project at distances of up to 500-feet between adjacent manholes.
- E. The project sewers convey sanitary sewage, storm water, or combined sewage flows. Certain Sections of sewer may be flowing entirely full or in a surcharged condition and the Contractor must be prepared at all times to use manual pushing rods, mechanical boring equipment or other methods to pass a leading line through the sewer prior to commencing dredging operations with winching.
- F. Any item of CONTRACTOR plant or equipment associated with the Work, which may cause obstruction to the flow in the sewer, shall be removed from the sewer at the close of work each day. It shall be permitted to leave a line or winching cable through the sewer during breaks in the work.
- G. Dredging operations in a particular Section of sewer will generally proceed in a downstream direction, working between consecutive manholes using winch buckets of sizes stated below.
- H. The size of winch bucket used in sewers up to 48" shall be 90% of the sewer bore up to a maximum of 24". It is anticipated that buckets of smaller sizes than those stated will need to be winched through Sections of sewer prior to the use of the maximum sizes. The maximum size bucket as stated may be varied at the discretion of the Engineer. However, no buckets larger than these maximum sizes specified shall be used without the approval of the Engineer.
- I. The Contractor is advised that use of the maximum size buckets listed above may not be practical due to restricted access through manhole covers and other access points. The Contractor shall ensure that his working procedures will not be unduly affected by such restrictions and shall allow for inefficiencies due to all such restrictions in his unit rates.
- J. The winches used to draw buckets, balls, breakers, scooters, scrapers, or tires shall be power driven. They shall incorporate a torque-limiting device to prevent the breaking of winching lines in case the line becomes jammed by obstructions.
- K. Where the operational cleaning equipment is towed by winch and bond through the sewer, all winches shall be stable with either lockable or ratcheted drums. All bonds shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the equipment. All winches shall be inherently stable under loaded conditions.

4A.04 PRESSURE JETTING EQUIPMENT

- A. Pressure jetting equipment used shall be sufficient for the purposes of attaining the degree of cleanliness in sewers and manholes as specified in Section 1.01.

- B. Jetting units in sewers must be capable of jetting a minimum distance of 500-feet either upstream or downstream from a manhole. Minimum nominal hose size shall be one-inch diameter.
- C. The Contractor's unit prices specified in the bid form shall include jetting in sewers both upstream and downstream.
- D. Successive passes using constantly moving pressure jetting techniques shall be applied to sewers until they are cleaned to the level specified. Nozzle hold-time (stationary time), for any particular location, shall not be more than 60 seconds in order to forestall damage to the pipe being cleaned. Nozzles shall have jet angles of between 30° to 45°. “High efficiency nozzles” (discharging “pencil jets”) with jet angles higher than this figure shall not be allowed to be stationary at any time.
- E. Silt shall be collected at manholes as specified herein. No silt shall be allowed to pass beyond the Section of sewer being cleaned.
- F. Pass rates (rewind speed) for the jetting head shall be at a consistent speed without jerking and excessive variations. Typical pass rates shall be 4 inches to 8 inches per second. The hose reel shall be power driven in the rewind direction.
- G. Manual pressure jetting within manholes shall not be allowed. Progress towards the desired level of service specified in manholes may be monitored by a stem linked TV camera. Manhole pressure jetting for the purpose of cleaning or preconditioning shall be executed either:
 - 1. Manually from the ground surface, or
 - 2. Robotically within the manhole
- H. The Engineer shall be notified of the jetting equipment proposed by the Contractor in the bid documents. The jetting equipment will be operated utilizing the pressures specified unless otherwise noted elsewhere in the document. The proposed equipment shall be categorized from the following table:

TABLE 4.4.1

CATEGORY	MACHINE TYPE	CAPACITY (GALL/MINUTE)		PRESSURE (p.s.i.)	
		min	max	min	max
<u>Manholes</u>					
1	High pressure/low volume – trailers	1	35	3,000	10,000
2	High pressure/low volume – mini	9	35	3,000	10,000
3	High pressure/low volume – non HGV/HGV jetter/combination	9	35	3,000	5,000
<u>Sewers</u>					
4	Low pressure/high volume – HGV	30	50	1,500	2,000
5	Low pressure/high volume – combination	30	75	1,500	3,000
6	Low pressure/high volume – super combination	75	175	2,000	2,500
7	Low pressure/high volume – separate jumbo jetter/suction units	75	200	2,000	2,500
<u>Other</u>					

Notes for Table 4.4.1

1. The categories listed are typical only of the equipment for use in the present contract. Exceptions to the duty and equipment shown above will be allowed subject to appropriate notification and approval. The Contractor is required to complete the table with details of any other equipment proposed.
2. Discretion shall be used concerning the maximum pressure used for cleaning sewers. In general for asbestos cement, clay and concrete pipes cleaning pressures shall be limited to 5000 psi (340 bar). For brick sewers cleaning pressures shall be limited to 3500 psi (240 bar) For pitch fiber and plastic pipes cleaning pressures will be limited to 1500 psi (102 bar) and 2500 psi (170 bar) respectively.
3. Cleaning pressures in concrete manholes shall be limited to 5000 psi (340 bar). Cleaning pressures in new brickwork manholes shall be limited to 5000 psi (340 bar) and in old brickwork manholes to 3500 psi (240 bar).
4. Higher pre-conditioning pressures in sewers and manholes prior to rehabilitation may be allowed at the sole discretion of the Engineer. The

Engineer's agreement to use higher pressures shall not relieve the Contractor of his responsibilities for any resultant damage in accordance with the requirements of paragraph 3.16 above.

- I. Where a jetter is fitted with an airflow suction unit for removal of silt and other material from the sewer, it shall be capable of removing materials such as sludge, silt and bricks from depths up to 32-feet with minimum suction of 2500-cfm. A tank with a minimum capacity of 175-cf shall be provided and be capable of decanting collected liquids and conveying them back to the sewer. The suction hose of such a system shall have a minimum internal diameter of 6-inches.
- J. Jetting equipment shall be calibrated on an annual basis by an approved body and calibration certificates made available for inspection by the Engineer as requested. Such equipment shall be maintained on a regular basis in accordance with the manufacturer's Specification. The Contractor shall make available copies of his maintenance certificates and/or schedules to the Engineer as requested.
- K. An automatic pressure relief valve shall be incorporated on the pump discharge chamber to prevent the pressure exceeding the safe maximum for the system as a whole. This may take the form of a pressure relief valve of the bursting disc type in holder or an automatic pressure regulating valve (unloading valve).

NOTE: The maximum working pressure is the lowest value of the maximum working pressure ratings of all individual components of the system.

4A.05 AIR DRIVEN, ELECTRO-MECHANICAL AND/OR MECHANICAL PRE-CONDITIONING AND CLEANING TOOLS

- A. Where necessary, and additional to winching and pressure cleaning equipment, appropriate air driven, electrically driven and/or mechanical tools may be used to needle, hammer, scrape or grind off corroded concrete, scarify and remove compacted silt, chip-off spilt grout, detach encrustation, trim and cut laterals and roots, etc. The Contractor shall provide prior notification to the Engineer prior to the use of such equipment and techniques.

4A.06 VENTILATION OF CONFINED SPACES

- A. The Contractor shall provide, operate, maintain and subsequently remove on completion, adequate ventilation apparatus in the form of blowers and/or fans. The ventilation apparatus shall introduce a fresh air supply to support a safe environment for work in sewers, manholes and all other confined spaces, which shall be kept free from dangerous, toxic and/or explosive gases, whether generated from sewage, soil strata or other source.

PART 4B – GENERAL TECHNICAL EQUIPMENT SPECIFICATION - MANHOLES

4B.01 PRECONDITIONING AND CLEANING AS A GENERAL LEVEL OF SERVICE

- A. With the exception of the “through flow” channel, all surfaces shall be thoroughly cleaned using high pressure water with sufficient pressure (minimum force of 3500 psi.(240 bar)) to achieve the specified level of preparation. Preconditioning and cleaning shall include the removal of all roots, corroded concrete, corroded rungs, intruding laterals and any other extraneous, loose material, debris or foreign matter using air driven, electrically driven or mechanical equipment as specified.
- B. Before preconditioning and cleaning work commences, silt, sand and debris traps shall be installed at the entrance to the downstream sewer to capture all silt and debris material.

4B.02 PRECONDITIONING AND CLEANING PRIOR TO REHABILITATION AND REPAIR

- A. All concrete and masonry surfaces to be rehabilitated or repaired shall be meticulously cleaned by water blasting utilizing a 210°F steam unit and appropriate nozzles to provide a contamination-free and sound surface. Other methods, such as wet or dry sand blasting, acid wash, concrete cleansers, degreasers or mechanical means, may be required to completely clean the manhole surface prior to rehabilitation or repair.
- B. All surfaces on which preconditioning and cleaning methods outlined in Paragraph 4B.02.A above have been used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their reactant products before rehabilitation commences. Concrete surfaces shall be accepted for the purpose of rehabilitation when they are sound, surface dry, porous and free from dust, dirt, oil, grease, fat efflorescence, concrete hardening or sealing chemicals, previous coatings, rust, form-release agents, laitance, other penetrating contaminants, fins, surface projections, thin crusts, bridging voids, and loosely adhering concrete and dirt particles.
- C. All manhole “runner” and “gusher” infiltration leaks shall be sealed in areas where linings are to be installed. The Contractor will not be allowed to commence rehabilitation work until these leaks have been sealed to the satisfaction of the Engineer.
- D. Where required by the relevant manhole rehabilitation system, manhole surfaces to be rehabilitated shall have a pH of 7 to 10. Surfaces shall be tested in accordance with ASTM D4262.
- E. Where instructed by the Engineer, the Contractor shall test prepared surfaces by Swiss impact hammer or other physical method to determine soundness.

PART 5 – QUALITY CONTROL/PRECONDITIONING AND CLEANING REPORT

5.01 GENERAL

- A. A quality control video inspection of preconditioned and cleaned sewers shall be carried out as directed, immediately following completion of preconditioning and cleaning work. If a sewer or pipe line has not been preconditioned or cleaned as specified (by visual inspection, video review or field analysis) in the sole opinion of the Engineer, the sewer shall be re-preconditioned and cleaned in accordance with the Specification at no additional cost to the City.
- B. The Contractor shall supply one copy of inspection video for each reach of sewer completed.
- C. When required by the Engineer, the Contractor shall supply one copy of the full internal sewer condition assessment report. This Specification includes a sample report sheet also reproduced at the end of this Specification. The sample report sheet shall be accurately and fully adopted in format and in detail and submitted by the Contractor immediately following the QA/QC inspection.

5.02 DAILY LOG

- A. The Contractor shall provide a report of work completed each day. The report shall be submitted to the Engineer no later than one workday following completion of the work. The report shall contain a separate sheet for each manhole and sewer reach preconditioned. The report shall utilize the form provided at the end of this Specification.
- B. The Contractor shall immediately notify the Engineer of any material such as bricks, concrete or broken clay pipe appearing in the materials removed from the sewers and/or manholes during preconditioning and cleaning activities.

(EXAMPLE)
CONFINED ENTRY LOG
MANHOLE/ SEWER SAFETY CHECK
(TO BE COMPLETED DAILY)

Date: _____ Supervisor: _____ Vehicle No. _____

Time	Manhole No.	Manhole Location
1.		
2.		
3.		
4.		
5.		

Workers on site: _____
 (Underline those with safety training certification)

Safety Apparatus on Site: (tick)

- | | | |
|---|--|--|
| Multi Gas Monitor <input type="checkbox"/> | Lifting Harness <input type="checkbox"/> | Lifeline <input type="checkbox"/> |
| Helmet/ Safety Boots <input type="checkbox"/> | First Aid Kit <input type="checkbox"/> | Torch Light <input type="checkbox"/> |
| Aluminum Ladder (AL) <input type="checkbox"/> | Air Blower <input type="checkbox"/> | Breathing Apparatus <input type="checkbox"/> |
| Headphone <input type="checkbox"/> | Cell Phone <input type="checkbox"/> | |

Safety Check: (tick)

- | | |
|--|--|
| Manhole Vented by Blower? <input type="checkbox"/> | Manhole Tested for Gases? <input type="checkbox"/> |
| Oxygen Sufficiency OK? <input type="checkbox"/> | Protective Clothing Worn? <input type="checkbox"/> |
| Top Men Carrying BA? <input type="checkbox"/> | Ladder Used <input type="checkbox"/> |
| Traffic Signs and Cones OK? <input type="checkbox"/> | Blinkers and Beacons OK? <input type="checkbox"/> Site Plans? <input type="checkbox"/> |

Gas Monitoring Readings

Time	Hydrogen Sulfide Level		Oxygen Level %	Carbon Monoxide Level		Methane Level	
	Detected (PPM)	Not Detected		Detected (PPM)	Not Detected	Detected (PPM)	Not Detected

Manhole/ Sewer Safe to Enter? Yes No Incidents, if any: _____
 (Append Lengthy Description)
 Signature of Safety Officer/ Supervisor: _____ Date: _____

PRECONDITIONING & CLEANING REPORT SHEET FORM 'A'
(TO BE COMPLETED DAILY)

Date _____
Crew _____
Site _____

Sheet ____ of ____
Time of Arrival _____
Time of Departure _____

Location (Street No., Easement Site)	U/S Manhole (Ref)	D/S Manhole (Ref)	Sewer Length (feet)	Unit Highway (Yes/No)	in Sewer Material	Silt Depths @Manholes (inches)	Sewer Size (inches)	Length Cleaned (feet)	Upstream/ Downstream (U/S-D/S)	Comments	
Typical Comments (Initial)	Emergency (**EM**)	Urgent Repair (*UR*)	Bad Joints (BJ)	Excessive Silt/Grease (DES/DEG)	Intense Odor (O)	Concrete Debris (DECO)	Roots (Size) (R)	High Levels (HWL)	Clayware Debris (DEC)	Number of Laterals (Size) (CNI)	Intruding

Note: Continue on next line where extensive comments or space is required

Signed _____
(Engineers Representative)

Signed _____
(Contractors Representative)

+++ END OF SECTION +++

SECTION 02513
CONSTRUCTION OF SIDEWALKS, CURBS, RAMPS AND APRONS

PART 1 GENERAL

1.01 SCOPE

Concrete curb, curb and gutter, sidewalks, driveway aprons, and wheelchair ramps shall be constructed of Portland cement concrete prepared as described in Part 2 of this specification and placed in one course. Concrete shall be Class "A" unless otherwise specified on the plans.

PART 2 PRODUCTS

The materials and general placement procedures for concrete and masonry construction shall adhere to those stated in this section unless specifically changed by the special provisions, plans, or the engineer.

2.01 CONCRETE

- A. Concrete shall be composed of cement, fine aggregate, coarse aggregate, water, entrained air, and such admixtures as may be specified; proportioned and mixed to produce a plastic workable mix in accordance with the requirements of these specifications and supplemental special provisions and suitable for the specific conditions of placement .
1. Classification and Strength: Concrete shall be in three classifications. Minimum 28-day compressive strength and usage shall be as follows:
 - a. Class "A": Minimum compressive strength 3000 psi at 28-days shall be used for all reinforced concrete work, and for non-reinforced footings and slabs 8 inches or less in thickness, unless a higher strength is required by the plans.
 - b. Class "B": Minimum compressive strength 2200 psi at 28-days may be used for gravity type walls and for non-reinforced footings and slabs greater than 8 inches in thickness, unless a higher strength is required by the plans.
 - c. Class "C": Minimum compressive strength 1500 psi at 28-days shall be used for concrete sub-foundations, pipe envelopes, and for concrete backfill when required. Compressive strength of concrete at the age of

28-days shall be determined by breaking standard 6-inch diameter by 12-inch test cylinders in accordance with ASTM C-31 and C-39.

- B. Concrete - High Early Strength: Concrete made with high early strength Portland cement shall not be used unless specifically authorized by the engineer or otherwise called for in the plans. The compressive strength of such concrete, at the age of 7 days, shall be at least equal to the minimum 28-day compressive strengths for the class specified above. All other provisions of these specifications, except for cement, shall be applicable to such concrete.
- C. Concrete - Air Entrained: The suffix A/E shall indicate air entrainment required for the concrete mix specified. Compressive strength requirements will not change due to the presence of air entrainment. Compensation for strength loss due to A/E% shall be accomplished by adjustment of the water/cement ratio. Percent of air entrainment shall fall within the range 3% - 7% (with 4.5% being desirable) as determined by the volumetric method in ASTM C-231. Admixtures used to achieve air entrainment shall conform to ASTM C-260, except that admixtures used in reinforced concrete shall not contain chlorides.

2.01 BRICK

All brick used for adjusting manholes, flush tanks, and catch basins shall be hard No. 1 building brick, manufactured of clay or shale. Brick shall be uniform standard commercial size with straight, parallel edges and square corners, burned uniformly hard entirely through, and uniform in color with uniform abrasion resistance. All brick shall conform to ASTM C-32 and meet the minimum requirements of grade SM.

2.03 CEMENT

All cement used in the work shall conform to ASTM C-150, specification for Portland cement.

2.04 SAND

The sand shall be clean and sharp, free from all deleterious substances and shall conform to ASTM C-33.

2.05 COARSE AGGREGATE

Coarse aggregate shall be crushed stone of a quality equal to the best Stone Mountain Granite, of solid composition, free from dirt and adherent coatings, and suited for the class of its intended usage. Unless otherwise stated, gradation shall conform with size number 467, number 57, or number 67 as described in ASTM C-33. The nominal maximum size of coarse aggregate used in concrete shall not be larger than one-fifth of the narrowest dimension between sides of the forms, one-third of the depth of slabs,

three-fourths of the minimum clear spacing between reinforcing bars as described in ACI 68-50, Article 3.4.1.

2.06 STEEL REINFORCEMENT

All steel bars used for reinforcement must be intermediate grade, new billet steel and must meet the requirements of ASTM A-615 and be of a pattern per the details in Part V of this document.

2.07 MISCELLANEOUS STEEL

The contractor shall be required to furnish, in addition to the reinforcement shown on the plans, such support bars, tie bars, chairs, etc., as are needed to properly secure the reinforcing bars in place as intended on the plans and all dowels, splices, etc., which shall be of design acceptable to the engineer.

2.08 RUBBLE MASONRY

Rubble stone masonry, when required, shall be built of sound and durable quarried stone, of shape and form to make neat and substantial work of this class. Stone shall be thoroughly cleaned of soil and dust and be bedded in cement mortar, every joint and space filled with mortar. No spalling under stone will be allowed. The headers must be of sufficient size and frequency to insure a strong bond. No stone shall have more "build" than "bed." Mortar shall be as specified in Section 1.10. Size of stone shall be the same as that specified for rip rap in Section 1.09.

2.09 STONE FOR RIPRAP

Stone for riprap shall consist of rough unhewn quarry granite as nearly in rectangular section as is practical. The minimum thickness of stone shall be 9" with more than 70% in any load having, a minimum dimension of twelve (12") inches. All stone shall weigh between 75 and 150 pounds. All rip rap shall be hand placed as a loose stone embankment or grouted in place as indicated on the plans or as directed by the engineer.

2.10 MORTAR

Mortar and grout shall consist of fresh mixtures of one part Portland or Masonry cement to three parts of sand and water. Hydrated lime may be added when Portland cement is used, in amounts not exceeding 10 percent of the weight of cement. Materials shall be mixed dry until a uniform mixture is produced; after which enough water shall be added to produce the desired consistency. Mortar and grout, which has been mixed for more than 45 minutes, shall not be used. Retempering of mortar is not permitted.

Fine aggregate for mortar and grout shall consist of natural sand or manufactured sand having clean, hard, strong, durable, uncoated particles. Unless otherwise specified, gradation of fine aggregate for mortar and grout shall be as follows:

TOTAL % BY WEIGHT PASSING EACH SIEVE

U.S. STD.

No.4	No. 16	No. 50	No. 100
100%	90-100%	15-40%	0-10%

PART 3 EXECUTION

3.01 PLACING CONCRETE

Before concrete is placed, the depth and character of the foundations, the adequacy of forms and false work, the placing of steel and appurtenant work shall be inspected and approved by the engineer; such approval, however, shall not relieve the contractor of the responsibility to produce the finished work in accordance with plans and specifications. Preparation for placing concrete, and the handling and placing of concrete, shall be in accordance with the following:

- A. Preparation: All accumulated water and debris shall be removed from excavations, or from form work into which concrete is to be placed, and any flow of water into such places shall be diverted into side drains or sumps, so as to be removed without disturbing newly placed concrete. Forms, unless lined, shall be thoroughly wetted with water before concrete is placed so as to tighten joints and prevent leakage from the runways for buggies or wheelbarrows, if used, shall not be supported on form work. Concrete shall be conveyed in such a manner so as not to disturb forms or segregate the mix.
- B. Daylight Placing: All concrete shall be placed in daylight, and the placing of concrete in any portion of the work shall not be started if such work cannot be completed during daylight, unless otherwise specifically approved by the engineer. Such approval will not be given unless an adequate lighting system is provided.
- C. Cold Weather Placing: Concrete shall not be placed when the atmospheric temperature is below 35 degrees Fahrenheit. If after placing concrete the temperature drops below 35 degrees Fahrenheit, the contractor shall enclose, heat and protect the work in such a manner so as to keep the air surrounding the fresh concrete at a temperature of not less than 45 degrees Fahrenheit for a period of 5 days after concrete is placed. The contractor shall assume all risk connected with the placement and protection of concrete under the above, and should such concrete be unsatisfactory, it shall be rejected.

- D. Hot Weather Placing: At no time shall the temperature of the concrete at the point of discharge exceed 90° Fahrenheit. The contractor may reduce the concrete temperature by cooling one or more of the ingredients. Water may be refrigerated. Ice may be added to the mixing water on a pound for pound replacement basis, provided that all ice is melted prior to the addition of the water to the mix. Fogging or other suitable means may be used to cool the aggregate, provided that aggregate moisture contents are adjusted with the mixing water to insure no increase in the design water-cement ratio. When the atmospheric temperature is above 90° Fahrenheit, ready mix concrete shall be completely discharged within 60 minutes from the time water is added to the mix.

Forms and reinforcement steel shall be pre-wet, and the contractor shall have sufficient skilled personnel and equipment to place and finish the concrete without delay. The contractor may be required to furnish wind screens, to use water fogging, or other means to prevent moisture loss as directed by the engineer.

Curing shall be as specified in Section 3.09, except that if a pigmented curing compound is used, it shall be white.

- E. Handling: Concrete shall be transported from the mixer to the point of deposit by a bottom dump concrete bucket handled by a crane; by concrete buggies, wheelbarrows, pumping, conveyor belts or by such means, approved by the engineer, as the contractor may elect. In the event the quality of the concrete as it reaches the forms, or the method and placing thereof, in the opinion of the engineer, is not satisfactory, the contractor shall change his method of operation so as to place concrete in a satisfactory manner.
- F. Placing: Concrete shall be placed in such a manner so as to avoid the possibility of segregation or separation of aggregates, so as to avoid displacement of reinforcing, and to avoid coating or splattering the reinforcing steel which is in place with concrete, which may set before completion of the pour and tend to reduce bond. Troughs, pipes, hoppers and chutes and canvas trellis used in placing concrete shall be arranged and used so as to place the concrete in the manner specified. The placing of concrete with in form work caused thereby shall not exceed the design pressure thereof. Concrete shall be placed in continuous horizontal layers, the thickness of which, in general, shall not exceed 12 inches. In placing concrete, each batch and each layer shall be placed following the preceding batch or layer so closely that there will be no lines of separation or "cold joints" in the work. Care shall be used to fill each part of the forms by depositing concrete as near final position as possible. After the concrete has taken its initial set, care shall be taken to avoid jarring the form work or placing strain or vibration on the ends of projecting reinforcing bars.
1. Compaction: Concrete, if placed in layers, shall be compacted by the use of mechanical internal vibrating equipment supplemented by hand spading

with a steel splicing rod. Vibrating shall not be used to transport concrete within forms. Internal vibrators shall maintain a speed of at least 5000 impulses per minute when submerged in concrete. At least one spare vibrator shall be maintained on the job site as a relief. The duration of vibration shall be limited to that necessary for satisfactory consolidation, without causing objectionable segregation. The vibrator shall not be inserted into layers, which have begun to set.

2. Thin Section: All thin section work shall be thoroughly worked with a steel rod; faces shall be shaped and mortar flushed to the surface of the forms thereby. Small diameter holes shall be drilled in form work beneath large wall sleeves and inserts which have been set therein, to prevent the entrapment of air beneath such wall sleeves and inserts, when concrete is placed.
- G. Continuous Placement: The placement of concrete within any unit of the work, between construction joints, once begun shall continue without interruption so that the unit will be monolithic.
- H. Defective Work: Concrete shall be placed and compacted so as to form a dense, compact, impervious, artificial stone, with smooth faces on exposed surfaces. Any section of concrete work found to be porous, plastered, or otherwise defective, in the opinion of the engineer, shall be removed and replaced in whole or in part, as directed by the engineer, at the expense of the contractor.

3.02 JOINTS

The unit of operation between construction joints shall be as shown on the drawings or as directed by the engineer. Concrete shall be placed continuously within the unit, as specified in the paragraph above, so that the unit will be monolithic. At least 72 hours shall elapse between casting of adjoining units, unless otherwise approved by the engineer.

- A. Construction Joints in Footings and Walls: Construction joints in footings and walls, required for proper execution of the work, and not shown on the drawings, shall be located, as directed by the engineer, across regions of low stress so as to least impair the strength and appearance of the work. Special provisions shall be made for joining successive units, as shown on the drawings and as directed by the engineer.
- B. Construction Joints in Slabs: Construction joints in slabs, required for proper execution of the work, and not shown on the drawings shall be located as directed by the engineer. Special provisions, including concrete footing for construction joints in slabs on earth, shall be made for joining successive units, as indicated on the drawings and as may as may be directed by the engineer.

- C. Expansion Joints: Expansion joints, when required, shall be located as indicated on the drawings and constructed in accordance with details thereon.
- D. Keys: Keys shall be constructed in all construction joints, as indicated on the drawings, and as directed by the engineer.
- E. Water Stops: Where indicated on the plans or at construction joints subject to water pressure, water stops shall be installed for the full length of the joint. Water stops shall be either 6" x 1/8" steel plates or 9" x 1/2" rubber or polyvinyl chloride. P. V. C. and rubber water stops shall be spliced in accordance with the suppliers recommendations while steel water stops shall be spliced by welding.

3.03 BONDING CONCRETE WORK

Bonding new concrete work, to be placed on or against new concrete work, shall be in accordance with the following:

- A. Bonding to New Concrete: Before placing new concrete work on or against new concrete work which has recently set, the surfaces of such work shall be thoroughly roughened and cleaned of all foreign matter and laitance, forms placed or tightened and the surfaces slushed with grout. New concrete shall be placed before grout has attained its initial set. All such work shall be done in such a manner to insure complete bonding.
 - 1. Grout: Grout for bonding to new concrete work shall be composed of 1 part Portland cement to 3 parts sand, and from 2 to 4 inches of such grout shall be applied horizontal construction joints.
- B. Bonding to old concrete shall be done in accordance with the plans.

3.04 WATERTIGHTNESS

Concrete required to be watertight shall be air entrained and be proportioned, mixed, and placed in strict accordance with these specifications. All concrete structures for holding or carrying water, or pits below ground level, shall be watertight, and a seepage loss of more than 1/4-inch depth in 24 hours will not be permitted when the water holding structures are filled. All exposed surfaces of water holding structures, and interiors of pits below ground water level, shall be free from visible damp spots or seepages before acceptance.

3.05 SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS

The preparation of natural, filled or excavated roadbed material prior to the placement of sub-base or base material, pavement, curbs and gutters, driveways, sidewalk, driveways, wheelchair ramps or other roadway structures shall conform to the following requirements:

- A. Preparation of Subgrade: Scarifying and cultivating will be required for dry soils which are impervious to the penetration of water, for soils which contain excessive amounts of moisture, for soils which are non-uniform in character, or when pavement is to be placed directly on the roadbed material. Unsuitable material found below the processing depth for subgrade specified herein shall be treated in accordance with Paragraph 3.05, Unsuitable Material.
After rough grading has been completed, when scarifying and cultivating are required, the roadbed shall be loosened to a depth of at least 6 inches. The loosened material shall then be worked to a finely divided condition *and all* rocks larger than 3 inches in diameter shall be removed. The moisture content shall be brought to optimum by the addition of water, by the addition and blending of dry suitable material or by the drying of existing material. The material shall then be compacted by approved equipment to the specified relative compaction.
- B. Relative Compaction: All relative compaction percentages refer to maximum dry density as determined by ASTM D-1557 (Modified Proctor). When pavement is to be placed directly on subgrade material, the top 6 inches of subgrade material shall be compacted to a relative compaction of 95%. When base or sub-base material, curb, gutter, driveways, or sidewalks are to be placed on subgrade material, the top 6 inches of such subgrade material shall be compacted to a relative compaction of 90%.
After compaction and trimming, the subgrade shall be firm, hard, and unyielding.
- C. Subgrade Tolerances: Subgrade for pavement, sidewalk, curb and gutter, driveways, or other roadway structures shall not vary more than 0.02 foot from the specified grade and cross section. Subgrade for sub-base or base material shall not vary more than 0.04 foot from the specified grade and cross section. Variations within the above specified tolerances shall be compensating so that the average grade and cross section are met.
- D. Grading of Areas Not to be Paved: Areas designated as "grade only" on the plans shall be graded to meet the tolerances for base subgrade. The surface shall be constructed to a straight grade from the finish pavement or curb elevations shown on the plans to the elevation of the existing ground at the extremities of the area to be graded.
- E. Adjustment of Manhole Frame and Cover Sets to Grade: Unless otherwise provided in the Measurement and Payment Section, the contractor shall adjust all utility manholes, vaults, frames and covers within the area to be graded or paved. Patching required as a result of reconstructing or adjusting all manhole and vault frames and covers shall be the responsibility of the contractor.

The contractor shall exercise the necessary caution to prevent debris from falling into manholes. In the event that debris should fall into a manhole, it shall be immediately removed.

- F. Payment: Payment for preparing a sub-grade will be considered as included in the item of work for which the sub-grade is prepared.

Payment for adjusting manhole frames and covers to grade, where the difference between the existing and final elevation of the top of the frame is less than one foot, will be made on the contract unit price for adjusting each manhole frame and cover.

If a provision for manhole adjustment or reconstruction is not made, payment for such work will be deemed to be included in other items of work.

3.06 CONSTRUCTION DETAILS

Concrete curb, curb and gutter, sidewalks, driveway aprons, and wheelchair ramps shall be constructed in strict accordance with the project plans or referenced standard plans on file in the City of Atlanta, Bureau of Highways and Streets.

3.07 FORMS

The forms shall be metal or wood, straight and free from warp, and of sufficient strength and section to resist springing during process of depositing concrete against them. If of wood, they shall be of approved section. The forms shall be of the full depth of the pavement, and shall be securely staked, braced and held firmly to the required line and grade. All forms shall be thoroughly cleaned and oiled before concrete is placed against them.

Form work shall be constructed and braced and shall be removed in accordance with the following:

- A. **Chamfer Strips:** Chamfer strips shall be placed in forms for all exterior corners.
- B. **Constructing and Bracing Forms:** Form work shall be built to conform to shape, lines, and dimensions of the concrete work as shown or indicated on the drawings: Forms shall be set to line and grade, and shall be braced, tied and secured so as to withstand placing of the concrete, and to maintain shape and position. Forms shall be tight and substantially assembled to prevent bulging, and to prevent leakage of concrete. Joints in form work shall be arranged vertically or horizontally. Temporary openings shall be arranged, where required, at the bottoms of wall forms and other necessary locations, to facilitate cleaning and inspection. Lumber used once in forms shall have nails removed and surfaces in

contact with concrete work thoroughly cleaned before re-use. All wall sleeves, inserts, and openings required in concrete work shall be properly set in form work. At all pipe connections to concrete structures, provide a formed socket for caulking or a poured-in-place bell at the face of the structure to match pipe.

- C. Shores: Shores shall be used as necessary; if adequate foundations for shores cannot be obtained, trussed supports shall be provided. Structural members and other work subjected to additional loads during construction shall be adequately shored to protect such work from distortion and/or damage.
- D. Removal of Forms: Forms shall not be removed until the member supported thereby has acquired sufficient strength to safely support its own weight and loads imposed on it. Tie rod clamps that are to be entirely removed from walls shall be loosened 24 hours after concrete has been placed. Standard snap ties shall be removed when forms are stripped, with care being taken to avoid damaging concrete surface. Cutting ties back from the face of the wall will not be permitted. Under normal conditions, the minimum time elapsing before the forms may be stripped shall be governed by the following schedule; however, the use of said schedule shall not relieve the contractor of his responsibility for the safety of the structure.

Slabs and Beams not on Grade	14 days
Columns and Pedestals	7 days
Walls and Vertical Faces not supporting other work	2 days

Wood forms shall be completely removed from all portions of the work so that no material will remain for termite infestation.

3.07 FINISHING

The pavement shall be neatly finished, floated and dressed to true and even plane, trowelling of surface being accomplished with wooden floats, and the surface shall be brushed to a true and even, but not a glassy or "slick" surface. All edges (except joints) shall be rounded to a one-half (1/2") inch radius by use of an edger tool. No coarse aggregate shall show on surface.

Transverse contraction joints shall be formed with a tool designed to form a groove one-fourth (1/4") inch deep in the sidewalk. All joint edges shall be rounded with a one-fourth (1/4") inch edger. Expansion joints shall be of material meeting approval of engineer, and shall be placed at locations requested by him. Joints shall be spaced at *all* driveway entrances (both sides) with no section more than one hundred (100) feet in length.

injure pavement, and if so injured, the entire section or sections shall be removed and properly restored. After removal of metal or wooden joints, the opening shall be poured and struck flush with surface using bitumen of crack filler type. Pre-fabricated expansion joint material of an approved type shall be permitted.

3.08 PROTECTION AND CURING

All new pavement shall be protected by the contractor for seventy-two (72) hours after finishing by covering the entire surface with wet burlap, canvas or sisal-craft paper, or by sprinkling during hot weather not less than three (3) times daily for three (3) consecutive days, beginning as soon as possible after pavement has been finished. In lieu of above, membrane curing compound may be applied immediately after finishing concrete.

The contractor shall keep pedestrian traffic off new pavement for a period of twenty-four (24) hours, and vehicular traffic off driveways for a period of three (3) days following the finishing of the pavement, and he shall be required, at his own expense, to remove and replace any work damaged by his failure to protect the same. He shall erect suitable barriers and provide adequate lighting until the public is permitted to use same.

Concrete freshly placed shall be protected from wash by rain and flowing water. Concrete shall not be allowed to dry out from the time it is placed until the expiration of the specified curing period. Methods of curing, unless otherwise approved by the engineer, shall be as follows:

- A. Wetting Concrete: Concrete shall be kept wet with clean water for a period of 7 days after placing. Each day forms are left in place will suffice for wetting.
- B. Leaving Forms in Place: Curing may be accomplished by leaving forms in place for a period of 7 days, and keeping such forms sufficiently wet to prevent opening of joints.
- C. Membrane Curing: In lieu of curing methods specified, the contractor, at his option, may use an approved membrane curing compound to seal water in concrete, except for surfaces which are to receive future concrete or mortar. The membrane shall be a pigmented type which will retain 97% of the moisture within concrete at a temperature of 135 °F. and a relative humidity of 3% in the first 24 hours. Curing compound shall be applied in accordance with the supplier's directions.

3.09 IMPERFECT OR DAMAGED WORK

Imperfect or damaged work or any work damaged before final acceptance shall be satisfactorily removed and replaced in accordance with requirements of the drawings and specifications. Removal and replacement of concrete work shall be done in such a manner that the strength of the structure will not be impaired.

3.10 CLEANING

Upon completion of work, all forms, equipment, protective covering and rubbish resulting therefrom shall be removed from the premises. Finished concrete surfaces shall be left in a condition satisfactory to the engineer.

3.11 MEASUREMENT AND PAYMENT

Payment for construction of concrete curb, curb and gutter, sidewalks, driveway aprons, and wheelchair ramps shall be as listed in Section 01025, Measurement and Payment.

+++ END OF SECTION 02513 +++

SECTION 02530
CONCRETE SEGMENTAL/INTERLOCKING RETAINING WALL SYSTEM

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Concrete segmental retaining wall units.

- B. Related Sections
 - 1. Section - Geosynthetic Wall Reinforcement
 - 2. Section - Backfill
 - 3. Section - Drainage Fill
 - 4. Section - Landscaping Turf
 - 5. Section - Drain Tile

1.02 REFERENCES

- A. American Society of Testing and Materials
 - 1. ASTM C1372-99a; Standard Specification for Segmental Retaining Wall Units
 - 2. ASTM C 1262-98; Standard Test Method for Evaluating the Freeze-Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units
 - 3. ASTM C698-91; Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb Rammer and 12-in. Drop, (Standard Proctor)
 - 4. ASTM D1557-91; Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb Rammer and 18-in. Drop, (Modified Proctor)
 - 5. ASTM D448-86; Standard Classification for Sizes of Aggregate for Road and Bridge Construction
 - 6. ASTM C 140-99b; Standard Test Methods of Sampling and Testing Concrete Masonry Units
 - 7. ASTM D 2922-96; Standard Test Method for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)
 - 8. ASTM D 1556-90; Standard Test Method for Density of Soil In Place by the Sand Cone Method
 - 9. ASTM D 2488-93; Standard Practice for Description and Identification of Soils, Visual-Manual Procedure (USCS; Unified Soil Classification System)

1.03 SUBMITTALS

- A. Submit the following:
 - 1. Supplier's literature: materials description
 - 2. Shop drawings: Retaining wall system design, including wall heights, geosynthetic reinforcement layout and drainage provisions. The shop drawings shall be signed by a registered professional engineer licensed in the State of Georgia.

3. Samples
 - a) Furnish (1) unit in the color and face pattern specified if requested by the architect/engineer. If approved, unit may be used in the finished work.
 - b) 12 inches square or larger piece of the geosynthetic reinforcement specified.
4. Test reports from an independent laboratory stating moisture absorption and compressive strength properties of the concrete wall units meet the project specifications when tested in accordance with ASTM C 140-96, Sections 6, 8 and 9.

1.04 Delivery, Storage And Handling

- A. To prevent damage, store above ground on wood pallets or blocking. Remove damaged or otherwise unsuitable material, when so determined, from the site.
 1. Faces of the concrete wall units shall be substantially free of chips, cracks and stains.
 2. Prevent excessive mud, wet cement, epoxy, and like material, which may affix themselves, from coming in contact with the materials.

1.05 EXTRA MATERIALS

- A. (3) replacement units identical to those installed on the project.

1.06 DEFINITIONS

- A. Geosynthetic reinforcement is a material specifically fabricated for use as soil reinforcement.
- B. Concrete retaining wall units are as detailed on the drawings and manufacture's literature.
- C. Drainage aggregate is a material used around and directly behind the concrete wall units.
- D. Backfill is the soil, which is used as fill behind the drainage aggregate and within the reinforced soil mass if applicable.
- E. Foundation soil is the soil mass supporting the leveling pad and reinforced zone of the retaining wall system.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete Retaining Wall Unit: "Anchor Diamond, Anchor Landmark Interlocking Retaining Wall Units," as manufactured by Pavestone Corp., or as manufactured by Versalock, or an approved equal.
 1. Concrete wall units shall meet requirements of ASTM C1372-97, except the maximum water absorption shall be limited to 7.0 percent and unit height dimensions shall not vary more than +/- 1/16 inch from that specified.
 2. Color as selected by engineer from supplier's standard selections.
 3. Face pattern: geometry: beveled or straight;
 4. Texture: smooth or split rock face.
 5. The concrete units shall include an integral concrete shear connection, flange/locator.

- B. Geosynthetic reinforcement: Polyester fiber geogrid, polyethylene expanded sheet geogrid, or polypropylene woven geotextile for use as soil reinforcement.
- C. Base: Material shall consist of drainage aggregate, sand and gravel and/or concrete as shown on the construction drawings. A minimum of 6 inches of compacted base is required.
- D. Drainage aggregate: Fill between units shall consist of free-draining, crushed coarse aggregate that meets the gradation requirements of ASTM 448-86; Standard Classification for Sizes of Aggregate for Road and Bridge Construction, designation 57, 67, 6, 7 or 8.
- E. Backfill: Materials are suitable non-organic soils at a moisture content which enables compaction to the specified densities. Unsuitable soils are organic soils and those soils with the USCS classification symbol of CH, OH, MH, OL, or PT. CL soils with a Plasticity Index (PI) greater than 25 are also considered unsuitable soils.
- F. Drain tile: The drainage collection pipe shall be a perforated or slotted PVC or corrugated HDPE pipe. The pipe may be covered with a geotextile filter fabric to function as a filter.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which the retaining wall is to be erected and notify the architect or civil engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected. Promptly notify the wall design engineer of any site conditions, which may affect wall performance or may require a reevaluation of the wall design.
- B. Foundation soil shall be examined by the project geotechnical engineer to ensure that the actual foundation soil strength meets or exceeds that required on the construction drawings.

3.02 EXCAVATION

- A. Excavate to the lines and grades shown on the construction drawings. Over-excavation not approved by the owner or duly appointed owner's representative shall not be paid for, and replacement with compacted fill and/or wall system components will be required at the contractor's expense. Do not disturb base beyond the lines shown. The contractor shall be responsible for the stability of the excavation and its influence on adjacent properties and structures.

3.03 FOUNDATION PREPARATION

- A. Foundation soil shall be excavated as required for footing or base dimension shown on the construction drawings, or as directed by the engineer.
- B. Soil not meeting the required strength shall be removed, sufficiently oversized from the front of the block and the back of the reinforcement and back-filled with suitable material.
- C. Over-excavated areas shall be filled with suitable compacted backfill.

3.04 BASE COURSE PREPARATION

- A. Base materials shall be placed as shown on the construction drawings with a minimum thickness of 6 inches.
- B. Base materials shall be installed upon undisturbed soils or foundation soils prepared in accordance with Section 3.03.
- C. Material shall be compacted so as to provide a level, hard surface on which to place the first course of units.
- D. Base materials shall be prepared to ensure complete contact of retaining wall unit. Gaps shall not be allowed.
- E. Base materials shall be to the depths and widths shown on the plans. Reduce the depth of sand and gravel and replace with a 1" to 2" concrete topping. Concrete shall be lean, unreinforced and a maximum of two inches thick. Where a reinforced footing is required, place below the frost line.

3.05 ERECTION

- A. First course of concrete wall units shall be placed on the prepared base material. Units shall be checked for level and alignment. The top of all units in base course shall be at the same elevation.
- B. Ensure that concrete wall units are in full contact with base.
- C. Concrete wall units shall be placed side by side for full length of wall alignment. Alignment may be done, by using a string line or offset of wall line.
- D. Fill all voids between and within concrete wall units with drainage aggregate.
- E. A minimum of 12 inches of drainage aggregate shall be placed behind the concrete wall units.
- F. Drain tile shall be installed at the lowest elevation possible to maintain gravity flow of water to outside of the reinforced zone. The drainage collection pipe shall be day-lighted to an appropriate location away from the wall system at each low point or at 50-foot intervals along the wall.
- G. Remove all excess fill from top of units and install next course. Ensure drainage aggregate and backfill are compacted before installation of next course.
- H. Install each succeeding course. Backfill as each course is completed. Pull the units forward until the locating surface of the unit contacts the locating surface of the units in the preceding course. Pull the units forward as far as possible.
- I. Install geosynthetic reinforcement in accordance with geosynthetic supplier's recommendations and the design drawings.

3.06 BACKFILL PLACEMENT

- A. Reinforced backfill shall be placed, spread and compacted in a manner that will minimize slack in the reinforcement.
- B. Fill in the reinforced zone shall be placed and compacted in lifts not to exceed 6 to 8 inches in loose thickness where hand operated compaction equipment is used and not exceeding 12 inches loose thickness where heavy, self-propelled compaction equipment is used.

- C. All fill placed in the reinforced zone must be compacted to a minimum of 95 percent of the soil's standard Proctor density (ASTM D 698-91) or as recommended by the project geotechnical engineer.
- D. Only lightweight hand-operated equipment shall be allowed within 4 feet of the back of the retaining wall units, or one-half of the wall height, whichever is greater.

3.07 CAP UNIT INSTALLATION (If Applicable)

- A. Apply construction adhesive to the top surface of the unit below and place the cap unit into desired position.
- B. Cap units may need to be cut to obtain the proper fit.
- C. Backfill and compact to finish grade.

3.08 ADJUSTING AND CLEANING

- A. Damaged units should be replaced with new units during construction.
- B. Contractor shall remove debris caused by this construction and leave adjacent paved areas broom clean.

3.09 QUALITY CONTROL

- A. The wall installation contractor is responsible for quality control of installation of all materials. The contractor should enlist the assistance of a qualified independent third party to verify the correct installation of all materials according to these specifications and the construction drawings.
- B. The owner, at his own expense, should retain a qualified professional to perform random quality assurance checks of the contractor's work.
- C. Work found to be deficient according to these specifications or the construction drawings must be corrected at the contractor's expense.
- D. The retaining wall will not be considered complete until accepted by the engineer or duly appointed owner's representative.

+++ END OF SECTION 02530 +++

**SECTION 02532
CONCRETE CURBS AND GUTTERS**

PART 1 GENERAL

1.01 SCOPE

- A. Work included in this Section includes furnishing all labor, materials, equipment, tools and incidentals required for construction of concrete curb, gutter and combined curb and gutter at the locations and to the lines, grades, cross sections, form and dimensions as shown on the Drawings.
- B. Work under this section shall also include removal and replacement of concrete gutter, combined curb and gutter as required for construction as shown on the Drawings and as directed by the Engineer.

1.02 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect concrete materials before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer at no additional cost to the City.

PART 2 PRODUCTS

2.01 FORMS

- A. Forms for curbs and gutters shall be full depth metal or wood of a size to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Forms shall be free from distortion and defects which will impair the appearance or structural quality of the completed sidewalk or curb and gutter.
- B. Provide stakes and bracing as required to hold forms securely in place.

2.02 CONCRETE REINFORCEMENT

- A. Concrete reinforcement shall conform to Section 03200, Concrete Reinforcement and Dowelling.

- B. Locate, place and support reinforcement as indicated on the Drawings

2.03 CONCRETE AND RELATED MATERIALS

- A. Concrete and related materials including, but not necessarily limited to, joint materials, membranes and curing compounds shall conform to Section 03300, Cast-In-Place Concrete.
- B. Ready-mix concrete shall be 3,000 psi and conform to the requirements of Section 03300, Cast-In-Place Concrete.
- C. Water used in mixing concrete shall be fresh, clean, potable water free from injurious amounts of oil, acid, alkali, vegetable, wastewater and/or organic matter.
- D. Admixtures shall meet the following requirements:
 - 1. Except as herein specified, no curative or hardening admixtures shall be used.
 - 2. An air entrainment agent capable of providing 3 to 6 percent air shall be used. Air entraining admixtures which are added to concrete mixtures shall conform to ASTM C260 for Air Entraining Admixtures for Concrete.
- E. Sub-base shall be constructed of granular material. Minimum depth of sub-base shall be 3-inches.
- F. Joint filler shall be a non-extruding joint material conforming to AASHTO M213 for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (non-extruding and resilient bituminous types). The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint unless otherwise specified by the Engineer.

PART 3 EXECUTION

3.01 EARTHWORK

All earth work shall be performed in accordance with Section 02225, Trench Excavation and Backfill and as specified in this Section.

3.02 SUBGRADE PREPARATION

- A. The subgrade shall be formed by excavating to the required depth below the finished surface of the respective types, in accordance with the dimensions and designs indicated on the Drawings or as directed by the Engineer, and shall be of such width as to permit the proper installation and bracing of forms. The subgrade shall be compacted by hand tamping and all soft, yielding or unsuitable material shall be removed and backfilled with satisfactory material and again compacted thoroughly to

98% of dry density per ASTM D698 and finished to a smooth and unyielding surface.

- B. The finished grade shall be to the dimensions and design indicated on the Drawings or as directed by the Engineer for the bottom of the proposed construction.
- C. After the subgrade is compacted and at the proper grade, spread 3 inches or more of sub-base material. Sprinkle with water and compact by rolling or other approved method. The top of the compacted gravel shall be at the proper level to receive the concrete.
- D. After the concrete has set sufficiently, the spaces on both sides of the curb, gutter, and combined curb and gutter shall be backfilled and materials compacted.
- E. Curbs to be used in the construction of asphalt pavements shall be backfilled prior to placement of base material for asphalt pavement.

3.03 CONCRETE CURB AND GUTTER CONSTRUCTION

- A. Construct curb and gutter to lines and grades shown or established by the Engineer. Curbs and gutters shall conform to the details shown on the Drawings.
- B. Forming:
 - 1. Forms shall show no vertical variation greater than 1/8-inch from design line and grade and no lateral variation greater than 1/8-inch in 10 feet from the vertical face of the form.
 - 2. Forms shall be of the full depth of the structure and be so constructed as to permit the inside forms to be securely fastened to the outside forms.
 - 3. Securely hold forms in place true to the lines and grades indicated on the Drawings.
 - 4. Wood forms may be used on sharp turns and for special sections as approved by the Engineer.
 - 5. All mortar and dirt shall be removed from forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited.
 - 6. The supply of forms shall be sufficient to permit their remaining in place at least 12 hours after the concrete has been placed.
 - 7. Thoroughly clean forms and coat with form release agent as required to insure form separation from concrete without damage before placing concrete.
- C. Joints:

1. Joints shall be constructed as indicated on the Drawings and as specified herein.
2. Construct joints true to line with their faces perpendicular to the surface of the sidewalk and curb and within ¼-inch of their designated position.
3. Thoroughly spade and compact the concrete at the faces of all joints to fill all voids.
4. Install expansion joint materials at the point of curve at all street returns.
5. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.
6. Place contraction joints every 10 feet along the length of the curbs and gutters.
7. Form contraction joints using steel templates or division plates which conform to the cross section of the structure. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place.
8. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or shall be notched to permit the reinforcement to be continuous through the joint.
9. Contraction joints shall be a minimum of 1-1/2-inches deep.

D. Finishing:

1. Strike off the surface with a template, and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.
2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius indicated on the Drawings.
3. Finish edges with an approved finishing tool having a 1/4-inch radius.
4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.
5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.

E. Concrete Curing:

1. After finishing operations have been completed and immediately after the free

water has left the surface, the surface of the structure shall be completely coated and sealed with a uniform layer of curing compound specified in Section 03300, Cast-In-Place Concrete.

2. The compound shall be applied in one or two applications as directed by the Engineer. When the compound is applied in two (2) increments, the second application shall follow the first application within 30 minutes.
3. The compound shall be applied continuously by means of an automatic self-propelled, pressure sprayer as approved by the Engineer at the rate directed by the Engineer, but not less than 1 gallon per 200 square feet of surface.
4. The equipment shall provide adequate stirring of the compound during application.
5. Should the method of applying the compound not produce uniform coverage, its use shall be discontinued, and the curing shall be by another method approved by the Engineer.

F. Protection:

1. Provide and use sufficient coverings for the protection of the concrete in case of rain or breakdown of curing equipment.
2. Provide necessary barricades and lights to protect the work and rebuild or repair to the approval of the Engineer.
3. All damage caused by people, vehicles, animals, rain, the Contractor's operations shall be repaired by the Contractor at no additional cost to the City.

3.05 REMOVAL AND REPLACEMENT OF CONCRETE CURB AND GUTTER

- A. When a section of existing curb and gutter is removed, the existing curb and gutter shall be cut to a neat line, perpendicular to both the centerline and the surface of the existing curb and gutter. Existing concrete shall be cut along the nearest existing construction joints; if such joints do not exist, the cut shall be made at minimum distances shown on the Drawings.
- B. Existing concrete curbs and gutters that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed. The new work shall be neatly jointed to the existing concrete so that the surfaces of the new work shall form an even, unbroken plane with the existing surfaces.
- C. All work shall conform to the requirements for new curbs and gutters as detailed on the Drawings and as specified in this Section.

3.06 CLEANING

- A. All excess or unsuitable material shall be removed from the site as specified in Section 02920, Site Restoration.
- B. All surfaces of the Work and adjacent surfaces shall be broom clean. Contractor shall use pressure washing and other means approved by the Engineer to remove splashed and spilled concrete from the Work and adjacent surfaces.
- C. Disturbed seeded areas shall be reseeded per requirements of Section 02933, Seeding.

+ + + END OF SECTION 02532 + + +

SECTION 02616
POLYETHYLENE ENCASUREMENT OF DUCTILE IRON PIPE

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall furnish all labor, materials, equipment and incidentals to furnish and install polyethylene encasement of ductile iron water mains.
- B. The polyethylene encasement shall prevent contact with the pipe and the surrounding backfill and bedding material, but it is not intended to be completely airtight or watertight.

1.02 SUBMITTALS

- A. Complete shop drawings, samples and engineering data shall be submitted to the Engineer in accordance with the requirements of the General Conditions of the Contract Documents. In addition the following specific information shall be provided:
 - 1. Certificate of compliance with ANSI/AWWA C105/A21.5

1.03 QUALITY ASSURANCE

- A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.
 - 1. ANSI/AWWA C105/A21.5 – Polyethylene Encasement for Ductile-Iron Pipe Systems
 - 2. ANSI/AWWA C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - 3. ASTM D149 – Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
 - 4. ASTM D882 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 5. ASTM D1709 – Standard Test Methods for Impact Resistance of Thin Plastic Film by the Free-Falling Dart Method.
 - 6. ASTM D1992 – Standard Test Method for Propagation Tear Resistance of Plastic

Film and Thin Sheeting by Pendulum Method.

7. ASTM D4976 – Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.

PART 2 PRODUCTS

2.01 POLYETHYLENE FILM

- A. Polyethylene film shall be shall be manufactured in accordance with AWWA/ANSI C105/A21.5.

- B. Linear low-density polyethylene film.

1. Linear low-density polyethylene film shall be manufactured of virgin polyethylene material in accordance with ASTM D4976.

2. Physical properties of finished film:

Tensile Strength	3,600 psi*
Elongations	800 percent*
Dielectric Strength	800 V/mil thickness minimum
Impact Resistance	600 g minimum
Propagation Tear Resistance	2,550 grams force minimum*

* Minimum in machine and transverse direction

3. Linear low-density polyethylene film shall have a minimum thickness of 0.008-inches (8 mil).

- C. High-density cross laminated polyethylene film.

1. High-density cross laminated polyethylene film shall be manufactured of virgin polyethylene material in accordance with ASTM D4976.

2. Physical properties of finished film:

Tensile Strength	6,300 psi*
Elongations	100 percent*
Dielectric Strength	800 V/mil thickness minimum
Impact Resistance	800 g minimum
Propagation Tear Resistance	250 grams force minimum*

* Minimum in machine and transverse direction

3. High-density cross laminated polyethylene film shall have a minimum thickness

of 0.004-inches (4 mil).

D. Polyethylene film to be supplied shall be black (weather resistant) in color.

E. Tube or sheet width sizes shall be as shown on the following table:

Pipe Diameter (inches)	Polyethylene Width Flat Tube (inches)	Polyethylene Width Sheet (inches)
3	14	28
4	14	28
6	16	32
8	20	40
10	24	48
12	27	54
14	30	60
16	34	68
18	37	74
20	41	82
24	54	108
30	67	134
36	81	162
42	81	162
48	95	190
54	108	216
60	108	216
64	121	242

F. The polyethylene film supplied shall be clearly marked every two feet along its length with the following information in one-inch high (minimum) letters:

Manufacturer's name or trademark

Year of manufacture

ANSI/AWWA C105/A21.5

Minimum film thickness and material type

Applicable range of nominal pipe diameter size(s)

Warning – Corrosion Protection – Repair any damage

G. Polyethylene adhesive tape 1-1/2-inches wide shall be used to seal joints.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall remove all lumps of clay, mud, cinders, etc. on the pipe surface before installation of the polyethylene encasement. During installation, soil or embedment material shall not be trapped between the pipe and the polyethylene.
- B. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings and to prevent damage to the polyethylene caused by backfilling operations. Overlaps shall be secured with adhesive tape.
- C. For installation below the water table tube form polyethylene shall be used with both ends sealed with tape or plastic tie straps at the joint overlap. Circumferential wraps of tape shall be placed at 2- foot intervals along the barrel of the pipe to minimize the space between the polyethylene and the pipe.
- D. Installation on ductile iron pipes shall be in accordance with methods A, B or C as outlined in ANSI/AWWA C105/A21.5 and as specified below. Methods A and B are for use with polyethylene tubes and Method C is for use with polyethylene sheets.
 - 1. Method A:
 - a. Cut polyethylene tube to a length approximately 2-feet longer than the pipe section. Slip the tube around the pipe, centering it to provide 1-foot overlap on each adjacent pipe section and bunching it accordion-fashion lengthwise until it clears the pipe ends.
 - b. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at the joints to facilitate installation of the polyethylene tube.
 - c. After assembling the pipe joint, make the overlap of the polyethylene tube. Pull the bunched polyethylene from the preceding length of pipe, slip secure it in place. Then slip the end of the polyethylene from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Secure the overlap in place. Take up the slack along the barrel of the pipe, securing the fold at quarter points. Proceed to the next section of pipe in the same manner.
 - 2. Method B:
 - a. Cut polyethylene tube to a length approximately 1-foot shorter than that of the pipe section. Slip the tube around the pipe, centering it to provide 6-inch of bare pipe at each end. Take up the slack width at the top to the pipe for a snug but not tight fit along the barrel of the pipe securing the fold at quarter points. Secure the ends with polyethylene tape.

- b. Before making up a joint, slip a 3-foot length of polyethylene tube over the end of the preceding pipe section, bunching it accordion-fashion lengthwise. Alternatively, place a 3-foot length of polyethylene sheet in the trench under the joint to be made. After completing the joint, pull the 3-foot length of polyethylene over or around the joint. Overlapping the polyethylene previously installed on each end snug and secure with polyethylene tape. A shallow bell hole is necessary and shall be made at joints to facilitate the installation of the polyethylene tube or sheet.

3. Method C:

- a. Cut polyethylene sheet to a length approximately 2-feet longer than that of the pipe section. Center the cut length to provide a 12-inch overlap on each adjacent pipe section, bunching it until it clears the pipe ends. Wrap the polyethylene around the pipe so that it circumferentially overlaps the top quadrant of the pipe. Secure the cut edge of the polyethylene sheet at intervals of approximately 3-feet.
- b. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at the joints to facilitate installation of the polyethylene. After completing the joint, make the overlap and secure the ends as specified in Para. 3.01B of this Section.

- E. Care shall be taken when installing backfill to prevent damage to the wrapping.

3.02 REPAIRS

- A. Repair cuts, tears, punctures, or damage to polyethylene with adhesive tape or with a short length of polyethylene sheet, or with a tube cut open, wrapped around the pipe to cover the damaged area, and secured in place.

3.03 OPENINGS IN ENCASUREMENT

- A. Provide openings for blow-offs, air and vacuum valves, and similar appurtenances by cutting an X in the polyethylene and temporarily folding back the film. After the appurtenance is installed, tape the slack securely to the appurtenance, and repair the cut and any other damaged areas in the polyethylene with tape.
- B. Direct service taps may also be made through the polyethylene with any resulting damaged areas being repaired as described above. To make direct service taps, apply multiple wraps of adhesive tape completely around the polyethylene-encased pipe to cover the area where the tapping machine and chain will be mounted. After the tapping machine is mounted, the corporation stop shall be installed directly through the tape and polyethylene. After the direct tap is completed, the entire circumferential area shall be inspected for damage and repaired if needed.

3.04 JUNCTIONS BETWEEN WRAPPED AND UNWRAPPED PIPE

- A. Where polyethylene wrapped pipe joins an adjacent pipe that is not wrapped, extend the polyethylene wrap to cover the adjacent pipe for a distance of at least 3-feet. Secure the end with circumferential turns of adhesive tape.
- B. Service lines of dissimilar metals shall be wrapped with polyethylene or a suitable dielectric tape for a clear minimum distance of 3-feet away from the ductile iron pipe.

3.05 BACKFILL FOR POLYETHYLENE-WRAPPED PIPE

- A. Use the same backfill as that specified for pipe without polyethylene wrap, exercising care to prevent damage to the polyethylene wrapping when placing backfill.

+++ **END OF SECTION 02616** +++

**SECTION 02645
FIRE HYDRANTS**

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall furnish all labor, materials and equipment to install and test fire hydrants as specified herein and as shown on the Drawings.
- B. Fire hydrants shall be Mueller Super Centurion 250 A-423, modified to meet the City of Atlanta standard requirements as specified in this section. In order to insure compatibility with the City's existing inventory of hydrants and spare parts and standardized maintenance procedures, no other hydrants shall be acceptable.

1.02 QUALITY ASSURANCE

- A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, unless indicated otherwise on the Drawings or specified herein.
 - 1. ANSI B18-2.1 - Standard specification for Square and Hex Bolt Screws, including Askew Head Bolts, Hex Cap Screws and Lag Screws
 - 2. ANSI/AWWA C110/A21.10 - Ductile Iron and Gray Iron Fittings
 - 3. ANSI/AWWA C111/A21.11 - Rubber Gaskets Joints for Ductile Iron Pressure Pipe and Fittings.
 - 4. ANSI/AWWA C151/A21.51 - Ductile Iron Pipe, Centrifugally Cast
 - 5. AWWA C502 - Dry Barrel Fire Hydrants.
 - 6. AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
 - 7. AWWA M17 - Installation, Field Testing and Maintenance of Fire Hydrants.
- B. Testing and Inspection: The Contractor shall perform all tests and inspections required by this specification unless otherwise stated. The Contractor may use the manufacturer's facility or any independent laboratory acceptable to the Owner. The Owner reserves the right to perform any of the test and inspection requirements where such tests and inspections are needed to further determine compliance with this specification.

- C. Samples, visual tests and inspections may be required by the Owner. These shall be performed and witnessed in the presence of the Engineer at no extra cost. Failure to comply with this provision may cause rejection of the hydrants.

1.03 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition the following specific information shall be provided:

1. Shop Drawings and Product Data
2. Certificate of compliance with the requirements of AWWA C502.
3. Records of standard tests.

PART 2 PRODUCTS

2.01 FIRE HYDRANTS

- A. Fire hydrant shall be three way, post type, dry top traffic design model with compression main valve opening against and closing in the direction of normal water flow. Hydrant shall be designed for 250 psi working pressure.
- B. Fire hydrants shall conform to the requirements of AWWA C502.
- C. Manufacture
 1. Hydrant shall have the name of the manufacturer, the year of manufacture, operating pressure and valve size in legible raised letters cast on the barrel. Hydrant shall also have the letters "AWB" cast on the barrel for identification purposes.
 2. Dry Top Bonnet:
 - a. Bonnet shall be constructed with a moist proof lubrication chamber which encloses the operating threads and which provides automatic lubrication of the threads and bearing surfaces each time the hydrant is operated.
 - b. Bonnet assembly shall be comprised of a top O-ring serving as a dirt and moisture barrier and a lower O-ring which will serve as a pressure seal. The O-ring packing shall be included in an oil filled reservoir so that all operating parts are enclosed in a sealed oil bath.
 - c. O-rings shall be Buna N in accordance with ASTM 2000.

- d. An oil filler plug shall be provided in the bonnet to permit checking of the oil level and adding oil when required.
3. Operating Nut
- a. Operating nut shall be ASTM B584 bronze, seven-eighths (7/8) – one (1) inch tapered square nut with tamper-proof device.
 - b. The tamper proof device shall be a ductile iron combination hold-down nut and operating nut shield to eliminate operation of hydrant with wrenches other than a special socket-type wrench. Arrow shall be cast on the periphery of the bonnet indicating direction of the operation for opening the hydrant.
4. Nozzles
- a. Fire hydrant shall have two (2) two and one-half (2-1/2) inch hose connections, 120 degrees apart and one (1) four and one-half (4-1/2) inch pumper connection, with National Standard threads. Nozzles to be made of bronze and have interlocking lugs to prevent blowout.
 - b. Nozzle caps nuts shall have the same cross section as the operating nut on the bonnet. Nozzle caps shall be secured to the fire hydrant with non-kinking type steel chain with chain loop on cap ends to permit free turning of caps.
 - c. Outlet Nozzle Threads shall conform to the National Fire Protection Association (NFPA) for National Standard Fire Hose Coupling Screw Threads.
5. Main Valve
- a. The internal main valve diameter shall be a minimum of five and one quarter (5 1/4) - inches.
 - b. The valve shall be designed to open against pressure and close with pressure.
 - c. Valve shall be made of synthetic rubber and formed to fit the valve seat accurately.
 - d. The valve shall be reversible.
6. Main Valve Seat
- a. The main valve seat shall be ASTM B584 bronze and its assembly into the hydrant shall involve bronze to bronze thread engagement.
 - b. Two (2) O ring seals shall be provided as a positive pressure seal between the

bronze seat ring and the shoe.

- c. Valve assembly pressure seals shall be obtained without the employment of torque or torque compressed gaskets.
- d. The hydrant shall be designed to allow the removal of all operating parts through the hydrant barrel by means of a single disassembly wrench without excavating.

7. Traffic Design

- a. Hydrant barrel section shall be connected at the ground line in a manner that will prevent damage to the hydrant when struck by a vehicle.
- b. Main valve rod section shall be connected at the ground line by a frangible coupling.
- c. The barrel and ground line safety construction shall be such that the hydrant nozzles can be rotated to any desired position without disassembling or removing the top operating components and top section of the hydrant barrel.

8. Drain

- a. The drain mechanism shall be designed to operate with the operation of the main valve and shall allow a momentary flushing of the drain ports.
- b. A minimum of two (2) internal positive opening drain valves and two (2) external bronze lined drain ports shall be required in the main valve assembly to drain the hydrant barrel.
- c. The drain valve facings shall be made of either rubber or polyethylene material and retained in position with stainless steel screws.

9. Shoe

- a. Shoe shall be ductile iron, ASTM A536, grade 65-45-12. Interior of shoe shall be epoxy coated in accordance with AWWA C550.
- b. Main valve travel stop shall be an integral part of the shoe permitting full opening of the hydrant and positive stop without over travel of the stem.

- 10. Barrel Extension Sections: Barrel extension sections shall be available in six (6) inch increments complete with rod, extension, coupling and necessary flanges gaskets and bolts so that extending the hydrant can be accomplished without excavating.

11. Nuts and Bolts: Nuts and bolts shall be corrosion resistant. Bolt material shall develop the physical strength requirements of ASTM A307 and may have either regular or square heads with dimensions conforming to ANSI B18.2.1 Nuts, bolts and studs shall be cadmium-plated (ASTM A165, grade NS) or zinc-coated (ASTM A153 or ASTM B633), or rust-proofed by a process acceptable to the Engineer.
12. O Rings: O rings shall be rubber and conform to the requirements of ASTM 2000.
13. Markings: Bury mark of fire hydrant shall be cast on the barrel of the hydrant. The bury mark shall provide not less than eighteen (18)-inches of clearance from the centerline of the lowest nozzle to the ground.
14. Direction of Opening: Hydrant shall be designed to open “right” or clockwise.
15. Joint Assemblies: Complete joint assemblies consisting of glands, gaskets, bolts and nuts shall be furnished.
16. Coating and Painting
 - a. All iron parts of the hydrant, inside and outside, shall be cleaned and all surfaces shall be coated with a two part epoxy. Epoxy shall be Amercoat 370.
 - b. The outside of the hydrant above ground level shall be cleaned and thereafter shop painted with two (2) coats of Sherwin Williams Quick Dry Alkyd Enamel, Mueller paint code RP. Color shall match existing color.
17. Lubrication: All bronze, threaded contact moving parts shall, during shop assembly, be lubricated and protected by a coating of rustproof compound to prevent damage in shipment and storage.

PART 3 EXECUTION

3.01 INSPECTION

Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating nut and cap nut dimensions, tightness of pressure containing bolting, cleanliness of inlet elbow, handling damage and cracks. Defective hydrants shall be corrected or held for inspection by the Engineer.

3.02 HYDRANT INSTALLATION

- A. Hydrants shall be placed at the locations indicated on the Drawings. The Contractor shall install proper “bury” hydrants or shall use, at no cost to the City, proper length extensions to ensure that each fire hydrant is installed in accordance with the manufacturer’s recommendation and the requirements of these Specifications.

- B. Hydrants shall stand plumb with pumper nozzle facing the roadway.
- C. Hydrants shall be set to the finished grade with the centerline of the lowest nozzle eighteen (18)-inches above finished grade.
- D. When placed behind curb, the hydrant barrel shall be set such that the distance from the face of the curb to the edge of the hydrant shall be twenty-one (21)-inches. Where no curb exists, the hydrant shall be set as directed by the Engineer.

3.03 CONNECTION TO WATER MAIN

- A. Fire hydrant shall be connected to the water main with a ductile iron branch connection. Gate valves shall be used on fire hydrant branches as shown on the Drawings.
- B. The connection of the hydrant to the water main shall be through a ductile iron hydrant tee. Tapping sleeves shall not be allowed.
- C. Hydrants shall be attached to the water main by the following method:
 - 1. For water mains sixteen (16) inches and smaller, the isolation valve shall be attached to the water main by connecting the valve to the hydrant tee.
 - 2. For water mains twenty (20) inches and larger, the isolation valve shall be attached to the water main by providing an anchor coupling between the valve and welded outlet or tee.
 - 3. The isolation valve shall be attached to the hydrant by providing an anchor coupling between the valve and hydrant, if the hydrant and valve are less than two feet apart. Otherwise, provide mechanical joint ductile iron pipe with retainer glands on the hydrant and valve.
- D. Pipe connecting the fire hydrant to the water main shall be six (6)-inch diameter class 350 ductile iron pipe meeting the requirements of Section 02665, Water Mains and Accessories. Anchor coupling shall be as specified in Section 02665.
- E. Anchoring and Bracing: The shoe of each fire hydrant and the hydrant tee shall be braced against unexcavated earth at the ends of the trench with poured concrete thrust blocks as shown on the Drawings.
- F. Drainage: No. 57 stone shall be placed around the shoe of the fire hydrant for a minimum distance of 18-inches below the drain ports, 6-inches above the drainports, fifteen (15)-inches laterally on each side of the shoe and 24-inches from the back of the shoe towards the main.
- G. Provide resistance to avoid transmitting shock moment to the lower barrel and inlet connection by pouring a concrete collar six (6) -inches thick with a diameter of

twenty-four (24) inches at the ground line around the hydrant barrel.

3.04 FIELD PAINTING

After hydrant is installed and approved by the Engineer, the Contractor shall touch up all exposed hydrant surfaces as directed by the Engineer. Touch up paint shall be as specified in paragraph 2.01 C 16 of this Section.

3.05 TESTING

All fire hydrants shall be tested in strict accordance with the requirements of AWWA C502, with no additional cost to the City. A certificate of compliance will be furnished to the Engineer.

3.06 REMOVAL AND SALVAGE OF EXISTING HYDRANTS

- A. Remove all existing hydrants shown on the Drawings to be removed. Hydrants shall be removed as follows:
 - 1. Insure that hydrant main valve is closed.
 - 2. Disconnect hydrant from barrel section.
 - 3. Saw cut or remove barrel section and lower stem to a minimum of twelve (12) - inches below finished grade.
 - 4. Remove hydrant connector pipe valve cover and concrete pad, valve box and extension stem. Insure that valve is closed. Valve shall remain in place.
 - 5. Deliver removed hydrant and valve components to the City's storage yard as directed by the Engineer.

- B. Backfill excavations and compact as specified in Section 02225 and restore area as required and as directed by the Engineer.

+++ END OF SECTION 02645 +++

SECTION 02665
WATER MAINS AND ACCESSORIES

PART I GENERAL

1.01 SCOPE

- A. Furnish all labor, materials, equipment and incidentals required for the complete installation of water mains and accessories as shown on the Drawings and as specified herein. The Work of this Section also includes, but is not limited to, hydraulic testing and disinfection of the completed water mains after installation.
- B. This Section includes ductile iron pipe and fittings ranging in size from 4-inches in diameter through 64-inches in diameter.
- C. Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.
- D. Galvanized pipe and fittings shall not be used as any part of the Water Transmission and Distribution System, nor shall it be used to join any appurtenances to the System.

1.02 QUALITY ASSURANCE

Reference Standards: The design, manufacturing and assembly of elements of the products herein specified shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or otherwise specified.

- 1. ANSI/AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
- 2. ANSI/AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings
- 3. ANSI/AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- 4. ANSI/AWWA C115/A21.15 – Flanged Ductile-Iron Pipe with Ductile- Iron or Gray-Iron Threaded Flanges
- 5. ANSI/AWWA C150/A21.50 - Thickness Design of Ductile-Iron Pipe
- 6. ANSI/AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast
- 7. ANSI/AWWA C153/A21.53 – Ductile-Iron Compact Fittings for Water Service
- 8. ANSI/AWWA C600 - Installation of Ductile-Iron Water Mains and Their

Appurtenances

9. ANSI /AWS D11.2 – Guide for Welding Iron Castings

10. AWWA C651 – Disinfecting Water Mains

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 - 1. Product data and engineering data, including shop drawings.
 - 2. Evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two (2) years.
 - 3. Written certification that all products furnished comply with all applicable requirements of these specifications.
- B. For pipe 24-inches in diameter or greater, submit shop drawings to the Engineer for review showing a complete laying plan of all pipe, including all fittings, adapters, valves and specials along with the manufacturer's drawings and specifications indicating complete details of all items. The pipe details shall include stationing, pipe class or design and supporting computations; and laying schedule which specifies pipe class, class coding, pipe stationing for all changes in grade or horizontal alignment, transition stations for various pipe classes and the limits of each reach of restrained joint pipe. The above shall be submitted to the Engineer for review before fabrication and shipment of these items.

1.04 TRANSPORTATION AND HANDLING

- A. Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.
- B. Handle pipe, fittings, and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.

1.05 STORAGE AND PROTECTION

- A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas.
- B. Stored materials shall be kept safe from damage. The interior of all pipe, fittings and other

appurtenances shall be kept free from dirt or foreign matter at all times.

- C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipe in adjacent tiers.
- D. Stored mechanical and push-on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.
- E. Mechanical joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

1.06 WATER MAIN LOCATION

- A. The minimum depth of cover over the pipe shall be four (4) feet and the maximum cover shall be five (5) feet. Any deviations must be approved by the Engineer.
- B. The installation of the water main parallel to another utility in the same vertical plane is not permitted, i.e., “stacking of utilities is not permitted.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE

- A. Ductile iron pipe shall be manufactured in accordance with ANSI/AWWA C151/A21.51. All pipe, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipe shall have a minimum pressure rating as indicated in the following table and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings:

Pipe Sizes (inches)	Pressure Class (psi)
4 - 12	350
14 - 18	350
20	300
24	250
30 - 64	200

- B. Flanged pipe minimum wall thickness shall be equal to Special Class 53. Flanges shall be

furnished by the pipe manufacturer.

C. Fittings shall be ductile iron and shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 with a minimum rated working pressure of 250 psi.

D. Joints

1. Unless shown or specified otherwise, joints shall be push-on or restrained joint type for pipe and standard mechanical, push-on or restrained joints for fittings. Push-on and mechanical joints shall conform to ANSI/AWWA C111/A21.11.
2. The only acceptable restrained joint systems are identified in the table below. No field welding of restrained joint pipe will be allowed.

Acceptable Restrained Joints				
Pipe Dia. (inches)	ACIPCO	U.S. Pipe	McWane	Generic*
4 – 12	Fast-Grip Flex Ring	Field Lok TR Flex	Push-On Restrained Joint Type A	MJ with Retainer Gland
16 – 24	Fast-Grip Flex Ring	Field Lok TR Flex	Push-On Restrained Joint Type A	MJ with Retainer Gland
30 – 36	Flex Ring	TR Flex	Push-On Restrained Joint Type B	MJ with Retainer Gland
42 – 48	Flex-Ring	TR Flex	N/A	MJ with Retainer Gland
54 – 64	Lok-Ring	TR Flex	N/A	N/A

* Fittings and valves only, and only where specifically allowed.

3. Restrained joint pipe (RJP) on supports shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet.
4. Flanged joints shall meet the requirements of ANSI B16.1, Class 125.

E. Gaskets: Gaskets for the various types of joints shall be as follows:

1. Gaskets for mechanical joints shall be made of vulcanized styrene butadiene (SBR) as specified in ANSI/AWWA C111/A21.11 unless specified otherwise. Reclaimed or

natural rubber shall not be used. Gaskets shall be free from porous areas, foreign material and other defects that make them unfit for the use intended.

2. Gaskets for flanged joints shall be made of synthetic rubber, ring type or full face type and shall be 1/8-inch thick. Gaskets shall conform to the dimensions specified in ANSI/AWWA C111/A21.11.
3. Gaskets for push-on and restrained joints shall be in accordance with the pipe manufacturer's design dimensions and tolerances. Gaskets shall be made of vulcanized styrene butadiene (SBR) as specified in ANSI/AWWA C111/A21.11 unless specified otherwise.

F. Bolts and Nuts

1. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit.
2. Bolts and nuts for mechanical joints shall be tee head bolts and nuts of high- strength low-alloy steel having a minimum yield strength of 45,000 psi. Dimensions of bolts and nuts shall be in accordance with the dimensions shown in ANSI/AWWA C111/ A21.11.
3. Flanged joints shall be bolted with through stud or tap bolts of required size as directed. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1.
4. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A563. Zinc plating shall conform to ASTM B633, Type II.
5. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A193, Grade B8. Nuts shall be heavy hex, stainless steel conforming to ASTM A194, Grade 8.

G. Mechanical joint glands shall be ductile iron.

H. Welded Outlets: Welded outlets may be provided in lieu of tees or saddles on mains with a diameter greater than or equal to 24-inches. The pipe joint on the outlet pipe shall meet the joint requirements specified above. The minimum pipe wall thickness of the parent pipe and the outlet pipe shall be Special Thickness Class 53 (Pressure Class 350 for 60 and 64-inch sizes). The welded outlet shall be rated for 250 psi working pressure. Each welded outlet shall be hydrostatically tested at 500 psi. The welded outlet shall be fabricated by the manufacturer of the parent pipe. The maximum outlet diameters shall not exceed those listed in the table below:

Parent Pipe	Maximum Outlet
-------------	----------------

Diameter, Inches	Diameter, Inches
24	16
30	20
36	24
42	30
48	30
54	30
60	30
64	30

- I. Thrust collars shall be welded-on ductile iron body type designed to withstand thrust due to 250 psi internal pressure on a dead end from either direction on that pipe size. The thrust collars shall be continuously welded to the pipe by the pipe manufacturer.
- J. Solid sleeves shall be used to connect plain end ductile iron pipe. Solid sleeves shall meet the requirements of ANSI/AWWA C110/A21.10 for long pattern and have a minimum pressure rating of 250 psi. Solid sleeves shall have mechanical or restrained joints as specified in this section or as shown on the Drawings. Solid sleeves shall be used only in locations shown on the Drawings or at the discretion of the Engineer. Solid sleeves shall be manufactured by American Cast Iron Pipe Company or U. S. Pipe.
- K. Pipe stubs for all structure connections shall not exceed 2-feet in length. Caps shall be furnished where required.

M. Cement Lining

- 1. Interior surfaces of all ductile iron pipe and fittings shall be cleaned and lined with a cement mortar lining applied in conformity with ANSI/AWWA C104/A21.4. If lining is damaged or found faulty upon delivery, the damaged pipe sections shall be repaired or removed from the site as directed by the Engineer.
- 2. The minimum lining thickness shall be as shown in the following table. Lining shall be square and uniform with regard to the longitudinal axis of the pipe.

Pipe Diameter (Inches)	Minimum Lining Thickness (Inches)
3 - 12	1/8
14 - 24	3/32
30 - 64	1/8

- N. Pipe Coating: Unless otherwise specified, pipe and fittings shall be coated with a 1 mil asphaltic coating as specified in ANSI/AWWA C151/A21.51.

- O. Polyethylene Encasement: Ductile iron pipe shall be encased with polyethylene film where shown on the Drawings, specified or directed by the Engineer. Polyethylene film shall be as specified in Section 02616.
- P. Pipe Insulation: Where a water main is exposed to the elements because the pipe is above ground, the Engineer shall determine whether the pipe is to be insulated or not. Where insulation is to be furnished and installed it shall conform to the following:
 - 1. Insulating material shall be 3-inch thick polyurethane pipe covering formed to fit the pipe diameter.
 - 2. Outer covering shall be 0.016-inch thick aluminum chiller jacket with moisture shield and secured with stainless steel wire or stainless steel straps.
- Q. Acceptance will be on the basis of the Engineer's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

2.02 PIPING APPURTENANCES

A. Mechanical Joint Restraint

- 1. Design
 - a. Restraint devices for pipe sizes 3 inches through 48 inches in diameter shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10.
 - b. Restraint devices shall have a working pressure rating of 350 psi for 3-inch through 16-inch diameter pipe and 250 psi for 18-inch through 48-inch diameter pipe. Ratings shall be for water pressure and shall include a minimum safety factor of 2 to 1 for all pipe diameters.
- 2. Material
 - a. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.
 - b. Ductile iron gripping wedges shall be contoured to fit on the pipe and shall be heat treated within a range of 370 to 470 BHN.
 - c. Dimensions of the glands shall be such that they can be used with the standard mechanical joint bell and tee head bolts conforming to the requirements of ANSI/AWWA C111/A21.11 and ANSI/AWWA C 153/A21.53, latest editions.
- 3. Approvals

- a. Restraint devices shall be listed by Underwriters Laboratories (3-inch through 24-inch size) and approved by Factory Mutual (3-inch through 12-inch size).
- b. Mechanical joint restraint shall be Megalug Series 1100 as manufactured by EBAA Iron Inc., Uni-Flange Series 1400, as manufactured by Ford Meter Box Company or approved equal.

B. Hydrant Connections

1. Pipe: Pipe shall have mechanical joint ends and be as specified in paragraph 2.02 of this Section.
2. Hydrant Tees: Hydrant tees shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53. Tapping saddles shall not be allowed.
3. Anchor Couplings:
 - a. Anchor couplings for hydrant installation shall be class 350 ductile iron pipe meeting the requirements of AWWA C151/ANSI A21.51, Class 53 and shall have an anchoring feature at both ends so that when used with mechanical joint split glands a restrained joint is provided.
 - b. Anchor couplings shall be cement lined in accordance with ANSI/AWWA C104/A21.4 and shall have a bituminous coating in accordance with ANSI/AWWA C151/A21.51.
 - c. Anchor couplings shall be equal to swivel anchor pipe and couplings as manufactured by Fab Pipe, Inc., Tyler Utilities Division of Union Foundry Company or approved equal.
4. Hydrant Connector Pipe:
 - a. Hydrant connector pipe shall be class 350 ductile iron meeting the requirements of ANSI/AWWA C153/A21.53 and shall be offset design so that the hydrant can be adjusted to ensure placement at the proper grade. Connector pipe shall have an anchoring feature at both ends so that when used with mechanical joint split glands a restrained joint is provided.
 - b. Hydrant connector pipe shall be cement lined in accordance with ANSI/AWWA C104/ A21.4 and have a bituminous coating in accordance with ANSI/AWWA C151/A21.51.
 - c. Hydrant connector pipe shall be equal to the Gradelok as manufactured by Assured Flow Sales, Inc., Sarasota, Florida.
 - d. Hydrant connector pipe shall not be used unless specifically directed by the Engineer.

- C. Tapping Saddles: Tapping saddles are not allowed.
- D. Detection Tape: Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket. Tapes shall be color coded in accordance with APWA color codes with the following legends: Water Systems, Safety Precaution Blue, "Caution Water Line Buried Below". Colors may be solid or striped. Tape shall be permanently printed with no surface printing allowed. Tape width shall be a minimum of 2-inches when buried less than 10-inches below the surface. Tape width shall be a minimum of 3-inches when buried greater than 10-inches and less than 20-inches. Detection tape shall be equal to Lineguard Type III Detectable or Allen Systems Detectatape.

PART 3 EXECUTION

3.01 LAYING AND JOINTING PIPE AND ACCESSORIES

- A. Lay all pipe and fittings to accurately conform to the lines and grades as shown on the Drawings or as established by the Engineer.
- B. Pipe Installation
 1. Proper equipment, tools and facilities shall be provided for the safe performance of the Work. All pipe, fittings, valves and hydrants shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or equipment in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.
 2. All pipe, fittings, valves, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject the materials.
 3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe containing dirt shall be laid.
 4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.
 5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.
 6. It is not mandatory to lay pipe with the bells facing the direction in which work is progressing.

7. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade, shall not be permitted.
8. Provide detection tape for all pipe greater than 12-inches in diameter. Detection tape shall be buried 4 to 10-inches deep. Should detection tape need to be installed deeper, the Contractor shall provide 3-inch wide tape. In no case shall detection tape be buried greater than 20-inches from the finish grade surface.

C. Alignment and Gradient

1. Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.
2. Maintain a transit, level and accessories at the work site to lay out angles and ensure that deflection allowances are not exceeded.

D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible. Do not leave unjointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the Engineer.

E. Joint Assembly

1. Push-on, mechanical, flange and restrained type joints shall be assembled in accordance with the manufacturer's recommendations.
2. The Contractor shall inspect each pipe joint within 1,000 feet on either side of main line valves to insure 100 percent seating of the pipe spigot, except as noted otherwise.
3. Each restrained joint shall be inspected by the Contractor to ensure that it has been "homed" 100 percent.
4. The Contractor shall internally inspect each pipe joint to insure proper assembly for pipe 24-inches in diameter and larger after the pipe has been brought to final alignment.

F. Cutting Pipe: The Contractor shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location. Only push-on or mechanical joint pipe shall be cut. Cement lining shall be undamaged.

G. Polyethylene Encasement: Installation shall be in accordance with ANSI/AWWA C105/A21.5 and the manufacturer's instructions. All ends shall be securely closed with tape and all damaged areas shall be completely repaired to the satisfaction of the Engineer.

3.02 CONNECTIONS TO WATER MAINS

- A. Make connections to existing pipe lines with tapping sleeves and valves, unless specifically shown otherwise on the Drawings.
- B. Location: Before laying pipe, locate the points of connection to existing water mains and uncover as necessary for the Engineer to confirm the nature of the connection to be made.
- C. Interruption of Services: Make connections to existing water mains only when system operations permit and only when notices are issued to the customer. The Contractor will operate existing valves only with the specific authorization and direct supervision of the Owner.
- D. Tapping Sleeves
 - 1. Holes in the new pipe shall be machine cut, either in the field or at the factory. No torch cutting of holes shall be permitted.
 - 2. Prior to attaching sleeve, the pipe shall be thoroughly cleaned utilizing a brush and rag as required.
 - 3. Before performing field machine cut, the watertightness of the sleeve assembly shall be pressure tested. The interior of the assembly shall be filled with water. An air compressor shall be attached, which will induce a test pressure as specified in this Section. No leakage shall be permitted for a period of five minutes.
 - 4. After attaching the sleeve to an existing main, but prior to making the tap, the interior of the assembly shall be disinfected. All surfaces to be exposed to potable water shall be swabbed or sprayed with a one percent hypochlorite solution.
- E. Connections using Solid Sleeves: Where connections are shown on the Drawings using solid sleeves, the Contractor shall furnish materials and labor necessary to make the connection to the pipe line including cutting, excavation and backfill.
- F. Connections Using Couplings: Where connections are shown on the Drawings using couplings, the Contractor shall furnish materials and labor necessary to make the connection to the existing pipe line, including all necessary cutting, excavation and backfill.

3.03 THRUST RESTRAINT

- A. Provide restraint at all points where hydraulic thrust may develop.
- B. Retainer Glands: Provide retainer glands where shown on the Drawings. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly, the required torque of the set screws. The Contractor shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.

C. Harnessing

1. Provide harness rods only where specifically shown on the Drawings or directed by the Engineer.
2. Harness rods shall be manufactured in accordance with ASTM A36 and shall have an allowable tensile stress of no less than 22,000 psi. Harness rods shall be hot dip galvanized or field coated with bitumastic before backfilling.
3. Where possible, harness rods shall be installed through the mechanical joint bolt holes. Where it is not possible, provide 90 degree bend eye bolts.
4. Eye bolts shall be of the same diameter as specified in ANSI/AWWA C111/A21.11 for that pipe size. The eye shall be welded closed. Where eye bolts are used in conjunction with harness rods, an appropriate size washer shall be utilized with a nut on each end of the harness rod. Eye bolts shall be of the same material and coating as the harness rods.

D. Thrust Collars: Collars shall be constructed as shown on the Drawings.

E. Concrete Blocking

1. Provide concrete blocking for all bends, tees, valves, and other points where thrust may develop, except where other exclusive means of thrust restraint are specifically shown on the Drawings.
2. Concrete shall be as specified in Section 03300, Cast-in-Place Concrete.
3. Form and pour concrete blocking at fittings as shown on the Drawings and as directed by the Engineer. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation.

3.04 INSPECTION AND TESTING

- A. All sections of the water main shall be hydrostatically pressure tested in accordance with AWWA C600 and these Specifications. A section of main will be considered ready for testing after completion of all thrust restraint and backfilling.
- B. Water used for flushing and testing mains and other construction purposes will be made available to the Contractor as specified in Section 01040.
- C. Each segment of water main between main valves shall be tested individually.
- D. Test Preparation
 1. For water mains less than 24-inches in diameter, flush sections thoroughly at flow velocities, greater than 2.5 feet per second, adequate to remove debris from pipe and valve seats. For water mains 24-inches in diameter and larger, the main shall be carefully

swept clean, and mopped if directed by the Engineer. Partially open valves to allow the water to flush the valve seat.

2. Partially operate valves and hydrants to clean out seats.
 3. Provide temporary blocking, bulkheads, flanges and plugs as necessary, to assure all new pipe, valves and appurtenances will be pressure tested.
 4. Before applying test pressure, air shall be completely expelled from the pipeline and all appurtenances. Insert corporation stops at high points to expel air as main is filled with water as necessary to supplement automatic air valves. Corporation stops shall be constructed with a meter box as shown on the Drawings.
 5. Fill pipeline slowly with water. Provide a suitable pump with an accurate water meter to pump the line to the specified pressure.
 6. The differential pressure across a valve or hydrant shall equal the maximum possible, but not exceed the rated working pressure. Where necessary, provide temporary backpressure to meet the differential pressure restrictions.
 7. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure.
- E. Test Pressure: Test the pipeline at 250 psi measured at the lowest point for at least two hours. Maintain the test pressure within 5 psi of the specified test pressure for the test duration. Should the pressure drop more than 5 psi at any time during the test period, the pressure shall be restored to the specified test pressure. Provide an accurate pressure gauge with graduation not greater than 5 psi.
- F. Testing Allowance
1. Testing allowance shall be defined as the sum of the maximum quantity of makeup water that must be added into the pipeline undergoing hydrostatic pressure testing, or any valved section, in order to maintain pressure within 5 psi of the specified test pressure for the test duration plus water required to return line to test pressure at the end of the test. Leakage shall be the total cumulative amount measured on a water meter.
 2. The Owner assumes no responsibility for leakage occurring through existing valves.
- G. Test Results: No installed pipe shall be accepted if the quantity of makeup water exceeds the limits determined by the following formula:

$$L = \frac{SD(P)^{1/2}}{148,000}$$

Where: L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)

As determined under Section 5 of ANSI/AWWA C600.

- H. If the water main section being tested contains lengths of various pipe diameters, the allowable leakage shall be the sum of the computed leakage for each diameter. The leakage test shall be repeated until the test section is accepted. All visible leaks shall be repaired regardless of leakage test results.
- I. After a pipeline section has been accepted, relieve test pressure. Record type, size and location of all outlets on record drawings.
- J. At the conclusion of the work, the Contractor shall thoroughly clean all new pipelines by flushing with water or other means to remove all dirt, stone, pieces of wood or other material which may have entered the pipeline during the construction period.
- K. The Contractor shall be responsible for legal disposal of all water used for flushing and testing.

+++ END OF SECTION 02665 +++

SECTION 02668
WATER SERVICE CONNECTIONS

PART I GENERAL

1.01 SCOPE

- A. Furnish all labor, materials, equipment and incidentals required for installing and testing water service connections complete as shown on the Drawings and as specified herein.
- B. The work of this Section is limited to water service connections 2-inches in diameter and smaller and may include all or some of the following:
 - 1. The installation of new water service connections from new and existing water mains.
 - 2. The transfer of existing service connections from existing water mains to new water mains.
 - 3. Installing meter boxes and lids for service lines up to 1-inch.
 - 4. Furnishing and installing meter boxes for 1½ -inch and 2-inch service lines.
- C. Water meters shall not be furnished or installed. However the water meter connections must be compatible with the water meters currently in use by the City.
- D. No galvanized pipe or fittings shall be used on water services.
- E. Definitions:
 - 1. Long side connection: A long side connection is a connection done with the meter on the opposite side of the street as the water main.
 - 2. Short side connection: A short side connection is a connection done with the meter on the same side of the street as the water main.

1.02 SERVICE COMPATIBILITY

All water service connections shall duplicate those presently in use by the Owner in order to insure service compatibility with their service maintenance procedures.

1.03 QUALITY ASSURANCE

Reference Standards: The design, manufacturing and assembly of elements of the products herein specified shall comply with the applicable provisions and

recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or otherwise specified.

1. ANSI/AWWA C800 – Underground Service Line Valves and Fittings
2. ASTM B88 – Standard Specification for Seamless Copper Water Tube
3. NSF/ANSI Standard 61 – Drinking Water System Components – Health Effects

1.04 MATERIAL TO BE FURNISHED BY THE OWNER

- A. The Owner will furnish the following materials to the Contractor for installation under this Contract:
 1. Oval cast iron meter boxes with lids for installation with ¾-inch and 1-inch meters.
 2. Rectangular cast iron meter box lids and frames for installation with 1 ½-inch and 2-inch meters.
 3. The City will not supply meter boxes for 1 ½-inch and 2-inch meter installations.
- B. Refer to Standard Details as shown on the Drawings

PART 2 PRODUCTS

2.01 MATERIALS

- A. Meter Boxes for 1 1/2-inch and 2-inch service lines: Meter boxes for 1 1/2-inch and 2-inch service lines shall be constructed of concrete masonry units as specified in Section 04000, Masonry, concrete as specified in Section 03300, Cast-in-Place Concrete or precast concrete.
- B. Service Line
 1. Service line shall be copper tubing. Tubing shall be Type K, rolled type, conforming to ASTM B88.
 2. Fittings shall be cast copper alloy with compression type inlet and outlet connections.
 3. Where required, adapters shall be brass.
- C. Valves and Accessories

1. Ball Valves

- a. Ball valves shall be full port, heavy duty type and shall seal full rated pressure with flow in either direction.
- b. Valve body shall be bronze conforming to ASTM B62, with threaded ends. End connections shall be compression type for type K copper tubing and shall be furnished with meter swivel nuts, with meter gasket, for 5/8-inch through 1-inch meter connections and flanged end for 1 1/2-inch and 2-inch meter connections.
- c. Valves shall have a maximum water pressure rating of 300 psi.
- d. Valves shall have a maximum water temperature rating of 180 degrees F.
- e. Valves shall be Mueller 300 ball valves or approved equal.

2. Corporation Stops

- a. Corporation stops shall be ball type and shall be made of bronze conforming to ASTM B62.
- b. Corporation stops shall be suitable for a maximum water pressure rating of 300 psi.
- c. Inlet shall be tapered thread conforming to AWWA C800.
- d. Outlet connection shall be threaded for compression type connection for type K copper tubing.
- e. Corporation stop shall be model B-25008 as manufactured by Mueller Company or model 3128B as manufactured by A.Y. McDonald Manufacturing Co. or approved equal.

3. Curb Stops

- a. Curb stops shall be ball type and shall be made of bronze conforming to ASTM B62.
- b. Curb stops shall be suitable for a maximum water pressure rating of 300 psi.
- c. Inlet connection shall be threaded for compression type connection for type K copper tubing. Outlet shall be furnished with a threaded

meter swivel nut, with meter gasket, or flanged to match size of meter.

- d. Ball valve shall be brass and shall seat watertight with flow in either direction.
 - e. Curb stop shall be furnished with padlock ring for locking valve in closed position.
 - f. Curb stop shall be model B-25172 as manufactured by Mueller Company or model 6100W as manufactured by A.Y. McDonald Manufacturing Co. or approved equal.
4. Service Fittings and Couplings: Service fittings and couplings shall conform to the requirements of AWWA C800.

PART 3 EXECUTION

3.01 GENERAL

- A. Following pressure testing and disinfection of the water main and when directed by the Engineer, the Contractor shall install water taps for each service connection. All taps shall remain exposed at the main until the service line has been inspected, tested for pressure and disinfected.
- B. Locations of taps shall be as directed by the Engineer along the route of the water main.
- C. Installation of water service connections shall conform to the details shown on the Drawings.
- D. The Contractor shall be prepared to make emergency repairs to the water main, if necessary, due to damage caused by the Contractor's operations. In conjunction with this requirement, the Contractor shall furnish and have available at all times, a tapping machine, for the purpose of making temporary water service taps or emergency repairs to damaged water services. The Contractor shall furnish the Engineer a phone number of an individual with the authority to initiate emergency repair work. The phone number shall be provided prior to starting work on the Project.

3.02 TAPPING WATER MAIN

- A. All services connected to water main shall be through a direct tap.
- B. The water main shall be tapped with a tapping machine specifically designed for that purpose. The tap shall be a direct tap into the water main through a corporation stop.

All taps shall be supervised by the Engineer. All taps shall be made on the water main at a position so as not to be on the top of the water main or on the bottom of the water main.

- C. The distance between taps shall be a minimum of 12-inches.

3.03 METER BOXES

- A. Oval cast iron meter boxes with lids for installation with $\frac{3}{4}$ -inch and 1-inch meters shall be furnished by the Owner as specified in Paragraph 1.04 of this Section.
- B. Rectangular cast iron meter box lids and frames for installation with 1 $\frac{1}{2}$ -inch and 2-inch meters shall be furnished by the Owner as specified in paragraph 1.04 of this Section. Meter boxes for 1 $\frac{1}{2}$ -inch and 2-inch meters shall be furnished and installed by the Contractor.
- C. Meter boxes shall be installed by the Contractor in the locations as shown on the Drawings or as directed in the field by the Engineer.
- D. Meter box installation shall include valves, fittings and accessories to allow for future installation of meter and backflow preventer by the City.
- E. Meter boxes shall be located perpendicular to the curb. The street edge of the box shall be located 18-inches (maximum) behind the back of the curb and the meter lid shall be set at finished grade. The meter box shall be set on a bed of gravel. The gravel shall be 3-inches thick and extend 6-inches in all directions beyond the edge of the meter box.

3.04 SERVICE LINES

- A. Copper tubing between tap and water meter shall be one continuous length of pipe with no intermediate joints or connections. The service line shall be placed without sharp turns or bends from the water main to the meter box.
- B. Size of new service connections shall as directed by the Engineer or as shown on the Drawings.
- C. New copper service lines shall be installed by free bore without a casing.

3.05 TRANSFER OF SERVICE

- A. All service lines to be replaced or transferred shall be the same size as existed prior to construction.
- B. As shown schematically on the Drawings, new service lines shall be installed between the new main and the existing meter. If a new service line or the existing

meter connection or fitting is damaged during construction, it shall be abandoned and a new copper service line and meter connection and fitting will be installed at the Contractor's expense.

- C. To minimize out of service time, the Contractor shall determine the connections to be made and have all the required pipe and fittings on hand before shutting off the existing service. After completing the connection, the new corporation cock shall be opened and all visible leaks shall be repaired and approved by the Engineer.
- D. Immediately before connecting to the existing meter, all service lines shall be flushed to remove any foreign matter. Any special fittings required to reconnect the existing meter to the new copper service line shall be provided by the Contractor.
- E. The existing service lines shall be abandoned in place at the corporation stop unless directed by the Engineer.

3.06 RELOCATION OF EXISTING METERS AND METER BOXES

- A. Before disconnecting the existing meter, the existing corporation stop in the main shall be closed. All existing meters and meter boxes shall be removed, reinstalled and reconnected as indicated on the Drawings and as directed by the Engineer.
- B. Existing service lines shall be field located by the Contractor. The Contractor shall be responsible for locating existing meters and meter boxes, relocating the meters and meter boxes as directed by the Engineer and determining the existing size service line to reconnect the meters to the water mains. All service lines installed under existing pavement, including streets, driveways and sidewalks, shall be installed by free bore.
- C. The Contractor shall relocate the existing meter box and meter and reconnect the house service. Refer to paragraph 3.04A of this Section.

3.07 MAINTENANCE AND REPAIRS

The tap and service line shall remain under Contractor's maintenance responsibility for the same warranty period as the water main. The Contractor shall promptly repair any damage to the water main and service line during the warranty period.

+++ END OF SECTION 02668 +++

**SECTION 02675
DISINFECTION OF WATER MAINS**

PART 1 GENERAL

1.01 SCOPE

The work covered by this Section includes furnishing all labor, equipment, materials, chemicals and incidentals required to disinfect all water mains installed under this contract in accordance with the procedures specified herein and as directed by the Engineer.

1.02 QUALITY ASSURANCE

Reference Standards: Procedures for disinfecting water mains unless otherwise modified herein shall conform to the requirements of AWWA Standard C651, Disinfecting Water Mains.

1.03 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

Disinfection shall be performed by an approved specialty contractor. Before disinfection is performed, the Contractor shall submit a written pipeline disinfection procedure for approval before being permitted to proceed with the disinfection. The plan shall also include the steps to be taken for the neutralization of the chlorinated water.

In addition, for mains twenty-four (24)-inches in diameter and larger, the Contractor shall submit the resume of a Disinfection Supervisor. The Disinfection Supervisor shall have demonstrated prior disinfection experience with at least ten (10) miles of twenty-four (24)-inch diameter or greater water transmission mains in the state of Georgia. Approval of the Disinfection Supervisor shall also include a one (1) hour interview with the Owner.

PART 2 PRODUCTS

2.01 DISINFECTION AGENT

The disinfection agent shall be free chlorine or chlorine compound.

PART 3 EXECUTION

3.01 DISINFECTION OF PIPELINE

- A. After successfully pressure testing each pipeline section, disinfect in accordance with AWWA C651 for the continuous-feed method and these Specifications. The Engineer shall be present during the disinfection process. The Contractor shall provide the Engineer with forty-eight (48)-hours notice prior to initiating disinfection.

- B. Chlorination:
 - 1. Contractor shall meet the disinfection requirements of the current version of the Georgia Environmental Protection Division, Drinking Water Permitting & Engineering Program, Minimum Standards for Public Water Systems, or the requirements below, whichever are more stringent.
 - 2. Prior to disinfection, the lines shall be flushed with water to create a velocity in the piping of at least 2.6 feet per second. These requirements apply equally to new pipe fittings and to existing pipelines into which connections have been made, or which may have been otherwise disturbed to the extent that contamination may have occurred.
 - 3. Contractor shall apply chlorine solution to achieve a concentration of at least twenty-five (25) milligrams per liter free chlorine in new line. Retain chlorinated water for twenty-four (24) hours. Water shall be supplied from a temporary source protected by appropriate backflow prevention devices. Backflow preventer must be approved by the Owner prior to connection. Chlorine shall be injected no more than ten (10) feet from the beginning of the new main.
 - 4. Chlorine concentration shall be recorded at every outlet along the line at the beginning and end of the twenty-four (24) hour period.
 - 5. After twenty-four (24) hours, all samples of water shall contain at least ten (10) milligrams per liter free chlorine. Re-chlorinate if required results are not obtained on all samples.
 - 6. Final pipeline disinfection shall occur at the end of the construction period immediately prior to putting the main in service.
 - 7. Main disinfection shall be performed and evaluated in sequential and contiguous pipe sections between in-line valves.

- C. Disposal of Chlorinated Water: Reduce chlorine residual of disinfected water to less than one (1) milligram per liter if discharged directly to a body of water or to less than two (2) milligrams per liter if discharged onto ground prior to disposal. Treat water with sulfur dioxide or other reducing chemicals to neutralize the chlorine residual. Flush all

lines until residual is equal to existing system. Contractor shall be responsible for any state or local permits required for the disposal of flushing water.

- D. Bacteriological Testing: After final flushing and before the water main is placed in service, the Owner shall collect samples from the main and deliver them to the Owner's designated laboratory for bacteriological testing. One set of samples shall be collected from every 1,200 feet of water main, plus one set from each end of main. Testing shall be performed by the Owner's water laboratory. If test results are not satisfactory, the Contractor shall re-chlorinate the mains until required results are obtained. The expense for labor, equipment, and materials, including Chlorine, shall be at the Contractor's expense. The results shall be furnished to the Engineer.

+++ END OF SECTION 02675 +++

SECTION 02681
SUBDRAINAGE FOR STORMWATER QUALITY FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Section includes construction of subdrainage (underdrain) systems to collect and discharge filtered stormwater runoff in stormwater quality facilities, including installation of piping, drainage stone and other granular materials.

- B. Related Work Specified Elsewhere in the Green Infrastructure Specifications:
 - 1. Section 02371 – Green Infrastructure Geotextiles

1.02 REFERENCES

- A. ASTM International:
 - 1. ASTM D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction

 - 2. ASTM D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

 - 3. ASTM D 2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

 - 4. ASTM D 2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

 - 5. ASTM D 3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

 - 6. ASTM D 3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

 - 7. ASTM F 477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

 - 8. ASTM F 810, Standard Specification for Smoothwall Polyethylene (PE) Pipe for Use in Drainage and Waste Disposal Absorption Fields

- B. Georgia Department of Transportation (GDOT):
 - 1. “Standard Specifications, Construction of Transportation Systems”, Latest Edition (GDOT Standard Specifications)

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the Contract Documents.
- B. Submit the following for review and approval prior to shipment of materials to the Site:
 - 1. Manufacturers' documentation indicating conformance with the specifications for underdrain pipe or specified subsurface drainage system components.
 - 2. Certificates and test reports, signed by the material producer of granular materials, indicating that the materials meet or exceed the specifications.

1.04 QUALITY ASSURANCE

- A. Pipe or drainage system manufacturer shall have manufacturing and quality control facilities capable of producing and assuring the quality of the pipe and fittings specified.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Pipe shall be marked with manufacturer's identification symbol, size, date of manufacture, class of pipe and applicable product specification identification number.
- B. During loading, transporting and unloading, exercise care to prevent damage to pipe. All materials shall be inspected upon delivery to the Site. Damaged or defective materials shall be rejected and shall be replaced with new materials at no additional cost to the Project.
- C. Granular materials of different gradations (including drainage stone and choker course) shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

- A. Proposed materials and sources of supply shall be approved by the Owner's representative as specified, prior to shipment and use of the materials in the construction.
- B. Granular materials shall meet specified gradations and quality prior to placement. All processing shall be completed at the source.

2.02 CHOKER COURSE

- A. Choker course shall consist of aggregate with gradation conforming to size number 8 (nominal 3/8-inch to No. 8 sieve sizes) or size number 89 (nominal 3/8-inch to No. 16 sieve sizes) as defined in ASTM D 448 or Table 880.1 of the GDOT Standard Specifications.

2.03 DRAINAGE STONE

- A. Washed drainage stone to be placed in bioretention areas, bioswales, and other designated stormwater quality facilities shall be washed stone conforming to the quality and gradation requirements for size number 57 coarse aggregate in ASTM D 448 or Section 800.2.01 of the GDOT Standard Specifications. Gradation shall be as summarized in the following table.

Sieve Size	Percent Passing, by Weight
1 1/2 inch	100
1 inch	95 - 100
1/2 inch	25 - 60
No. 4	0 - 10
No. 8	0 - 5

2.04 GEOTEXTILE

- A. Specified in Section 02371.

2.05 UNDERDRAIN PIPE

- A. Underdrain pipe shall be perforated ADS Smoothwall Sewer and Drain pipe (or approved equal) suitable for gravity flow drainage, meeting the requirements of ASTM F 810 and conforming to the following additional requirements.
- B. Pipe shall have a smooth interior and exterior and the pipe joints shall be bell and spigot with the bell ends integrally formed to provide a soil-tight connection.
- C. Pipe material shall be high density polyethylene (HDPE) conforming to the minimum requirements for cell classifications 424410C or E as defined in ASTM D 3350.
- D. Perforation pattern and spacing shall be *[as indicated on the Drawings] [as follows]. [Each perforation shall be [0.2 inch] maximum diameter. Perforations shall be spaced approximately [120 degrees] around the circumference of the pipe and shall be arranged in rows parallel to the axis of the pipe at spacing not greater than [3 inches].]*
- E. Furnish required fittings and connectors for a complete system as shown on the Drawings. A cleanout shall be provided on the upstream ends of the underdrain system. Pipe material shall conform to the requirements of subsection 2.06. The cleanout shall

include a 12-inch by 12-inch (or larger) by 3-inch thick minimum thickness concrete pad, unless otherwise indicated on the Drawings.

2.06 NON-PERFORATED PIPING

- A. Non-perforated piping (including upturned “S” piping, cleanouts and outlets) in designated stormwater quality facilities shall conform to one of the following specifications:
 - 1. Polyvinyl chloride (PVC) pipe and fittings conforming to ASTM D 3034, SDR 26. Joints shall conform to ASTM D 3212 with a factory-installed elastomeric gasket conforming to ASTM F 477.
 - 2. Schedule 40 PVC pipe conforming to ASTM D 1785. Fittings shall conform to ASTM D 2466.
- B. Furnish suitable fittings, transition couplings and other accessories as required for a complete installation as indicated on the Drawings. Transition couplings for connection of perforated corrugated polyethylene pipe (with smooth inner liner) to smooth-wall PVC pipe shall include “corrugated pipe couplings” manufactured by Fernco, Inc., or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Construction of bioretention areas, bioswales and other stormwater quality facilities shall not commence until the proposed facility area is isolated from all contributing drainage areas. Excavate in dry conditions.
- B. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and other specifications.
- C. Locate and mark existing utilities, underground structures, and above ground obstructions before beginning installation and avoid disruption and damage of services.
- D. Excavate to the required dimensions, side slopes and depths shown on the Drawings or as otherwise approved by the Owner’s representative. Exposed subgrade soils at bottom of excavation shall not be compacted. Low ground pressure equipment shall be used for excavation.
- E. Excavated materials shall be removed from the construction areas and placed in other locations on the Site, if needed, or off-site where approved by the Owner’s representative.
- F. Prior to placement of choker course, drainage stone, other granular materials, and underdrain piping, the bottom of the excavation shall be dry and scarified (by raking, disking or tilling) to a minimum depth of six inches.

3.02 GEOTEXTILE INSTALLATION

- A. Place geotextile on exposed excavated side slopes or other locations where indicated on the Drawings prior to placement of granular materials and engineered soil mix (as applicable) and as specified in Section 02371.

3.03 INSTALLATION OF GRANULAR MATERIALS

- A. Place and uniformly grade specified gradations of granular materials in sequential layers to the thicknesses and limits indicated on the Drawings. Level and contour surface of each layer to required elevations.
- B. Coordinate placement of granular materials with installation of geotextile and underdrain piping.

3.04 PIPE INSTALLATION

- A. Examine pipe and fittings before installation and assure no defective materials are incorporated. Keep inside of pipes and fittings free of dirt and debris.
- B. Install piping beginning at low points of the system, true to grades and alignment indicated, with continuous slope.
- C. Lay perforated underdrain piping on uniformly graded materials for entire length of alignment at the required locations and lengths. Installation shall be in accordance with ASTM D 2321.
- D. Install fittings and observation features as shown on the Drawings.
- E. Install non-perforated outlet pipes and valves (as applicable) at the required locations and orientation as indicated on the Drawings.
- F. Pipe and fittings shall be joined in accordance with manufacturers' recommendations and reference standards. Non-perforated pipe connections shall be watertight.
- G. Whenever pipe laying is not actively in progress, the open ends of the piping shall be closed by a temporary plug or cap to prevent soil and other foreign matter from entering the piping.
- H. For connections to storm drainage system, comply with requirements for applicable City of Atlanta Storm Sewer Specifications and as indicated on Drawings.

3.05 FIELD QUALITY CONTROL

- A. Tests and Inspections: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
- B. Remove obstructions, replace damaged components, and repeat test until free flow of system is achieved.

- C. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses.

3.06 BACKFILLING

- A. Place drainage stone around and over perforated piping as indicated on the Drawings up to required elevation or depth in each area.
- B. Place soil backfill around and over non-perforated pipe in layers not exceeding six inches loose thickness up to finish grade. Each layer shall be thoroughly compacted using manually guided compaction equipment.
- C. Placement and compaction of drainage stone and other backfill materials shall be performed in a manner that will not damage the pipe. Pipe that is damaged shall be replaced at no additional cost to the Project.

3.07 MAINTENANCE AND PROTECTION

- A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.

+++END OF SECTION 02681+++

**SECTION 02682
PRETREATMENT FOR STORMWATER QUALITY FACILITIES**

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Section includes construction of pretreatment measures that are designed to provide energy dissipation and filter out debris from surface runoff prior to flowing into stormwater quality facilities. Pretreatment measures included in this specification:
 - 1. Grass (vegetated) filter strips
 - 2. Sediment forebays
 - 3. Depressed curb inlets
 - 4. River cobble flume
 - 5. Gravel verges
 - 6. Sediment trap sump

- B. Related Work Specified Elsewhere in the Existing COA DWM Specifications:
 - 1. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control
 - 2. Section 02200 – Earthwork
 - 3. Section 02933 – Seeding and Sodding
 - 4. Division 03 Specifications: For concrete construction

- C. Related Work Specified Elsewhere in the GI Infrastructure Specifications:
 - 1. Section 02371 – Geotextiles

1.02 REFERENCES

- A. Georgia Department of Transportation (GDOT):
 - 1. “Standard Specifications, Construction of Transportation Systems”, Latest Edition (GDOT Standard Specifications)

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the Contract Documents.

- B. Submit the following for review and approval prior to shipment of materials to the Site:
 - 1. Shop Drawings for structures, showing plans, sections and details.
 - 2. Manufacturer's data (including product data sheets and test results) from manufacturers or suppliers for proposed materials showing compliance with the Specifications.

1.04 QUALITY ASSURANCE

- A. Comply with the requirements of governmental authorities having jurisdiction.

1.05 SEQUENCING AND SCHEDULING

- A. Coordinate construction of pretreatment measures with associated work specified in other sections.

PART 2 PRODUCTS

2.01 VEGETATION MATERIALS

- A. Vegetation for filter strips shall consist of turf grass seed or sod conforming to the requirements of Section 02933. Grass species shall be as specified in Section 02933 or as otherwise indicated on the Drawings.
- B. Topsoil (if required), fertilizer and liming materials, and mulch for turf grass shall conform to the requirements of Section 02933.
- C. Vegetation for sediment forebays shall consist of native plug plantings as indicated on the Drawings.

2.02 CONCRETE

- A. Concrete formwork, reinforcement, concrete materials and mix design for curb inlets, splash pads and other concrete structures shall conform to the applicable requirements of Division 3 Specifications. Unless otherwise specified, minimum compressive strength of concrete shall be 3,000 psi.

2.03 RIPRAP

- A. Riprap shall consist of hard, angular shaped stone complying with the quality requirements of Section 805.2.01 of the GDOT Standard Specifications. Gradation shall be as indicated on the Drawings.

2.04 RIVER COBBLES

- A. River cobbles shall be locally available smooth water-washed river rock ranging in size from approximately 3-inch to 8-inch diameter, unless otherwise specified or indicated on the Drawings.

2.05 SEDIMENT TRAP SUMP

- A. Sediment trap sump assembly shall include influent and effluent piping and sump structure.
- B. Prefabricated sediment trap sump shall *[be constructed of precast concrete, thermoplastic materials or composite materials and] [conform to the following specifications]*:
 - 1. *[Insert material specifications]*
 - 2. Sump shall be fabricated to the dimensions indicated on the Drawings, and shall include a removable grate or cover and openings for pipe penetrations. Design load capacity shall be as determined by the Designer for the site conditions and as indicated on the Drawings.
 - 3. Sump shall be sized to provide one cubic foot of storage for every 100 square feet of drainage area.
- C. Piping shall be *[insert material specifications]*

PART 3 EXECUTION

3.01 PREPARATION

- A. Establish required dimensions and elevations for pretreatment facility construction.
- B. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.
- C. Excavate and grade existing materials as required for construction of the facilities in accordance with applicable requirements of Section 02200 and other specification sections.

3.02 VEGETATED FILTER STRIP CONSTRUCTION

- A. Vegetated filter strips shall be located immediately adjacent to stormwater quality facilities. Each filter strip shall be 10 feet wide minimum or the width of the

receiving stormwater quality facility, whichever is greater. Length (dimension parallel to the receiving facility) shall be as required based on site conditions, facility layout and selected practices.

- B. Grade existing soils to provide a uniform slope toward the stormwater quality facility. Slope shall range from 2 to 10 percent, or as indicated on the Drawings. Surface shall not be compacted. Grading must facilitate sheet flow across filter strip. Surface grades that allow concentrated flow across filter strip will not be accepted.
- C. Coordinate filter strip construction with adjacent stormwater quality facility and additional pretreatment and energy dissipation measures to provide required control of erosion and other protection of the filter strips.
- D. Completed graded surfaces shall be stabilized with approved permanent turf grass and mulch (including soil amendments and topsoil as required) as specified in Section 02933.

3.03 SEDIMENT FOREBAY CONSTRUCTION

- A. Sediment forebays shall be constructed where concentrated flow is directed to a stormwater quality facility through curb turnouts or pipe outlets.
- B. Sediment forebays shall be constructed as indicated on the Drawings and specified below.
 - 1. Each forebay shall be sized to contain 0.1 inch of runoff per impervious acre of contributing drainage. The forebay storage volume counts toward the total water quality storage requirements.
 - 2. Exit velocities from the forebay shall be non-erosive.
 - 3. Direct maintenance access for appropriate equipment shall be provided to the forebay.
 - 4. A fixed vertical sediment depth marker shall be installed in the forebay to measure sediment deposition over time.
 - 5. Sediment removal in forebay shall occur when 50 percent of the total capacity has been lost.
- C. Coordinate sediment forebay construction with adjacent stormwater quality facility and additional pretreatment and energy dissipation measures to provide required control of erosion and other protection of the forebays.

- D. If indicated on the Drawings, the bottom of the forebay shall be lined with concrete, paver blocks or other approved hard materials to facilitate removal of sediment.
- E. Side slopes and top of slopes (not including inflow areas and overflow spillway) shall be armored with stone or other hard material, or stabilized with approved vegetation as indicated on the Drawings and specified in Section 02933.
- F. A stabilized overflow spillway (lined with concrete, riprap or other approved armoring materials) shall be constructed where water flows between each forebay and adjacent stormwater quality facility.
- G. Install vertical sediment depth markers in forebays as indicated on the Drawings.

3.04 DEPRESSED CURB INLET CONSTRUCTION

- A. Depressed curb inlets shall consist of curb openings and adjacent splash pads as shown on the Drawings. Horizontal surface (gutter) of curb openings shall be constructed of concrete to match adjacent curb and gutter. Splash pads shall be constructed of either concrete or river cobble as indicated.
- B. Design criteria include the following (unless otherwise determined by the Designer):
 - 1. Size depressed curb inlets to accommodate design flows in accordance with COA Post-Development Stormwater Management Requirements.
 - 2. Depth of drop from curb opening shall be as shown on the typical details.
 - 3. A 2 foot by 3.5 foot section of pavement adjacent to the Curb Inlet shall be tapered to provide a lowered flow line as shown on the typical details.
- C. Coordinate construction of depressed curb inlets with adjacent stormwater quality facility and additional pretreatment and energy dissipation measures to provide required control of erosion and other protection of the facilities.
- D. Conform to the applicable requirements of Division 3 Specifications for concrete construction and as indicated on the Drawings.
- E. Place river cobble as specified in subsection 3.05.

3.05 RIVER COBBLE FLUME CONSTRUCTION

- A. River cobble flumes shall consist of river cobbles embedded in a concrete slab and an adjacent ungrouted river cobble level spreader underlain with separation

geotextile as shown on the Drawings. Horizontal surface (gutter) of curb openings shall be constructed of concrete to match adjacent curb and gutter.

- B. Construct concrete slab to the dimensions indicated on the Drawings. Unless otherwise determined by the Designer, the river cobble flumesshall be 6 inches thick, a minimum of 18 inches in length, and width (dimension parallel to the receiving facility) as determined by the Designer and indicated on the Drawings.
- C. Concrete construction shall conform to the applicable requirements of Division 03 Specifications, except river cobbles shall be embedded into the surface of the concrete as follows:
 - 1. Prior to the concrete placing operation, all select cobbles shall be washed so that they are free of soil and other foreign particles. The cobbles shall be in a damp condition at the time of placement. There shall be sufficient cobbles on hand to complete placement once it has commenced.
 - 2. The cobble placement operation shall start immediately after the placement of concrete. Uniformly place cobbles by suitable means so that the entire surface is covered with one layer of cobbles. Embed the cobbles partially into the concrete surface as necessary to prevent dislodgement after concrete curing. Do not over-embed and deform the concrete surface.
 - 3. Remove excess concrete with suitable brushes and fine water spray as needed.
- D. For ungrouted river cobble level spreader, install separation geotextile over prepared subgrade as specified in Section 02371. Place river cobbles to a minimum depth of 12 inches as shown on the Drawings. Size of river cobbles for level spreader shall be 3-inch maximum.

3.06 UNGROUTED GRAVEL VERGE CONSTRUCTION

- A. Gravel verge consists of ungrouted gravel (ASTM number 57 aggregate) installed over geotextile in a trench running alongside surface contributing stormwater drainage. Unless combined with other energy dissipation or pretreatment structures, the ungrouted gravel verge is only for use with sheet drainage.
- B. Excavate trench to approximately 3-inch depth and 18-inch width.
- C. Install separation geotextile in trench as specified in Section 02371. Place gravel to the full depth of trench up to adjacent ground surface as shown on the Drawings.

3.07 INSTALLATION OF SEDIMENT TRAP SUMP

- A. Excavate and prepare subgrade for sump installation. Subgrade shall be compacted or undisturbed and suitable for sump as determined by the Engineer.
- B. Install sediment trap sump on prepared subgrade at the required location, elevation and orientation. Bottom of sump shall be level. Top of grate or cover shall match existing or finish grade (as applicable).
- C. Connect piping to sump using transition fittings or couplings as recommended by the manufacturer to provide a watertight connection.
- D. Place suitable backfill material around sump and over piping up to required elevation. Place and compact backfill using methods that will not dislodge or damage sump and piping. Finish surface as indicated.

3.08 MAINTENANCE AND PROTECTION

- A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.
- B. Remove construction debris and protect areas from erosion and other damage until completion of the Project.
- C. Damage to the constructed areas shall be fully repaired as approved by the Owner's representative.

+++END OF SECTION 02682+++

SECTION 02683
SUBSURFACE INFILTRATION FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Section includes construction of subsurface infiltration facilities for the interception, temporary storage and infiltration of stormwater runoff from impervious areas directed to the facilities through inlets, roof leaders, pretreatment systems, or other directly piped connections. Subsurface infiltration facilities include modified French drains, dry wells, subsurface stone galleries, and proprietary manufactured products.
- B. Related Work Specified Elsewhere in the Existing COA DWM Specifications:
 - 1. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control
 - 2. Section 02200 – Earthwork
 - 3. Division 03 Specifications: For concrete construction
- C. Related Work Specified Elsewhere in the Green Infrastructure Specifications:
 - 1. Section 02371 – Green Infrastructure Geotextiles
 - 2. Section 02681 – Subdrainage for Stormwater Quality Facilities
 - 3. Section 02922 – Amended Soil and Mulch

1.02 SYSTEM DESCRIPTION

- A. Modified French drains (MFD) shall consist of perforated piping installed in shallow excavated trenches filled with washed drainage stone, surrounded by geotextile, and covered with soil. MFD components shall conform to the Green Infrastructure typical detail for “Infiltration Trench”, with the exception that the surface layer shall conform to the topsoil specifications in Section 02922.
- B. Dry wells shall consist of seepage tanks set in the ground and surrounded with washed drainage stone and geotextile (on sides and bottom only). Alternately, water can flow into a pit filled with washed stone via a perforated pipe with a perforated standpipe in place of the tank.
- C. Subsurface stone galleries shall consist of excavated pits filled with washed drainage stone, surrounded by geotextile (on sides and bottom only), covered with soil, and include influent piping
- D. Open-bottom chamber products or other proprietary manufactured systems shall be furnished for subsurface infiltration facilities if indicated on the Drawings. The systems shall meet structural requirements for minimum cover, overburden support,

and live loads for anticipated surface use without compacting subsoils. Additional drainage stone may be required for structural support if indicated on the Drawings.

- E. Subsurface infiltration facilities shall all include overflow mechanisms such as surcharge pipes or connections to larger infiltration areas. These are designed to adequately convey discharges from major storm events to the downstream drainage system.

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the Contract Documents.
- B. Submit the following for review and approval prior to shipment of materials to the Site.
 - 1. Manufacturers' documentation indicating conformance with the specifications for perforated and non-perforated pipe and fittings.
 - 2. Certificates and test reports, signed by the material producers of drainage stone and choker course, indicating that the materials meet or exceed the specifications.
 - 3. Geotextile product certification as specified in Section 02371.
 - 4. Manufacturers' documentation (including product data sheets and specifications) for precast reinforced concrete and other proprietary manufactured systems to be furnished, indicating the systems can meet design runoff reduction volume (RRv) for the Site and other specified design criteria.
 - 5. Shop drawings showing fabrication and construction details for proprietary manufactured systems.
- C. Submit the following at completion of the Work:
 - 1. Field Quality Control: Submit test reports and inspection reports (as applicable)

1.04 QUALITY ASSURANCE

- A. Comply with the requirements of governmental authorities having jurisdiction.

1.05 DELIVERY, STORAGE AND HANDLING

- A. All manufactured products shall be inspected upon delivery to the Site. Damaged or defective materials shall be rejected or repaired as approved by the Owner's representative.
- B. Conform to manufacturer's recommendations for handling and storage of products.
- C. Granular materials of different gradations shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

1.06 PROJECT CONDITIONS

- A. The Contractor is solely responsible for excavation slope stability. Excavation work shall be in compliance with applicable local, state and federal regulations (including OSHA).
- B. Work shall be performed in a manner that does not damage or disturb existing utilities, structures, vegetation, and other site features not indicated to be removed.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate subsurface infiltration facility construction with associated work specified in other sections.

PART 2 PRODUCTS

2.01 CHOKER COURSE AND DRAINAGE STONE

- A. Choker course material and washed drainage stone shall conform to the material specifications in Section 02681.

2.02 SPECIAL GRANULAR BEDDING AND BACKFILL

- A. Granular bedding and backfill for open-bottom chamber products and other proprietary manufactured systems shall conform to the manufacturer's recommendations.

2.03 GEOTEXTILE

- A. Specified in Section 02371.

2.04 PIPING

- A. Perforated and non-perforated piping shall conform to the applicable specifications in Section 02681.
- B. Furnish required fittings (including tees, elbows and caps) to provide a complete installation.

2.05 CHECK DAMS

- A. Check dams shall be constructed of concrete, stone, or other approved materials. Stone check dams shall conform to COA Standard Detail ER-G CD001.
- B. Concrete structures shall be cast-in-place or precast reinforced concrete constructed to the dimensions indicated on the Drawings. Unless otherwise specified, minimum compressive strength of concrete shall be 3000 psi.
- C. Concrete formwork, reinforcement, concrete materials and mix design, and accessories shall conform to the applicable requirements of Division 03 Specifications.

2.06 PROPRIETARY MANUFACTURED SYSTEMS

- A. Furnish open-bottom chamber products, dry well structures and other pre-fabricated or field assembled manufactured systems as indicated on the Drawings.
- B. Manufactured systems shall meet the following requirements:
 - 1. Manufactured products shall be designed and fabricated by the manufacturer for the anticipated loading and burial conditions as indicated on the Drawings.
 - 2. Furnish systems constructed of high density polyethylene (HDPE) or other materials as indicated on the Drawings and approved by the Owner's representative. Sizes and numbers of structures shall be as indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Establish required dimensions and elevations for subsurface infiltration facility construction.

- B. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.

3.02 EARTHWORK

- A. Excavate in accordance with the applicable requirements of Section 02200 as modified in this Section. Excavate to the required dimensions, side slopes and depths shown on the Drawings. Exposed subgrade soils at bottom of excavation shall not be compacted. Low ground pressure equipment shall be used for excavation. Bottom of the excavation shall be flat or gently sloping toward the downstream end (if applicable).
- B. Prior to placement of choker course (if applicable) and drainage stone, bottom of the excavations shall be scarified (by raking, disking or tilling) to a minimum depth of six inches.
- C. Conform to manufacturer's recommendations for excavation and preparation of subgrade for installation or construction of open-bottom chamber products and other proprietary manufactured systems.
- D. Excavated materials shall be removed from the construction areas and placed in other locations on the site or off-site where approved by the Owner's representative.

3.03 GEOTEXTILE INSTALLATION

- A. Place geotextile on exposed excavated side slopes where indicated on the Drawings prior to placement of drainage stone as specified in Section 02371.
- B. Provide pipe penetrations through geotextile in accordance with the manufacturer's recommendations to provide a soiltight seal.

3.04 INSTALLATION OF DRAINAGE STONE

- A. Place drainage stone in excavations to the horizontal limits of the excavations. Total depth of drainage stone shall be as indicated on the Drawings.
- B. For required total depths up to 12 inches, place drainage stone in a single lift.
- C. For required total depths greater than 12 inches, place drainage stone in lifts of equal thickness, with no compacted lift more than 12 inches thick or less than 3 inches thick.

- D. Lightly compact drainage stone by tamping with the bucket of placement equipment or using manually guided compaction equipment such as vibratory plate compactors.
- E. Coordinate placement of drainage stone with installation of geotextile, piping and structures.
- F. Protect stone storage section from adjacent runoff during construction to avoid clogging of system.

3.05 INSTALLATION OF MANUFACTURED SYSTEMS

- A. Install products at the required elevations, orientation and location as indicated on the Drawings. Bottom of structures shall be leveled and properly stabilized on subgrade or prepared granular base.
- B. Conform to manufacturer's recommendations for construction of the systems, including placement and assembling of joints, pipe penetrations and other details for a complete system.
- C. Place drainage stone or other specified granular backfill around and over installed structures in uniform layers.
- D. Systems shall be tested prior to completion of construction as recommended by the manufacturer.

3.06 PIPE INSTALLATION

- A. Examine pipe and fittings before installation and assure no defective materials are incorporated. Keep inside of pipes and fittings free of dirt and debris.
- B. Lay perforated piping in drainage stone at the required locations, alignment and elevations as indicated on the Drawings. Connect to structures (if applicable), adjacent piping and other facilities as indicated.
- C. For modified French drains, perforated pipe shall be sloped between 0.5 and 6 percent, unless otherwise indicated.
- D. Install non-perforated outlet pipes, standpipes and cleanouts, as applicable, at the required locations and orientation as indicated on the Drawings.
- E. Pipe and fittings shall be joined in accordance with manufacturers' recommendations and reference standards, to provide stable and watertight connections.

- F. Whenever pipe laying is not actively in progress, the open ends of the piping shall be closed by a temporary plug or cap to prevent soil and other foreign matter from entering the piping.

3.07 BACKFILLING

- A. Continue placement of drainage stone up to required elevation or depth in each area.
- B. After placement of drainage stone to required depth, lay geotextile over top of drainage stone and overlap adjacent panels as specified in Section 02371.
- C. Place soil backfill over completed geotextile-wrapped drainage stone backfill in layers not exceeding six inches loose thickness up to finish grade. Each layer shall be thoroughly compacted using manually guided compaction equipment.
- D. Placement and compaction of drainage stone and soil backfill shall be performed in a manner that will not damage piping and structures. Products that are damaged shall be replaced at no additional cost to the Project.

3.08 MAINTENANCE AND PROTECTION

- A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.
- B. Remove all debris from within the limits of the constructed stormwater quality facilities.
- C. Protect the constructed areas from erosion and keep free from accumulation of debris. Damage to the constructed areas shall be fully repaired as approved by the Owner's representative.
- D. Where settling occurs prior to final acceptance of the Work, remove finished surfacing, backfill with additional granular material and make other repairs as necessary and as approved by the Owner's representative.

+++END OF SECTION 02683+++

SECTION 02700
REMOVING AND REPLACING PAVEMENT

PART 1 GENERAL

1.01 SCOPE

- A. The work under this Section includes, but it is not necessarily limited to, the removal and replacement of all asphalt paving materials as necessary for the completion of the Work.
- B. This section also includes pavement milling and application of a new surface course over the entire width of existing pavement or to other widths as directed by the Engineer.
- C. This section also includes removing and replacing existing sidewalks, steps, patios, curbs, and gutters in areas where such have been removed for construction of pipelines and appurtenances.
- D. Existing pavement, sidewalks, curbs, and gutters shall be replaced to meet the current City of Atlanta standards, or to match existing pavement sidewalk, curb, or gutters, whichever is more stringent.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 - 1. Batch design.
 - 2. Density and viscosity tests on each run.
 - 3. Weight slips for pavement base and asphalt paving materials.
- B. Provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the asphalt producer and the Contractor.

1.03 CONDITIONS

- A. Weather Limitations
 - 1. Apply bituminous tack coat only when the ambient temperature in the shade has been at least 40 degrees F for 12 hours immediately prior to application.
 - 2. Do not conduct paving operations when surface is wet or contains excess moisture that would prevent uniform distribution and required penetration.

3. Construct asphaltic courses only when atmospheric temperature in the shade is above 40 degrees F, when the underlying base is dry and when weather is not rainy.
 4. Place base course when air temperature is above 40 degrees F and rising. Do not place base on a frozen or muddy subgrade.
- B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.
- C. Traffic Control
1. The Contractor shall maintain vehicular and pedestrian traffic during paving operations and as required for other construction activities.
 2. The Contractor shall provide flaggers, barricades and warning signs for the safe and expeditious movement of traffic through the construction zone within the public right-of-way in accordance with the requirements of Section 01550, Traffic Regulation.

1.04 QUALITY ASSURANCE

- A. All work under this Section shall be performed in accordance with the current Georgia Department of Transportation Standard Specifications.
- B. The Contractor shall use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete and shall be a GDOT approved facility.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary to gain the approval of the Engineer at no additional cost to the City.

1.06 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with the requirements of the General Conditions.
- B. The City's independent testing laboratory shall take samples and perform tests in accordance with the Georgia Department of Transportation Standard Specifications

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: All materials and products for the work under this Section shall conform to the current Georgia Department of Transportation Standard Specifications except as otherwise specified herein.
- B. Graded Aggregate Base: Graded aggregate base shall be Class A meeting the requirements of the Georgia Department of Transportation Specification Section 815.01. Graded aggregate base shall be compacted to a minimum of 95% Standard Proctor Density (ASTM D698).
- C. Prime Coat: Prime coat shall be in accordance with Section 412 of the Georgia Department of Transportation Standard Specifications.
- D. Base: The base for all paved roadways shall conform to the requirements of the Georgia Department of Transportation Specifications for the hot mix asphalt Section 828, Type "B".
- E. Tack Coat: Tack coat shall conform to Section 413 of the Georgia Department of Transportation Standard Specifications.
- F. Surface Course
 - 1. The surface course for all pavement, including prime and tack coat shall conform to the requirements of the Georgia Department of Transportation Specifications for Asphaltic Concrete, Section 828, Type "E".
 - 2. Surface course for pavement within GDOT right of way shall be Superpave as specified in Section 828 of the GDOT Standard Specifications. Thickness shall be 12.5 mm.
- G. Special Surfaces: Where existing pavement, sidewalks, steps, patios, curbs, or gutters are disturbed or damaged which are constructed of specialty type surfaces, e.g., brick or stone, these facilities shall be restored utilizing similar, if not original, materials. Where the nature of these surfaces dictate, a specialty Contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

2.02 PAVEMENT MARKINGS

- A. Pavements markings shall be either pavement paint or thermoplastic reflectorized pavement marking compound.

1. Pavement Paint: Pavement paint shall be No. 5A White Traffic Line Paint and No. 5B Yellow Traffic Line Paint as described in and conforming to the requirements of Article 652 of the Georgia Department of Transportation Standard Specifications.
 2. Pavement Marking Compound: Thermoplastic reflectorized pavement marking compound shall be as described in and conform to the requirements of Article 653 of the Georgia Department of Transportation Standard Specifications.
- B. Pavement markings shall include, but not be limited to the following:
1. Double solid yellow center line.
 2. Solid white pavement edge line where street does not have curb and to mark bicycle lane.
 3. Skip yellow lines to designate lanes in multi-lane streets.
 4. White crosshatch lines for crosswalks at schools and at intersections.
 5. White stop bars at stop streets.
 6. Symbols such as turn arrows one way arrows, etc.
 7. Wording such as “STOP”, “SCHOOL”, etc.
- C. Traffic stripe shall be 6-inches wide on Georgia Department of Transportation streets and City streets designated as arterial. Traffic stripe shall be 4-inches wide on all other streets.

PART 3 EXECUTION

3.01 REMOVING PAVEMENT

- A. General: Remove existing pavement and base as necessary for trench excavation and installation of pipeline and appurtenances.
- B. Remove and replace pavement and base beyond pipeline trench to outer edge of existing pavement if remaining existing pavement width is 24-inches or less from side of trench to outer edge of pavement or roadway.
- C. Marking: Before removing any pavement, mark the pavement neatly paralleling pipelines and existing street lines.
- D. Saw Cutting: Under no circumstances shall the Contractor be allowed to remove concrete or asphalt without prior saw cutting. Asphalt pavement shall be saw cut

- along the marks using suitable equipment. The saw cutting shall be deep enough to produce an even, straight cut.
- E. Machine Pulling: Do not pull pavement with machines until the pavement is completely broken and separated from pavement to remain.
 - F. Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.
 - G. Sidewalks and Patios: Remove and replace any sidewalks or patios disturbed by construction for their full width and to the nearest undisturbed joint.
 - H. Curbs and Gutters: Tunnel under or remove and replace any curb and/or gutter, which is disturbed by construction to the nearest undisturbed joint.
 - I. Steps: Completely remove and replace any steps, constructed of concrete or special surfaces, which are disturbed by construction.

3.02 TYPES OF PAVEMENTS

- A. General: All existing pavement removed, destroyed or damaged by construction shall be replaced with the same type and thickness of pavement as that existed prior to construction, unless otherwise directed by the Engineer. Materials, equipment and construction methods used for paving work shall conform to the Georgia Department of Transportation specifications applicable to the particular type required for replacement, repair, or new pavements.
- B. Graded Aggregate Base: Aggregate base shall be constructed in accordance with the requirements of the Georgia Department of Transportation Standard Specifications. The maximum thickness to be laid in a single course shall be 6-inches compacted. If the design thickness of the base is more than 6-inches, it shall be constructed in two or more courses of approximate equal thickness. After the material placed has been shaped to line, grade, and cross section, it shall be rolled until the course has been uniformly compacted to at least 100 percent of the maximum dry density when Group 2 aggregate is used, or to at least 98 percent of maximum dry density when Group 1 aggregate is used.
- C. Concrete Pavement: Concrete pavement or base courses shall be replaced with concrete. The surface finish, joint pattern and joint sealant of the replaced concrete pavement shall conform to that of the existing pavement. The surface of the replaced concrete base course shall be left rough. The slab depth shall be equivalent to the existing concrete pavement or base course, but in no case less than 6-inches thick. Transverse and longitudinal joints removed from concrete pavement shall be replaced at the same locations and to the same types and dimensions as those removed. Concrete pavements or concrete base courses shall be reinforced. Reinforcing bars and concrete shall

conform to the requirements of Section 03200, Concrete Reinforcement and Section 03300, Cast-In-Place Concrete. Concrete for pavement shall be 3000 psi.

- D. Asphaltic Concrete Base, Bituminous Tack Coat, and Surface Course: Asphaltic concrete base, tack coat, and surface course construction shall conform to Georgia Department of Transportation Standard Specifications. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared; surface is intact, firm, properly cured, dry and the tack coat has been applied. Apply and compact the base in maximum layer thickness by asphalt spreader equipment of design and operation approved by the Engineer. After compaction, the black base shall be smooth and true to established profiles and sections. Apply and compact the surface course in a manner approved by the Engineer. Immediately correct any high, low, or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.
- E. Surface Treatment Pavement: Bituminous penetration surface treatment pavement shall be replaced with the thickness indicated on the Drawings.
- F. Gravel Surfaces: Existing gravel road, driveway and parking area replacement shall meet the requirements of graded aggregate base course. This surfacing may be authorized by the Engineer as a temporary surface for paved streets until replacement of permanent pavement is authorized.

3.03 TEMPORARY ROADWAY SURFACES

- A. After installation of pipeline and appurtenances, the trench shall be backfilled in accordance with the requirements of Section 02225, Trench Excavation and Backfill.
- B. The Contractor shall be required to install and maintain temporary roadway surfaces over all roadway cuts at the end of each day's work if the road is to be opened for traffic when work is not in progress. Temporary roadway surfaces shall consist of either temporary cold asphalt patch, aggregate base course or steel plates over the trench. The surface to be installed shall be selected by the Contractor and approved by the Engineer.
 - 1. Temporary Patch Paving: Temporary patch paving shall be placed on the aggregate base course and shall conform to the existing road surface. Prior to installation of permanent pavement, the temporary patch, and aggregate base course, if necessary, shall be removed to the required depth and leveled to allow for permanent pavement replacement of the thickness as shown on the Drawings.
 - 2. Aggregate Base Course: Aggregate base course surface shall conform to the existing road surface and shall be maintained at grade, dust free, by the Contractor. Prior to installation of permanent pavement, the aggregate base course shall be removed to the required depth and leveled to allow for permanent pavement replacement of the thickness as shown on the Drawings.

3.04 STEEL TRAFFIC PLATES

Following completion of pipeline installation including backfilling but prior to replacement of pavement, steel plates may be used to temporarily carry vehicular traffic if approved by the Engineer. Requirements for utilization of steel plates shall be as follows:

1. Steel plates shall not be allowed in GDOT right of way where the posted speed limit is 45 mph or greater.
2. Trench shall be backfilled and compacted to within ten (10) inches from top of existing pavement prior to placing the steel plate.
3. Steel plates shall meet ASTM structural specifications having "A36" designation with minimum yield stress of 36 ksi (ksi = kilopounds per square inch).
4. Steel plates shall extend a minimum of 12-inches beyond all edges of the trench.
5. In streets and roads where the posted speed is 44 mph or less, asphaltic patching material (cold mix) shall be used to secure the steel plate around its edges. The asphaltic concrete shall be compacted to form ramps with a minimum 12-inch taper to cover all edges of the steel plate.
6. In streets and roads where the posted speed is 45 mph or greater, the approach plate and ending plate shall be attached to the road surface by a minimum of 4 Hilti type anchors predrilled into each corner of the plate and drilled a minimum of 4-inches into the pavement. Asphaltic patching material (cold mix) shall be used to secure the steel plate around its edges. The asphaltic concrete shall be compacted to form ramps with a minimum 12-inch taper to cover all edges of the steel plate. When the plates are removed, the dowel holes in the pavement shall be backfilled with asphalt concrete mix or concrete, as directed by the Engineer.
7. No plate shall be allowed over a trench having a width greater than 48 inches when adequate soil conditions are present. When the trench is greater than 48 inches, the entire lane containing the trench shall be closed. Before closing a lane, a Lane Closure Permit shall be obtained from the City of Atlanta, Department of Public Works, Bureau of Traffic and Transportation. At least 24 hours prior notification is required for the Lane Closure Permit.
8. The width of a trench is measured normal to the length of the trench. The largest reading of the measurements is the determining factor for width. For a series of steel plates on any continuous trench, all plates shall have the same thickness.
9. All necessary warning signs, barricades, and lights shall be adequately provided and placed for the safety of the public and in full conformity with the latest

edition of the MUTCD at no additional cost to the City.

10. Trench shall be fully covered with a minimum of twelve (12) inches of asphalt taper on all sides of the plate.
11. After water service connections are transferred from the existing main to the new main and accepted by the Engineer, the maximum time that steel plates shall remain in place is as follows:
 - a. In City streets – 7 consecutive days
 - b. In GDOT right-of-way - 4 consecutive days
12. Upon the completion of the work and removal of the steel plates, the existing surface shall be cleaned and pavement replaced as specified hereinafter.
13. In the event the steel plates are not removed and pavement restoration initiated within the above specified time frames, the City and GDOT reserve the right to remove the steel plates and replace the pavement at the expense of the Contractor.

3.05 TESTING OF SUBGRADE

- A. Trench backfill shall be compacted for the full width and depth of the trench as specified in Section 02225, Trench Excavation and Backfill.
- B. Upon completion of backfilling and compaction of the backfill, the Contractor shall arrange to have the compaction tested by an independent testing laboratory approved by the Engineer. Compaction testing shall be as specified in Section 02225, paragraph 3.16.
- C. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks, and curbs and gutters removed.
- D. Tests repeated because the compacted backfill, subgrade or base does not meet the specified compaction shall be paid for by the Contractor and will not be reimbursed by the City.

3.06 PAVEMENT REPLACEMENT

A. Limits of Pavement Replacement

1. City Streets

- a. The existing street pavement or surface shall be milled for the full width of the affected travel lane unless directed otherwise by the Engineer. The depth of milling shall be 2-inches.

- b. Milling shall be performed as specified in Section 432 of the GDOT Standard Specifications.
- c. 2-inch thick pavement shall be applied over entire milled area to restore the existing roadway to the same elevation that existed prior to construction.

2. GDOT Right of Way

- a. The existing street pavement or surface shall be milled from curb to curb or to other limits as specified by the Engineer or GDOT. The depth of milling shall be 2-inches unless directed otherwise by the Engineer.
- b. Milling shall be performed as specified in Section 432 of the GDOT Standard Specifications.
- c. Superpave shall be applied over entire milled area to restore the existing roadway to the same elevation that existed prior to construction.

B. Preparation of Subgrade

- 1. If the temporary aggregate base surface is to be replaced, it shall be removed and the graded aggregate base surfacing for unpaved streets or the base for the bituminous surface shall be placed.
- 2. Following this preparation, the graded aggregate base shall be primed with a suitable bituminous material and surfaced with the proper type of bituminous surface treatment.
- 3. Where the paved surface is to be replaced with asphaltic concrete pavement, concrete pavement or with a concrete base and a surface course, the temporary aggregate base surface and any necessary backfill material, additional existing paving and new excavation shall be removed to the depth and width shown on the Drawings. All edges of the existing pavement shall be cut to a straight, vertical edge. Care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street. Concrete base slabs and graded aggregate bases, if required, shall be placed and allowed to cure for three days before bituminous concrete surface courses are applied. Expansion joints, where applicable, shall be replaced in a manner equal to the original joint.
- 4. Where driveways or roadways, constructed of specialty type surfaces, e.g., brick or stone are disturbed or damaged, these driveways and roadways shall be restored utilizing similar materials. Where the nature of these surfaces dictate, a specialty Contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

C. Pavement Placement and Resurfacing

1. After all pipe line installations are complete and subgrade has been placed as specified in Paragraph 3.06.B above, apply tack coat and surface course as specified herein.
2. Resurfacing limits shall be perpendicular to the road centerline.
3. Where pavement is damaged with potholes, the Contractor shall remove all existing loose pavement material and fill the hole with black base, as specified, to the level of the existing pavement.
4. Placement of pavement shall conform to the Standard Details shown on the Drawings and GDOT standard specifications.

3.07 ADJUSTING EXISTING STRUCTURES

Existing manholes, inlets, valve boxes etc. within the limits of construction, which do not conform to the finished grade of the proposed pavement or the finished grade designated on the Drawings shall be cut down or extended and made to conform to the finished grade. The materials and construction methods for this work shall be approved by the Engineer.

3.08 SIDEWALK, WHEELCHAIR RAMP AND CURB AND GUTTER REPLACEMENT

- A. All sidewalks, wheelchair ramps and curbs and gutters damaged by the Contractor shall be replaced by the Contractor at no expense to the City.
- B. Refer to section 02302 for Granite Curb Construction.
- C. Refer to Section 02308 for Hexagonal Block Sidewalk Construction.
- D. Refer to Section 02310 for Unit Paver Construction.
- E. Refer to Section 02530 for Concrete Sidewalk and Wheelchair Ramp Construction.
- F. Refer to Section 02532 for Concrete Curb and Gutter Construction.

3.09 TRAFFIC DETECTION LOOPS

- A. Replacement and/or repair of damaged traffic detection loops shall be constructed and tested in accordance with the requirements of Section 647 of the Georgia Department of Transportation Standard Specifications.

- B. The Contractor shall coordinate the testing of all traffic detection loops with the City of Atlanta Department of Public Works and/or GDOT to ensure the functionality of all traffic signals affected by the Work.

3.10 PAVEMENT MARKINGS

- A. Pavement marking shall be applied to pavement in the same pattern that existed prior to construction. All final markings shall meet the requirements of the Manual of Uniform Traffic Control Devices (MUTCD) and GDOT Standard Specification Sections 652 and 653.
- B. Pavement surfaces on which paint will be applied shall be examined for conditions that would adversely affect application of paint, permanence and quality of work. Paint shall be thoroughly mixed before being applied.
- C. Pavement surfaces on which paint will be applied shall be free from moisture, dirt, dust grease, oil and all other foreign matter immediately before paint is applied. Cleaning equipment shall not damage the pavement.
- D. Paint wet film thickness shall not be less than 15 mils.
- E. Thermoplastic traffic stripe shall consist of solid or broken (skip) lines, words and/or symbols of the type and colors shown in the MUTCD Manual. Short lines such as crosswalks, stop bars, arrows, symbols and crosshatching shall be extruded. All other lines shall be sprayed.
- F. Pavement markings which fail to present a satisfactory appearance or to otherwise meet the requirements of this section shall be corrected by removing the affected portion and by painting a new marking in accordance with the requirements of this Section.

3.11 INSTALLATION

- A. Asphaltic construction shall be performed in accordance with Section 400 of the Georgia Department of Transportation Standard Specifications.
- B. Place each course in the required quantities so that when compacted, they will conform to the indicated grade, cross section and minimum thickness as specified or as indicated on the Drawings.

3.12 CLEANING AND PROTECTION

Prior to acceptance of the work of this Section, clean the pavement and related areas in accordance with the requirements of the General Conditions of the Contract Documents. The Contractor shall remove all surplus excavation materials and debris from the street

surfaces and rights-of-way and shall restore street, roadway or sidewalk surfacing to its original condition.

3.13 APPROVAL AND ACCEPTANCE

- A. Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.
- B. Obtain the Engineer's approval of restoration of pavement, such as private roads and drives that are not the responsibility of a regulatory agency.
- C. Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.
- D. Prior to acceptance and approval of any asphaltic concrete binder and/or topping which is installed for the purpose of City maintenance, a representative of the City of Atlanta's Department of Traffic and Transportation may require one or all of the following tests: 1) coring, 2) extraction, 3) compaction and 4) density. The frequency and location of these tests will be at the discretion of the Engineer.

3.14 MAINTENANCE

- A. The Contractor shall maintain the surfaces of roadways and pavements replaced until the acceptance of the Project. Maintenance shall include replacement, scraping, reshaping, milling, overlapping, and re-rolling as necessary to prevent raveling of the road material, the preservation of smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the Engineer.
- B. Maintenance shall also include sprinkling as may be necessary to abate dust from the gravel surfaces.

+ + + END OF SECTION 02700 + + +

**SECTION 02730
SEWERS AND ACCESSORIES**

PART 1 – GENERAL

1.01 SCOPE

- A. This Section describes products to be incorporated into sewers and accessories and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.
- B. General: Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

1.02 QUALIFICATIONS

- A. If requested by the Engineer, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

1.03 SUBMITTALS

- A. If required by the City or Engineer, complete product data and engineering data shall be submitted to the Engineer in accordance with the requirements of General Condition Section 28 of the Contract Documents.

1.04 TRANSPORTATION AND HANDLING

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.
- B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front loader. Do not use material damaged in handling.
- C. Lined pipe shall be handled and transported to prevent damage to linings.

1.05 STORAGE AND PROTECTION

- A. Make arrangements for the use of suitable storage areas for piping and other materials required for the Work.
- B. Stored materials shall be kept safe from damage. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.
- C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated “bell, plain end,” “bell, plain end.” At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipes in adjacent tiers.
- D. Store joint gaskets in a cool location, out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.
- E. PVC pipe and fittings shall not be stored in direct sun light.

1.06 QUALITY ASSURANCE

- A. Product manufacturers shall provide the Engineer with written certification that all products furnished comply with all applicable provisions of these Specifications.
- B. If ordered by the Engineer, each pipe manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of five days during initial pipe installation.
- C. Upon request by the Engineer, the Contractor shall furnish samples for material tests by the City’s independent laboratory demonstrating compliance with this Specification to verify the required physical properties and characteristics of supplied materials. The City shall pay for tests on pipe samples that meet specification requirements. Contractor shall pay for failed tests and re-testing of failed materials.

PART 2 – PRODUCTS

2.01 DUCTILE IRON PIPE (DIP)

- A. Ductile iron pipe shall be utilized where shown on the Drawings or directed by the Engineer.
- B. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipes, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipes shall have a minimum pressure rating as indicated in the following table, and corresponding minimum wall thickness, unless otherwise specified, or shown on the Drawings. Pipe wall thickness shall be determined based on dead loads indicated on the Drawings and the anticipated live loads, assuming a minimum HS 20 live load.

Pipe Sizes (inches)	Pressure Class (psi)
4 - 12	350
14 - 20	250
24	200
30 - 60	150

- C. Fittings and Accessories:
- Fittings shall be ductile iron and shall conform to AWWA C110/ANSI A21.10 or AWWA C153/ANSI A21.53, with a minimum rated working pressure of 250 psi.
 - Flanged elbow fittings shall be ANSI pattern using short radius elbows, except where noted differently on the Drawings. Special fittings, ductile iron wall pipes and sleeves shall conform to the dimensions and details as shown on the Drawings.
- D. Joints for Ductile Iron Pipe and Fittings:
- General:
 - Joints for ductile iron pipe and fittings shall be mechanical joints, restrained, flanged or push-on joint as specified herein.

- b. Unless otherwise shown on the Drawings, specified or directed, all ductile iron pipe laid underground shall be joined using push-on type joints.
- c. In all cases, gaskets shall be made of material that will not be damaged by the fluid being transported or by the environment in which the pipe is installed.
- d. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.

2. Mechanical Joints:

- a. Joints shall conform to AWWA C111/ANSI A21.11.
- b. Bolts and nuts shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A 242 to the dimensions shown in AWWA C111/ANSI A21.11.
- c. Gaskets shall be in accordance with AWWA C111/ANSI A21.11 and shall be constructed of plain rubber.
- d. Mechanical joint glands shall be ductile iron.

3. Push-On Joints: Push-on joints and gaskets shall conform to AWWA C111/ANSI A21.11. Details of the joint design shall be in accordance with the manufacturer's standard practice such as ACIPCO "Fastite," McWane (Clow) "Bell-Tite," or U.S. Pipe "Tyton" joints.

E. Linings & Coatings: Sewer pipe and fittings shall be cement lined in accordance with ANSI/AWWA C104/A21.4.

F. Polyethylene Encasement: Polyethylene film shall meet the requirements of AWWA C 105.

G. Wall Sleeves and Wall Pipes:

- 1. Where piping passes through concrete structures, furnish and install wall sleeves unless wall pipes or other provisions are specifically shown on the Drawings. Wall sleeves shall be accurately located and securely fastened into position before concrete is poured.

2. Wall Sleeves:

- a. For pipe sizes smaller than 3-inches, wall sleeves shall be steel oversize sleeves furnished with a full circle, integral or continuously welded waterstop collar. The sleeve seal shall be the mechanically expanded, synthetic rubber type. Provide all associated bolts, seals and seal fittings, pressure clamps, or plates necessary to achieve a watertight installation. Sleeves shall extend the full thickness of the concrete. Sleeves and seal shall be Link Seal.
- b. For larger pipe sizes, wall sleeves shall be ductile iron mechanical joint wall sleeves. Unless specified or shown otherwise for a specific situation, wall sleeves shall be mechanical joint bell-plain end types with waterstop/thrust collar. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead end load from either direction on that size pipe. Sleeves shall be constructed with studs and mechanical joint retainer gland on the air side of the concrete structure. Provide retainer gland where shown on the Drawings. Where the concrete structure is exposed to dirt on one side and is wet on the other side, construct with studs and glands on the dirt side. Wall sleeves shall be equal to ACIPCO A-10771.

3. Wall Pipes:

- a. Wall pipes shall be either ductile iron with integral waterstop/thrust collar or centrifugally cast ductile iron with a continuously welded waterstop/thrust collar. The welded on collar shall be attached to the pipe by the manufacturer. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead end load from either direction on that size pipe. Wall pipes shall be furnished uncoated on the outside and cement lined on the inside. Unless specified or shown otherwise, wall pipes shall be flange end types.
- b. Wall pipes shall be cast and/or fabricated and lined in one manufacturer's facilities and delivered to the job site ready for use.

2.02 REINFORCED CONCRETE PIPE (RCP)

A. Pipe:

1. Pipe shall be bell and spigot reinforced concrete conforming to ASTM C 76 for Class III, IV and V pipe as shown on the Drawings.
2. In addition, the pipe and materials shall meet the following requirements:

- a. Concrete shall have a minimum compressive strength of 5,000 psi for Class III and IV and 6,000 psi for Class V
 - b. Cement shall meet the requirements of ASTM C 150, Type II
 - c. Absorption shall not exceed six percent when tested in accordance with ASTM C 497.
3. Reinforced concrete pipe shall be supplied in lengths of at least eight feet, except for specials.
- B. Joints: Pipe shall have concrete and rubber O-ring gasket type joints conforming to ASTM C 361. A rectangular groove shall be supplied in the spigot end to receive the rubber O-ring gasket, and it shall be so formed that when the joint is complete the gasket will be deformed to a rectangular shape and confined on all four sides. Bell and spigot surfaces shall be accurately formed and smooth to provide a close sliding fit with a nominal clearance of 1/16-inch.
- C. Fittings and Specials: Reinforced concrete pipe fittings and specials shall meet all requirements for reinforced concrete pipe, including materials of construction, structural strength, linings, and joints. Provide special adapters or transition pieces for connection to pipe of different materials where shown on the Drawings.
- D. Acceptance:
1. Acceptance of pipe shall be based on plant load-bearing tests for the load to produce 0.01-inch crack, material tests, and inspection of manufactured pipe for visual defects and imperfections as described in Paragraph 5.1.1 of ASTM C 76.
 2. Provide results of tests on pipe, pipe materials, joint material, and made-up joints performed by an independent testing laboratory approved by the Engineer. Include materials, absorption, crushing, and hydrostatic leakage tests on pipe of each size in accordance with applicable specifications.
 3. Each length of pipe shall be stamped by a regular employee of the approved testing laboratory.
 4. Inspect pipe after delivery for laboratory stamp, shape, cracks, uniformity, blisters and imperfect surfaces, hammer test, damaged ends, and gasket grooves. Do not accept or use pipe with repaired or patched gasket grooves or shoulders. Any pipe repaired or patched is subject to rejection if such repairs or patches, in the opinion of the Engineer or City, are not sound and properly finished.

5. The City shall, at its own discretion, select another independent testing laboratory to confirm those tests performed by the manufacturer's testing laboratory. This testing laboratory shall observe the tests conducted by the laboratory selected by the manufacturer, or, as necessary, conduct its own tests. The manufacturer shall provide the necessary facilities for the performance of these tests at the plant site. These test specimens shall be provided in accordance with paragraph 11 of ASTM C 76.
6. No pipe shall be shipped before it has been cured for a minimum of 14 days.

2.03 POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE

A. Acceptability of PVC pipe for gravity sewers is indicated in the following table:

Standard Minimum Thickness Type PVC¹	Wall	Acceptable Manufacturers	≤ 6	8 to 15	18	21	24
ASTM D 3034 SDR 35 12454B	Solid Wall	Open	Yes	Yes	No	No	No

¹ As specified in ASTM D 1784

- B. All pipes shall have a minimum pipe stiffness of 46 psi at five percent deflection as determined by ASTM D 2412.
- C. PVC gravity sewer pipe shall be supplied in lengths not longer than 13 feet.
- D. Fittings:
 1. Fittings 15 inches in diameter and less shall be manufactured in accordance with ASTM D 3034. PVC compound shall be 12454B or 12454C as specified in ASTM D 1784.
 2. For sizes 8-inches and less in diameter, fittings shall be molded in one-piece with no solvent welded joints. Minimum socket depths shall be as specified in ASTM D 3034, Table 2.
 3. For sizes 10-inches and larger in diameter, fittings shall be fabricated from pipe conforming to ASTM D 3034 using solvent welding. No field fabrication of fittings will be allowed. All such fabrication shall be performed at the factory and the fittings shall be delivered ready for use.

4. 4-inch and 6-inch cleanout piping assembly shall be constructed with by connecting the cleanout branch to the lateral with a 2-way, smooth flowing sanitary cleanout tee to facilitate the insertion of a sewer snake or exploratory flexi-cameras for either direction. The 2-way cleanout fitting shall be manufactured with gasketed hub connections. Solvent weld connections will not be allowed. Acceptable manufacturers are those equal to Plastic Trends, Inc. Part No. G1006.
 5. Fittings 18 inches in diameter and larger shall be fabricated from pipe conforming to ASTM F 679 using solvent welding. No field fabrication of fittings will be allowed. All such fabrication shall be performed at the factory and the fittings shall be delivered ready for use.
- E. Joints: Joints for pipe and fittings shall be of the integral bell and spigot type with a confined elastomeric gasket having the capability of absorbing expansion and contraction without leakage, when tested in accordance with ASTM D 3212. Gaskets shall meet the requirements of ASTM F 477. The joint system shall be subject to the approval of the Engineer and shall be identical for pipe and fittings.
- F. Manhole Connections - Solid Wall Pipe: The sewer shall be connected to manholes utilizing a boot connection.
- G. Acceptance: Acceptance will be based on the Engineer's inspection and the manufacturer's written certification that the pipe and fittings were manufactured and tested in accordance with the applicable standards.

2.04 HDPE PIPE

- A. The pipe supplied under this specification shall be high performance, high molecular weight, high-density polyethylene pipe equal to Driscoplex as manufactured by Chevron Phillips Chemical Company. The pipe material shall be Type III, Class C, Category 5, P34 material as described in ASTM D 1248. Minimum cell classification values of the pipe material shall be (3 4 5 4 3 4 c) as referenced in ATSM D 3350. The SDR shall be 17. The fittings supplied under this specification shall be molded from a polyethylene compound having a cell classification equal to or exceeding the cell classification of the pipe supplied under this specification.
- B. Physical Properties of Pipe of Pipe Compound:
1. Density: The density shall be 0.941 – 0.957 gms/cm when tested in accordance with ASTM D 1505.
 2. Melt Flow: Melt Flow shall be no greater than 0.11 gm/10 min. When tested in accordance with ASTM D 1238 – Condition E.

3. Flex Modulus: Flexural Modulus shall be 110,000 psi to less than 160,000 psi when tested in accordance with ASTM D 790.
 4. Tensile Strength at Yield: Tensile strength at yield shall be 3,200 PSI to less than 3,500 PSI when tested in accordance with ASTM D638.
 5. ESCR: Environmental Stress Crack Resistance shall be in excess of 5,000 hours with zero failures when tested in accordance with ASTM D 1693 Condition C.
 6. Hydrostatic Design: Basic shall be 1,600 psi at 23-C when tested in accordance with ASTM D 2837.
- C. Deviations: If a supplier chooses to submit a bid that does not meet all the requirements of this specification, his bid shall include a written description of the deviation with data that shows the magnitude of the deviation and the justification for the deviation from this specification. The decision to accept material deviating from this specification shall be the responsibility of the specifying engineer.
- D. Certification: The City or the specifying engineer may request certified lab data to verify the physical properties of the materials supplied under this specification or may take random samples and have them tested by an independent laboratory.
- E. Rejection: Polyethylene pipe and fittings may be rejected for failure to meet any of the requirements of this specification.
- F. Pipe Dimensions: Pipe supplied under this specification may be iron pipe size (IPS) or ductile iron pipe size (DIPS) as produced by the manufacturer. IPS or DIPS nominal pipe sizes equal to the pipe dimension shown on the Drawings shall be provided for all pipe sizes equal to or less than 12 inches. IPS or DIPS actual inside diameter shall be provided which is equal to or greater than the pipe dimension shown on the Drawings for all pipe sizes greater than 12 inches. The SDR (Standard Dimension Ratio) of the pipe supplied shall be as specified by the Engineer.
- G. Color: Material color shall be light gray. Light gray interior color of pipe shall allow easier/better viewing for television inspection.
- H. Anti-flotation Measures: Where ground cover for HDPE pipe is less than four feet (4 ft), antiflotation devices are to be installed in order to overcome potential uplifting forces from groundwater. These devices may include, but are not limited to, precast concrete saddles, gravel-filled saddle bag pipeline weights, or cast-in-place anti-flotation collars (per Detail 21 on the Drawings). Wherever such a device is to be installed, the Contractor shall be responsible for performing the necessary

calculations to ensure that the pipe will not float AND that the pipe and/or antiflotation device will not be overstressed. The pipe manufacturer's allowable shear stress, compressive stress due to buckling and thermal expansion shall be considered in the calculations. Minimum factor of safety against flotation is 1.5. These calculations shall be submitted with shop drawings for anti-flotation devices when such devices are required.

2.05 HDPE MANHOLES

- A. Material: The material used under this specification shall be high performance, high molecular weight, high density polyethylene plastic compound having a cell classification of 334433C or higher. The material must have a proven capacity for sustaining long term stresses (radial loading, ring compressive thrust, bending, buckling, axial strain, axial buckling, and groundwater effects) as quantified under ASTM Test Method D2837 or other applicable testing procedures under ASTM.
- B. Appurtenances:
1. Polyethylene Manhole Covers: Polyethylene flat-plate covers shall be designed to withstand light live-loads, such as light equipment and personnel. All manhole covers shall prove to meet this requirement through either physical testing or design calculations. If subject to repeated vehicular loading, the cover should be capped or cast in concrete.
 2. Risers: All riser sections shall be joined by thermal fusion or gasket joints. Where risers are joined by a gasket joint, the joints must meet the requirements of Specification D 3212.
 3. Cones: Where gasket joints are required to seal the connection between a manhole cone or top, the gasket joint shall prove to provide an adequate seal against the maximum water-head expected for the joint in question.
 4. Antiflotation Devices: Where manhole risers extend below the groundwater level, antiflotation devices are to be installed in order to overcome any foreseen uplifting forces. These devices may include, but are not limited to, anchoring to a concrete slab, or attaching a concrete ring to the base or riser. Wherever such a device is to be installed, the Contractor shall be responsible to perform the necessary calculations to ensure that both the manhole will not float AND that the antiflotation device will not be overstressed. These calculations shall be included with the shop drawing submittals.
 5. Pipe Connection: Each HDPE manhole will have a stub for all pipes entering and leaving the chamber. The Contractor shall supply under this

section all necessary connections, couplings, etc., to join adjacent pipe to HDPE stub pipe.

2.06 PRECAST CONCRETE MANHOLES AND PRODUCTS

A. Precast Concrete Sections:

1. Precast concrete sections shall meet the requirements of ASTM C 478 or ASTM C 913. The minimum compressive strength of the concrete in precast sections shall be 4,000 psi.
2. Wall thickness shall be as shown on the Drawings.
3. Transition slabs or cones that convert bases larger than four feet in diameter to four foot diameter risers shall be designed by the manhole manufacturer to carry the live and dead loads exerted on the slab.
4. Seal joints between precast sections by means of rubber O-ring gaskets or flexible butyl rubber sealant. Butyl rubber sealants shall meet the requirements of AASHTO M-198. Sealant shall be pre-formed type with a minimum nominal diameter of 1-inch. Butyl rubber sealant shall be equal to Kent Seal No. 2 or Concrete Sealants CS202.
5. Each section of the precast manhole shall have not more than two (2) holes for the purpose of handling and laying. These holes shall be tapered and shall be plugged with rubber stoppers or mortar after installation.
6. Polypropylene plastic manhole steps shall be installed in each section of the manhole in accordance with the City of Atlanta standard details.

B. Brick and Mortar: Brick shall be whole and hardburned, conforming to ASTM C 32 Grade MS. Mortar shall be made of one part Portland cement and two parts clean sharp sand. Cement shall be Type 1 and shall conform to ASTM C 150. Sand shall meet ASTM C 144.

C. Foundations: A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed in accordance with the requirements of Section 03300. The foundation shall be built to the correct elevation and shall be finished to cause the least possible resistance to flowing water.

D. Laying Brick: All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar that is not used within 45

minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it, which can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint. Any bricks that may be loosened after the mortar has taken its set shall be removed, cleaned, and relaid with fresh mortar. No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.

- E. Joints: All joints shall be slushed with mortar at every course, but slushing alone will not be considered adequate for making an acceptable joint. Exterior faces shall be laid up in advance of backing. Exterior faces shall be back plastered or pargeted with a coat of mortar not less than ½ -inch thick before the backing is laid up. Prior to pargeting, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than ¼-inch or more than ½-inch wide and whatever width is adopted shall be maintained uniform throughout the work.
- F. Pointing: Face joints shall be neatly struck, using the weather joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used, the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.
- G. Cleaning: Upon completion of the work, all exterior surfaces shall be thoroughly cleaned by scrubbing and washing down with water and, if necessary to produce satisfactory results, cleaning shall be done with a 5 percent solution of muriatic acid, which shall then be rinsed off with liberal quantities of clean fresh water.
- H. Curing and cold weather protection: In hot or dry weather, the brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost in the brick or when the air temperature is below 50 degrees F, unless the Contractor has on the project, ready to use, suitable covering and an artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60 degrees F for the duration of the curing period.
- I. Iron Castings:
 - 1. Cast iron manhole frames and covers shall meet the requirements of ASTM A 48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth, and free from blow holes, blisters,

shrinkage, strains, cracks, cold shots and other imperfections. No casting will be accepted which weighs less than 95 percent of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking.

2. Manhole frames and covers shall be as shown on the Standard Details.
 3. All frames and covers shall have machined horizontal bearing surfaces.
 4. All manholes shall have standard frames and covers except where specifically shown otherwise on the Drawings.
 5. Watertight covers shall be bolt-down type and shall be equipped with four 1/2-inch stainless steel bolts and a 1/8-inch red rubber or rubber O-ring gasket. Covers shall be rotatable and interchangeable. Bolt holes shall be bored through so that debris entering the bolt hole will fall into the manhole. Bolt holes shall have the full 360 degree circle within the cover's radius when bored through the cover.
- J. Boots: Provide preformed rubber boots and fasteners equal to those manufactured by Kor-N-Seal or Press Seal Gasket Corporation. Boots may be mechanically attached to the manhole or cast into the walls of the manhole.

2.07 MISCELLANEOUS

A. Flexible Adapter Couplings:

1. Couplings for pipe sizes 15-inches in diameter and less shall be elastomeric plastic sleeves designed to connect pipes of dissimilar materials. Adapters shall provide a positive seal against infiltration and exfiltration and remain leakproof and rootproof up to 4.3 psi. The adapter manufacturer shall provide all stainless steel clamps and required accessories.
2. Couplings shall be products equal to Fernco and shall be installed in accordance with the manufacturer's recommendations.

B. Inside Drop Connections:

1. Where a sewer entering an existing manhole is more than 24-inches above the manhole invert, an inside drop inlet shall be constructed to lower the inlet elevation of the sewer to coincide with the invert elevation of the manhole. If required, the manhole invert and bench shall be re-built in conjunction with the installation of the drop connection to ensure a smooth flow path for the incoming sewer drop. The inside drop connection shall be field fabricated with Schedule 80 PVC fittings and piping, or may be

shop fabricated with different materials by a specialty manufacturer subject to approval by the Engineer (e.g. molded polyethylene inside drop inlet by GU International). The top fitting of the inside drop connection shall be a tee fitting or a 90-degree bend with a clean out attachment at the opposite end of the incoming flow opening (to facilitate future sewer inspection and/or cleaning). The bottom fitting of the drop shall be a 90-degree bend into the manhole invert, or a plain end may be used where a concrete fillet is constructed to transition flow from the plain end into the manhole invert. All pipe to manhole connections must conform to ASTM C923. Anchor straps and bolts shall be 304 stainless steel, minimum, with 4 vertical feet maximum spacing (2 straps minimum).

C. Chemical Root Treatment:

1. Chemical Root treatment shall be utilized where indicated to kill invasive roots and to prevent root re-growth in small diameter sewers. Chemical treatment shall be non-carcinogenic, herbicidal type and applied by professional applicator personnel licensed by the Georgia Department of Agriculture. The applicator shall have a minimum of one year experience and having successfully treated a minimum of one hundred thousand lineal feet of sewer main piping in the continental United States of America.
2. Preconditioning or cleaning of the sewer main shall not be required before or after application of chemical root control unless specifically indicated by the Engineer (e.g. to remove large blockages or debris, which may be surcharging the sewer). Root masses do not generally require cutting by mechanical means prior to application of chemical root treatment and shall not be performed unless directed by the Engineer. In such an event, the contractor shall coordinate root cutting with application of the chemical root treatment in accordance with the manufacturer recommendations to meet the desired level of performance stated below.
3. Each treatment application shall progress from the downstream manhole (whenever practical) at such a rate and pressure so as to provide full chemical contact of the entire interior surface of the sewer main while providing penetration of all piping joints, cracks, holes and service connections. The retention time and concentration of the chemical shall be sufficient to kill all roots in the sewer and prevent root re-growth for a period of two years after the application. If re-growth is evident prior to expiration of the aforementioned two-year period, the Contractor shall provide additional chemical root treatment to the satisfaction of the City at no additional cost.

4. Acceptable products are diquat based herbicides equal to those manufactured by Dukes Root Control, Inc.

PART 3 – EXECUTION

3.01 EXISTING UTILITIES AND OBSTRUCTIONS

- A. The Contractor shall call the Utilities Protection Center (UPC) (1-800-282-7411) as required by Georgia law (O.C.G.A. §§25-9-1 through 25-9-13) and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site, at least 72 hours (three business days) prior to construction, to verify the location of the existing utilities.
- B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.
 1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only ten days after original notice. The Contractor shall ensure, at the time of any excavation, that a valid utility location exists at the point of excavation.
 2. Expose the facility to verify its true location and grade for a distance of at least 200 feet in advance of pipeline construction to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
 3. Avoid utility damage and interruption by protecting it with means or methods recommended by the utility owner.
 4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Engineer an updated copy of the log bi-weekly, or more frequently if required.
- C. Conflict with Existing Utilities:
 1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the sewer by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the sewer to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement and complies with

regulatory agency requirements after a written request to and subsequent approval by the Engineer. Where the Engineer does not approve such relocation of the sewer, the Contractor shall arrange to have the utility, main, or service relocated.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed sewer does not permit the crossing without immediate or potential future damage to the utility, main, service, or the sewer. The Contractor may change the proposed grade of the sewer to avoid vertical conflicts if the changed grade provides minimum required capacity, maintains adequate cover and complies with regulatory agencies requirements, after written request to and subsequent approval by the Engineer. Where the Engineer does not approve such relocation of the sewer, the Contractor shall arrange to have the utility, main, or service relocated.

D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

E. Water and Sewer Separation:

1. Sewers should maintain a minimum 10-foot edge-to-edge separation from water mains. Where the sewer crosses a water main, an 18-inch vertical separation shall be maintained where possible. Where possible, a full joint of sewer pipe shall be centered over the water main. Any deviation shall be requested in writing to the Engineer.
2. No water main shall be permitted to pass through or come in contact with any part of a manhole.

F. Installation: The covers of all manholes shall be at least 30" above grade after installation, except in grassed/landscaped or paved areas. After completion of the manhole survey, the contractor shall submit finish grades of all manhole covers and submit with shop drawings.

G. Rock Excavation: When rock is encountered in trenches, it shall be removed to a depth of at least six inches (6") below the pipe bell, and a width of three inches (3") on each side of the pipe bell, except for a minimum required trench width of twenty-four inches (24"). Refer to Section 02200 for rock classification and measurement.

3.02 PIPE DISTRIBUTION

A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

- B. No pipe shall be strung further along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the City. The City reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.
- C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.
- D. No distributed pipe shall be placed inside drainage ditches.
- E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.03 LOCATION AND GRADE

- A. The slope shown on a pipeline profile and/or called for in the Specifications is the slope of the invert of the pipe.
- B. Prior to clearing and grubbing, construction staking shall be performed.
- C. Construction shall begin at the low end of the sewer and proceed upstream without interruption. Multiple construction sites shall not be permitted without written authorization from the Engineer for each site. At a minimum, cut sheets between construction sites shall be submitted and approved before multiple construction sites will be permitted.
- D. The Contractor shall be responsible for any damage done to reference points, base lines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, base lines, center lines and temporary bench marks as a result of the operations.

3.04 LAYING AND JOINTING PIPE AND ACCESSORIES

- A. Lay all pipe and fittings to accurately conform to the lines and grades established by the Engineer.
- B. Pipe Installation:
 - 1. Proper implements, tools and facilities shall be provided for the safe performance of the Work. All pipe, fittings and valves shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or

equipment in such a manner as to prevent damage to sewer materials and protective coatings and linings. Under no circumstances shall sewer materials be dropped or dumped into the trench.

2. All pipe, fittings and appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject the materials.
3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe that contains dirt shall be laid.
4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.
5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.
6. It is common practice to lay pipe with the bells facing the direction in which work is progressing; however, it is not mandatory.
7. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted.
8. Polyethylene Encasement: For Ductile Iron Pipe, installation of encasement, when directed by the Engineer, shall be in accordance with AWWA C105 and the manufacturer's instructions. All ends shall be securely closed with tape and all damaged areas shall be completely repaired to the satisfaction of the Engineer.

C. Alignment and Gradient:

1. Lay pipe straight in alignment and gradient or follow true curves, where shown on the Drawings, as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.
2. Maintain a transit, level and accessories on the job to lie out angles and ensure that deflection allowances are not exceeded.
3. The Contractor shall check the invert elevation at each manhole and the pipe invert elevation at each bell in open cut areas of pipe installation

4. The Contractor shall check the horizontal alignment of the sewer and ground surface elevations at the same schedule as for invert elevations.
- D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible, as determined by the Engineer. Do not leave unjointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the Engineer.
- E. Joint Assembly:
1. Joints shall be assembled in accordance with the manufacturer's recommendations.
 2. The Contractor shall internally inspect each pipe joint to insure proper assembly for pipe 30-inches in diameter and larger after the pipe has been brought to final alignment.
 3. On reinforced concrete pipe, diameters 30-inches and larger, the Contractor shall fill the voids, on the pipe joint interior, with grout.
- F. Cutting Pipe:
1. Cut ductile iron pipe using an abrasive wheel saw.
 2. Cut PVC/HDPE pipe using a suitable saw.
 3. Remove all burrs and smooth the end before jointing.
 4. The Contractor shall cut DIP pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location. Only push-on or mechanical joint pipe shall be cut. Plastic and HDPE Pipe shall be cut precisely square.

3.06 SEWER SERVICE CONNECTIONS

- A. All sewer service connections shall be identified and located prior to pipe installation or replacement. The complete list of service laterals; included relevant footage and diameter of lateral shall be submitted prior to pipe installation or replacement to the Engineer for information. Upon commencement, pipe installation or replacement shall be continuous and without interruption from one manhole to another, except as approved by the Engineer and/or Engineer representative.
- B. After installation or replacement of mainline sewer is complete, but prior to service reconnects, perform a CCTV inspection with a hand held (“Push”) CCTV camera of all service laterals to the edge of right-of-way (ROW) or edge of easement, or as far as is feasible based on configuration or defects of laterals. The inspection shall be performed in the presence of the Engineer and/or Engineer representative. If the Engineer determines that a lateral requires replacement, the service lateral shall be replaced complete from the mainline sewer to the edge of ROW or edge of easement. If directed to do so by the Engineer, install a two-way cleanout at the edge of ROW or easement. The cleanout shall incorporate all appropriate and necessary couplings for a watertight connection to the service lateral piping.
- C. Upon completion of installation of the new mainline sewer pipe, the Contractor shall complete the reconnection of all service laterals on the segment within 24-hours to minimize inconvenience to sewer customers. Exceptions to this requirement apply only to service laterals that will be replaced from the mainline sewer to the edge of ROW or easement. In these cases, services shall be reconnected within a time frame specified by the Engineer at the work site.
- D. All service connections shall be made by core drilling a circular hole through the wall of the existing pipe. The hole size shall be equal to the inside diameter of the connecting piping, free of burrs or rough edges and perpendicular to the existing pipe. Installation of the saddle assembly shall be in accordance with the saddle manufacturer’s recommendations and provide a watertight seal. Pipe branch connection products shall correspond to the sewer main pipe material as indicated below:

Sewer Main Material	Branch Connection Product
Ductile Iron ***	Sewer saddle equal to CB Sewer Saddle manufactured by Romac Industries.
Concrete	Sewer saddle equal to CB Sewer Saddle manufactured by Romac Industries.
Vitrified Clay ***	Sewer saddle equal to CB Sewer Saddle manufactured by Romac Industries.
PVC ***	Flexible type saddle equal to Fernco Flexible Tap Saddle.
HDPE	Flexible type saddle equal to Fernco Flexible Tap Saddle or electrofusion saddle equal to Central

	Plastics Company Electrofusion Branch Saddle.
Planned CIPP Lining	Ductile Iron Tee or Wye installed prior to lining sewer main to prevent damage to branch fitting during robotic reconnection of service lateral

*** Wye or Tee fittings shall be used in lieu of the products indicated above if the sewer main piping is installed or repaired using open cut trench methods.

- E. Connections to the existing sewer house connection pipe shall be made using sleeved stainless steel flexible couplings. All flexible couplings shall conform to ASTM C 425 and shall be equal to those manufactured by Fernco Inc., DFW Plastics, Inc., or Mission Rubber Company.
- F. In the event a lined pipe is encountered, the host pipe (outer) pipe material shall be used to determine the branch connection product as indicated above.
- G. The slope of the existing service connection (lateral) toward the new pipe shall be maintained at the existing percent slope. Reconstructed service laterals shall be installed at a minimum slope of one percent (1%) or as specified by the Engineer.

3.07 CONSTRUCTION PRACTICES FOR POLYETHYLENE PIPE

- A. Handling of Pipe: Pipe shall be stored on clean, level ground to prevent undue scratching or gouging of the pipe. If the pipe must be stacked for storage, such stacking should be in accordance with the pipe manufacturer's recommendations. The pipe should be handled in such manner that it is not damaged by being dragged over sharp objects or cut by chokers or lifting equipment.
- B. Repair of Damaged Sections: Segments of pipe having cuts or gouges in excess of 10% of the wall thickness of the pipe shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the butt fusion joining method.
- C. Pipe Joining: Sections of polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedure shall be capable of meeting all conditions recommended by the pipe temperature, alignment, and fusion pressure.
- D. Handling of Fused Pipe: Fused segments of pipe shall be handled so as to avoid damage to the pipe. When lining fused sections of pipe, chains or cable-type chokers should be avoided. Nylon slings are preferred. Care should be exercised to avoid cutting or gouging the pipe.

- E. Trenching and Backfill: All trenching and backfill shall be in accordance with Section 02200 and standard details on the Drawings and as indicated below:
1. Trench Construction: The trench and trench bottom should be constructed in accordance with ASTM D 2321 – Section 7.
 2. Embedment Material: Embedment materials should be Class I, Class II, or Class III materials as defined in ASTM D 2321 – Section 6. The use of Class IV and/or Class V materials for embedment are not recommended and should be allowed only with the approval of the engineer.
 3. Bedding: Bedding of the pipe should be performed in accordance with ASTM D 2321 –Section 8. Compaction should be specified in ASTM D 2321. Deviation from the specified compaction shall be approved by the engineer.
 4. Haunching and Initial Backfill: Haunching and initial backfill should be as specified in ASTM D 2321- Section 9 using Class I, Class II, or Class III materials. Materials used and compaction shall be as specified by the engineer. Compaction 85% Standard Proctor Density must be maintained in unpaved areas. Paved areas will require a higher level of compaction in accordance with the pavement design criteria.
 5. Special Conditions: ASTM D 2321 – Section 11.2, Minimum Cover for Load Application, Section 11.3, Use of Compaction Equipment and Section 11.4, Removal of Trench Protection, should apply unless directed otherwise by the engineer.

3.08 MANHOLE AND PRECAST CONCRETE PRODUCT CONSTRUCTION

- A. Construct manholes as shown on the Drawings.
- B. Precast Concrete: Handle sections carefully to prevent cracking or chipping. Provide uniform bedding of the bottom section to prevent uneven loading. Install gaskets and joint sealants in accordance with manufacturer's recommendations to produce a watertight structure.
- C. Brick: Bed the bottom and sides of every brick in mortar. Apply a smooth coat of mortar, 3/4-inch thick, on the inside and outside.
- D. Pipe Connections: Seal the connection between the pipe and the manhole as follows:
 1. Pipe 36-Inch Diameter and Less: Connect pipe to manhole utilizing rubber boots.

2. If rubber boots are damaged, replace Type I boots with a new boot and repair Type II boots by constructing a manhole collar.
 3. If preformed openings must be enlarged or altered, or if new openings must be made in the field, minimize the amount of material removed to provide closely matched surfaces for grouting.
- E. Inverts: Form channels as shown on the Drawings, rounded, and troweled smooth with brick faces exposed. Maintain consistent grade through the invert.
- F. Top Elevations: Build manholes outside of paved areas to 30-inches above finished grade, unless otherwise shown on the Drawings or directed by the Engineer. Build manholes in paved areas to existing grades.
- G. Drop Connections: Replace existing manholes that contain drop connections, where required, with a similar drop connection. Construct drop connections of the same materials as the upstream sewer and in accordance with the details shown on the Drawings.
- H. Frames and Covers: Unless frame and cover is at grade, the frame shall be cast into the cone section. Covers shall be solid, cast-iron, without ventilation holes.
- I. Seal all manhole joints and lift holes, both inside and out, with grout. Between precast sections, this is in addition to joint sealant.

3.09 CONCRETE ENCASEMENT

- A. Provide concrete encasement of pipe when directed by the Engineer or to protect the pipe when any one of the following conditions are encountered:
1. Pipe crosses under a creek;
 2. The top of the pipe would have less than 30 inches of ground cover;
 3. The trench bottom consists of unstable material.

3.10 INSPECTION AND TESTING

- A. Clean and test lines before requesting final acceptance. Where any obstruction is met, clean the sewers by means of rods, swabs, or other instruments. When requested by the Engineer, flush out lines and manholes before final inspection. The costs for inspection and testing shall be included in the unit prices for pipe replacement and point repairs.

- B. Alignment: Pipe lines shall be straight and show a uniform grade between manholes. Correct any discrepancies discovered during inspection.
- C. Watertightness: A watertightness test shall be performed on all new sewers constructed and lined sewers (prior to cutting the liner to reinstate lateral connections) as indicated below. All visible leaks, including those found via television inspection, shall be repaired.
1. Low-Pressure Air Test: Sewer diameters less than or equal to 24-inches.
 - a. Prior to air testing, the section of sewer between manholes shall be thoroughly cleaned and wetted. Immediately after cleaning or while the pipe is water soaked, the sewer shall be tested with low-pressure air. At the Contractor's option, sewers may be tested in lengths between manholes or in short sections (25 feet or less) using inflatable balls pulled through the line from manhole to manhole. Air shall be slowly supplied to the plugged sewer section until internal air pressure reaches approximately 4.3 psi. After this pressure is reached and the pressure allowed to stabilize (approximately two to five minutes), the pressure may be reduced to 3.5 psi before starting the test. If a 1.0 psi drop does not occur within the test time, then the line has passed the test. If the pressure drops more than 1.0 psi during the test time, the line is presumed to have failed the test, and the Contractor will be required to locate the failure, make necessary repairs, and retest the line. Minimum test time for various pipe sizes and types is as follows:

Nominal Pipe Size, inches	Time (Min/100 feet)	
	VCP, RCP	DIP, PVC, HDPE, CIPP
6	0.7	5.7
8	1.2	7.6
10	1.5	9.4
12	1.8	11.3
15	2.1	14.2
18	2.4	17.0
21	3.0	19.8
24	3.6	22.8

- b. Required test equipment, including inflatable balls, braces, air hose, air source, timer, rotameter as applicable, cut-off valves, pressure reducing valve, 0-15 psi pressure gauge, 0-5 psi pressure gauge with gradations in 0.1 psi and accuracy of + two percent, shall be provided by the Contractor. Testing equipment shall be equal to Cherne Air-Loc Testing Systems.
- c. The Contractor shall keep records of all tests made. Copy of such records will be given to the Engineer or the City. Such records shall show date, line number and stations, operator, and such other pertinent information as required by the Engineer.
- d. The Contractor is cautioned to observe proper safety precautions in performance of the air testing. It is imperative that plugs be properly secured and that care be exercised in their removal. Every precaution shall be taken to avoid the possibility of over-pressurizing the sewer line.

D. Deflection Test:

- 1. All PVC pipe gravity sewers.
 - a. Test PVC and gravity sewer for excessive deflection by passing a mandrel through the pipe. Deflection of the pipe shall not exceed ten percent.
 - b. The mandrel size shall be based upon the maximum possible inside diameter for the type of pipe being tested, taking into account the allowable manufacturing tolerances of the pipe. The mandrel shall have an odd number of legs, or vanes, with a quantity of such equal to or greater than nine. The legs of the mandrel shall be permanently attached to the mandrel. A mandrel with variable sizes shall not be allowed. The mandrel shall be constructed of steel, aluminum or other material approved by the Engineer, and shall have sufficient rigidity so the legs of the mandrel will not deform when pulling through a pipe. The mandrel dimensions shall be checked by the Engineer before use by the Contractor.
 - c. Excavate and install properly any section of pipe not passing the test. Re-test until results are satisfactory.
 - d. The test shall be performed twice:
 - 1) Once within the first 30 days of installation

- 2) Once during final inspection, but no sooner than 30 days after pavement backfill done, at the completion of this contract.

E. Closed Circuit Television: The interior of the gravity sewers shall be subjected to a televised inspection. The audio/video shall provide an audio description of what is being viewed; provide a continuous running footage indicator between manholes; and be prepared in the presence of the City’s representative. Prior to Final Acceptance, the City shall be provided with one copy of the TV inspection report and video showing the entire length of gravity sewer being tested. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness, and distance between manholes. Any pipe found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced. All costs associated with the CCTV inspection shall be considered incidental to the pipe installation work and shall be included in the unit prices.

F. Manholes:

1. The costs for vacuum testing of lined and new manholes shall be included in the unit price for the manhole work. Prior to testing manholes for watertightness, all liftholes shall be plugged with a non-shrink grout, all joints between precast sections shall be properly sealed and all pipe openings shall be temporarily plugged and properly braced.
2. Vacuum Tests: The manhole, after proper preparation as noted above, shall be vacuum tested prior to or after backfilling. The test head shall be placed at the inside of the top of the cone section and the compression head inflated to 40 psi to affect a seal between the vacuum base and the manhole structure. Connect the vacuum pump to the outlet port with the valve open. A vacuum of 10-inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9-inches. The manhole shall pass if the time is greater than that specified in the table below. If the manhole fails the initial test, necessary repairs shall be made with non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained. Vacuum testing equipment shall be equal to that as manufactured by P.A. Glazier, Inc.

MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS AND DEPTHS			
<i>Depth (feet)</i>	Minimum Test Times with a 4 ft. Diameter	Minimum Test Times with a 5 ft. Diameter	Minimum Test Times with a 6 ft. Diameter
8	20	28	33

10	25	33	41
12	30	39	49
14	35	48	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

3.11 PROTECTION AND RESTORATION OF WORK AREA

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.
 2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
 3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.
 4. The Engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.
- B. Man-Made Improvements: Protect, or remove and replace with the Engineer's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and

telephone lines and cables, property pins and other improvements that may be encountered in the work. Fences crossing the easement shall be gated.

- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Engineer. Any such trees or shrubbery that must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, woodpiles, or trash piles will be permitted on the work site. The Contractor may chip and grind vegetation and spread over the disturbed area if approved by the City.
- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the project in accordance with the applicable codes and rules of the appropriate City of Atlanta, state and federal regulatory agencies. All debris and rubbish from clearing operations shall be removed from site within one (1) week after cutting.
- F. Swamps and Other Wetlands:
 - 1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures that alter the original topographic features within the easement.
 - 2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.
 - 3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream that may be temporarily divided by construction.
 - 4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

+++END OF SECTION 02730+++

SECTION 02735
Sewer Service Connections

PART 1 – GENERAL

1.01 SCOPE

- A. The work covered by this Section shall consist of installing new sewer service connections and/or performing re-connections, furnishing and installing materials and piping of the size and type shown on the Drawings and specified herein, and furnishing and installing sewer cleanouts on each service pipeline.
- B. Where practical, the Contractor is encouraged to use low impact construction techniques, including trenchless technologies such as vacuum excavation, to complete the work covered in this section.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Service connection (lateral) piping shall be PVC or ductile iron material and shall be of the same diameter as the existing service.
- B. The sewer cleanouts shall be installed as indicated in the standard detail drawings. Sewer cleanouts will be positioned at the edge of the property on the service line or at the edge of the easement within 5 feet of the sewer main, as directed by the Engineer.
- C. Service re-connections associated with replacing sanitary sewer by open cut or horizontal directional drilling shall be made at the top or from the side at an angle of 45 degrees to the sewer line. Connection shall be by means of standard tees or wyes, or as indicated in the Drawings.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Existing services shall be re-connected to sewer pipeline installed as part of the pipeline Work. The slope of the existing service toward the new pipeline shall be maintained at the existing percent slope. Installation of new service connection lines shall be in accordance with Section 02730 – “Sewers and Accessories”. New service connections shall be installed at a minimum slope of one percent (1%) or as specified by the Engineer.

- B. If directed to do so by the Engineer, a two-way cleanout will be installed at the right-of-way or easement boundary on service reconnections in accordance with the detail shown on the drawings. The cleanout shall incorporate all appropriate and necessary couplings to both the service connection and house connection. Excavation for the cleanout and all appropriate and necessary couplings shall be included in the cost of the cleanout.

+++END OF SECTION 02735+++

**SECTION 02750
WASTEWATER FLOW CONTROL**

PART 1 – GENERAL

1.01 SCOPE

- A. The objective of flow bypass and/or diversion pumping is to:
1. Maintain an efficient and uninterrupted level of service to wastewater collection system users while maintenance or construction operations (including rehabilitation, repair or replacement) are facilitated on the segment or segments being bypassed and/or from which flow is being diverted, within the wastewater collection system
 2. Ensure all levels of sewage flow are continuously and effectively handled around the segment or segments of sewer being bypassed and/or from which flow is being diverted by:
 - a. Ensuring that bypass and diversion pumps are adequately fueled, lubricated and maintained
 - b. Ensuring backup spare parts are expeditiously applied to the flow bypass and/or diversion pumping system in the event of component breakdown
 - c. Ensure an emergency backup plan is smoothly implemented in the event of system failure
 - d. Preventing backup, spillage, flooding or overflow onto streets, yards and unpaved areas or into buildings, adjacent ditches, storm sewers, and waterways, while flow bypass or diversion pumping takes place and ensure that installation, startup and subsequent disassembly of the flow bypass and diversion pumping system is smoothly transitioned
- B. When pumps are operating, an experienced bypass/diversion pump maintenance operator/mechanic and/or assistant shall continuously be on site to monitor the operation of the entire bypass/diversion system. The operator/mechanic and/or assistant shall comprehensively, methodically and continuously:
1. Adjust pump speed as appropriate so as not to adversely impact upstream or downstream flow condition levels

2. Check that the effectiveness and security of bulkheads, dams, diaphragms, plugs, valves, weirs, and all other flow control devices are working effectively and according to plan
 3. Check the integrity of hoses and couplings along the entire bypass/diversion system
 4. Monitor fuel tanks and refuel as necessary
 5. Monitor lubrication levels and provide additional lubrication as
 6. Facilitate minor repairs as required
 7. Report on potential problems arising
 8. Inspect bypass-pumping system at least hourly to ensure that the system is working correctly.
 9. Maintain adequate supply of spare parts on site as required.
- C. Bypass pumping systems shall include a sufficient amount discharge piping, bends and accessories to accommodate site conditions with minimal disruption and damage to the existing landscape.

1.02 SUBMITTALS

- A. The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor that can demonstrate to the Engineer that the vendor specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least three (3) references of projects of a similar size and complexity as this project, which were successfully performed by the vendor's firm within the past three years. The reference shall include the name of the agency, the name of the project, the date of the project, and the agency contact (telephone, fax, and e-mail). The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction. **(Submit at Pre-Construction Meeting)**
- B. During the course of the project, the detailed, work-specific Bypass Pumping/Flow Diversion Plan for any bypass utilizing multiple pumps, or a single pump greater than 4" discharge, shall be submitted to the Engineer at least 10 days before required. This plan shall outline all provisions and precautions, to be taken by the Contractor, regarding the handling of existing wastewater flows. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protection of the facilities. The Plan shall also include details of protection of the access and bypass pumping locations from damage due

to the discharge flows, compliance with the requirements and permit conditions specified in these Contract Documents. No construction shall begin until all provisions and requirements have been reviewed and authorized by the Engineer.

- C. The Contractor shall submit two copies of the Flow Bypass Pumping/Flow Diversion Plan, described in Item 1.02(B) above, for each sewer bypass set-up with sufficient detail to show:
1. Staging areas for pumps
 2. Sewer plugging method and types of plugs
 3. Number, size, material, location, and method of installation of suction piping
 4. Bypass pump sizes, capacity, number of each size to be on site and power requirements
 5. Calculations for selection of bypass pump size
 6. Standby power generator size, location
 7. Downstream discharge plan
 8. Method of protecting discharge manholes or structures from erosion and damage
 9. Thrust and restraint block sizes and locations
 10. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill where required
 11. Method of noise control for each pump and/or generator
 12. Any temporary pipe supports, including rollers and elevated rollers, as well as anchoring required
 13. Design plans and computation for access to bypass pumping locations indicated on the drawings
 14. Schedule for installation of and maintenance of bypass pumping lines
 15. Plan indicating selection location of bypass pumping line locations
 16. The Plan shall indicate the means by which flows from service laterals will be accommodated

- D. All proposed flow control arrangements, including flow bypass and/or diversion pumping plans for sewers, shall also include an emergency response plan to be followed in the event of a failure of the bypass pumping and/or diversion system. Contractor's emergency response plan shall be in accordance with the City's Emergency Response Plan.
- E. The Contractor shall notify the Engineer 24 hours prior to commencing actual flow bypass and/or diversion pumping operations. The Contractor flow control proposal shall be agreed to by the Engineer before the Contractor shall be allowed to commence sewerage bypass pumping and/or diversion.

1.03 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

- A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.
- B. In the event of overflows caused by the Contractor's work activities, the Contractor shall immediately take appropriate action in accordance with the City's Emergency Response Plan (ERP), to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the designated Engineer in a timely manner. The Contractor shall prepare his own written Standard Operating Procedure (SOP) for handling and reporting spills, which shall be compatible with the City's ERP.
- C. Contractor will indemnify and hold harmless the City for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the City in defending such fines and claims.

PART 2 – PRODUCTS

2.01 PUMPING EQUIPMENT

- A. All pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows.
- B. The Contractor shall provide the necessary stop/start controls for each pump.

- C. The Contractor shall include one stand-by pump of each size to be maintained on site for each by pass set up unless otherwise agreed with the Engineer.
- D. The Contractor shall design all piping, joints, and accessories to withstand twice the maximum system pressure or 50 psi, whichever is greater. The back-up pump, appropriate piping, fuel, lubrication and spare parts shall be incorporated into the bypass arrangement at the site, ready for use in case of breakdown. A bypass “drill” shall be carried out by the Engineer before the bypass arrangement is accepted on all sewers > 12” diameter, at no cost to the City. The drill shall demonstrate the incorporation of all standby equipment to handle flows when the main pump set is switched off. The Engineer’s instructions following the drill shall be adhered to in full at no additional cost to the City.
- E. No more than two (2) pump discharge hoses shall be used for the bypass/diversion over the length of the line of segment(s). If the flow exceeds the capacity of 2 “hoses”, then rigid piping shall be used. The rigid piping shall consist of HDPE or steel pipes with suitably pressure rated couplings to withstand twice the maximum system pressure or 50 psi, whichever is greater.
- F. Under no circumstances will aluminum “irrigation” type piping or glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the Engineer.

2.02 SYSTEM DESCRIPTION

A. Design Requirements:

1. Bypass pumping systems shall have sufficient capacity to pump a peak flow in the pipes that are being rehabilitated or repaired. The Contractor shall provide all pipeline plugs, pumps of adequate size to handle wet weather peak flows, and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the section to be repaired. Bypass pumping system will be required to be operated 24 hours per day.
2. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.
3. Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow, up to full available flow, into the work area as necessary for satisfactory performances of work.

4. The Contractor shall make all arrangements for bypass pumping during the time when the main is shut down for any reason. System must overcome any existing force main pressure on discharge.

B. Performance Requirements:

1. It is essential to the operation of the existing sewerage system that there is no interruption in the flow of sewage throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with his work, carry it past his work, and return it to the existing sewer downstream of his work.
2. The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility. The bypass system shall be the Contractor's responsibility. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
3. The Contractor shall provide all necessary means to safely convey the sewage past the work area. The contractor will not be permitted to stop or impede the main flows under any circumstances.
4. The Contractor shall maintain sewer flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers and that will protect public and private property from damage and flooding.
5. The Contractor shall protect water resources wetlands and other natural resources.

PART 3 – EXECUTION

3.01 PLANNING

- A. The Contractor shall be solely responsible for planning and executing sewer flow control, bypass, and diversion pumping operations. The Contractor shall be entirely liable for damages to private or public property that may result from his operations and for all cleanup, disinfection, damages, and resultant fines in the event of a spillage, flooding or overflow.

3.02 GENERAL

- A. If, during normal rehabilitation work on manholes and sewers, where flow control devices, including flow bypass and diversion pumping have not been deployed, and

wastewater flow depth exceeds the workable levels, the rehabilitation work shall be discontinued immediately. Rehabilitation work shall only resume when minimum flow levels prevail— normally between 2:00 am to 5:30 a.m. Under these circumstances, one or more of the following flow control systems shall be deployed at no additional cost to the City:

1. Plugging or blocking
 2. High-velocity jet nozzles
 3. Bypass and/or diversion pumping
- B. Before any flow control arrangement is installed, the Contractor shall arrange to desilt the segment of sewer to be bypassed while still under flow. Subsequent jetting and final cleaning before rehabilitation or repair shall be undertaken while the segment of sewer is bypassed.
- C. Precautions:
1. Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate his bypass pipelines to minimize any disturbances to existing utilities and shall obtain approval of the pipeline locations from the City and the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor.
 2. During all bypass-pumping operations, the Contractor shall protect mains, manholes, and all local sewer lines from damage caused by any equipment. The Contractor shall be responsible for all physical damage to mains, manholes, and all local sewer lines caused by human or mechanical failure.

3.03 PLUGGING OR BLOCKING

- A. Insert sewer line plug into the line at a manhole upstream from the manhole or sewer that is to be rehabilitated and tested. For manhole rehabilitation, the plug shall be designed so that a portion of the sewage can be released downstream. During this portion of the operation, shut off or substantially reduce flows so that the manhole can be properly cleaned, prepared, and rehabilitated. Flow shall be shut off as required, to properly rehabilitate the manhole or sewer.
- B. Plugging or blocking of sewage flows shall incorporate primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance or work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

3.04 FLOW BYPASS AND/OR DIVERSION PUMPING SCHEDULING

- A. If the City is operating or maintaining conventional pumping facilities and/or flow bypass and/or diversion pumping in the construction area of the present Contract, the Contractor shall coordinate with the City as necessary to determine and effect optimum working arrangements.
- B. The Contractor shall immediately cease bypass and/or diversion pumping when so ordered by the City.

3.05 ENVIRONMENTAL PROTECTION MEASURES

- A. During flow bypass and/or diversion pumping, the Contractor is prohibited from allowing any sewage to be dumped, or spilled in or onto the ground or any area outside of the existing wastewater collection system. In addition, due care and attention shall be given to prevent vehicular or pump fuel or lubrication oil to be leaked.

3.06 PIPE RESIDUE

- A. When flow bypass and diversion pumping operations are complete, the residual contents of sewage in piping shall be drained into the existing sewer prior to disassembly.

+++END OF SECTION 02750+++

(This page is intentionally blank)

**SECTION 02796
PERMEABLE INTERLOCKING CONCRETE PAVERS**

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Section includes furnishing and installation of permeable interlocking concrete pavers, including subbase, base, bedding and joint filler materials.
- B. Related Work Specified Elsewhere in the Green Infrastructure Specifications:
 - 1. Section 02371 – Green Infrastructure Geotextiles
 - 2. Section 02681 – Subdrainage for Stormwater Quality Facilities

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301, Specifications for Structural Concrete
- B. ASTM International:
 - 1. ASTM C 33, Standard Specification for Concrete Aggregates
 - 2. ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate
 - 3. ASTM C 150, Standard Specification for Portland Cement
 - 4. ASTM C 936, Standard Specification for Solid Concrete Interlocking Paving Units
 - 5. ASTM C 979, Standard Specification for Pigments for Integrally Colored Concrete
 - 6. ASTM C 1781, Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement Systems
- C. Georgia Department of Transportation (GDOT):
 - 1. “Standard Specifications, Construction of Transportation Systems”, Latest Edition (GDOT Standard Specifications)
- D. Interlocking Concrete Pavement Institute (ICPI)

1. Permeable Interlocking Concrete Pavements, 4th Edition (PICP Manual)

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the Contract Documents.
- B. Submit the following for review and approval prior to shipment of materials to the Site:
 1. Manufacturer's (or installation subcontractor's) drawings and details: Indicate perimeter conditions, junction with other materials, expansion and control joints, paver layout, patterns, color arrangement, and installation and setting details. Indicate layout, pattern, and relationship of paving joints to fixtures and structures.
 2. Minimum 3-pound samples of subbase, base and bedding aggregate materials.
 3. Test results for soil subgrade, including in-place density test reports, soil classification, and infiltration rate measured on-site under compacted conditions, and suitability for the intended project.
 4. Manufacturer's product data sheets (including specifications) for each type of unit paver.
 5. Four representative full-size samples of each paver type, showing color, dimensions, and finish.
 6. Certification (including sieve analysis test results per ASTM C136) from supplier for subbase, base, bedding and joint filler materials.
 7. Test results from an independent testing laboratory showing compliance of concrete pavers to ASTM C 936.
 8. Manufacturer's Material Safety Data Sheets for the safe handling of the specified materials and products.
 9. Written documentation of installation subcontractor's qualifications as specified in subsection 1.04.
 10. Written Method Statement and Quality Control Plan that describes material staging and flow, paver installation pattern and sequencing, and installation procedures, including representative reporting forms that ensure conformance to the Specifications.

1.04 QUALITY ASSURANCE

- A. Unless otherwise specified, Contractor shall retain the services of an approved independent testing laboratory to determine conformance of the materials and the constructed work with the Specifications.
- B. Manufacturer shall be a firm specializing in the manufacture of interlocking pavers of the type specified.
- C. Installation shall be performed by a subcontractor (paver installer) with experience in installing interlocking pavers of the type specified on projects of similar size and scope, and holding a current certificate from the Interlocking Concrete Pavement Institute (ICPI), Accredited Paver Installation Company (APIC) Program. At a minimum, the Contractor's Site Foreman shall hold a PICP Technician Certificate from ICPI contractor certification program. The Site Foreman shall be onsite for the entire installation.
- D. Contractor shall conduct a preconstruction meeting with the paver installer, Owner's representative and other affected subcontractors prior to commencement of paver installation work. Discuss procedures for construction including, but not limited to: site controls, staging, site construction layout, excavation and protection of subgrade, sequencing of work, and coordination with adjacent construction.
- E. Field Construction Mock-Ups:
 - 1. After material samples are approved and prior to starting concrete paver installation, a mock-up area shall be constructed. At least 48 hours prior to constructing the mock-up area, submit written notification to the Owner's representative.
 - 2. The mock-up area shall be minimum 10-foot by 10-foot dimension and constructed as required in this Section. Mock-up area shall show joint sizes, lines, laying pattern, color and texture of the concrete unit paver construction.
 - 3. The completed mock-up area shall be used as the standard of workmanship for the Project. Consideration will be given with regard to differences in age of materials from time of mock-up construction to time of actual product delivery.
 - 4. Subject to acceptance by Owner's representative, mock-up may be retained as part of finished work. If mock-up is not retained, remove and properly dispose of materials offsite.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver concrete pavers in manufacturer's original, unopened, undamaged container packaging with identification tags intact on each paver bundle. Pavers shall be in steel banded, plastic banded, or plastic wrapped cubes suitable for unloading by forklift or clamp lift. Unload pavers as recommended by the manufacturer to prevent damage to the products.
- B. Concrete unit pavers shall be visually inspected by the Contractor upon delivery to the Site. All units shall be sound and free of defects that would interfere with the proper placing of pavers or impair the strength and quality of the construction. Products that are damaged or fail to conform to material specifications shall be rejected and shall not be incorporated in the Work as determined by the Owner's representative.
- C. Store pavers in protected area such that they are kept free from mud, dirt, and other foreign materials.
- D. Handle and transport aggregates to avoid segregation, contamination and degradation. Keep materials sufficiently separated to prevent mixing. Cover material with waterproof covering to prevent exposure to rainfall or removal by wind; secure the covering in place.
- E. Geosynthetics shall be delivered, stored and handled as specified in Section 02371.
- F. Coordinate delivery and installation schedule to minimize interference with adjacent construction and normal use of adjacent buildings.

1.06 PROJECT CONDITIONS

- A. Subbase, base bedding, joint filler material and pavers shall not be installed during rain, snow, or over frozen base materials.

1.07 MAINTENANCE MATERIALS

- A. Furnish additional paver materials for use by Owner for maintenance and repair. Quantity to be determined by Owner. Pavers shall be from the same production run as installed materials. Store the materials where directed by the Owner's representative.

PART 2 PRODUCTS

2.01 PAVING UNITS

- A. Permeable interlocking concrete paver units shall be [*specify product group, series, etc.*] manufactured by [*specify manufacturer*], [or approved equal,] conforming to the following specifications.
 - 1. Material Standard: Comply with ASTM C 936.
 - 2. Color and finish: [*Specify*].
 - 3. Color Pigment Material Standard: Comply with ASTM C 979.
 - 4. Size: [*Specify dimensions*].
- B. Product substitutions may be allowed if approved by the Owner’s representative.
- C. Materials shall be manufactured to produce a solid homogeneous matrix in the produced unit.

2.02 JOINT FILLER, BEDDING, BASE AND SUBBASE

- A. Joint filler, bedding, base and subbase materials shall be washed stone conforming to the quality requirements of Section 800.2.01 of the GDOT Standard Specifications for “Class A” aggregate. All stone materials shall be washed, with less than 2 percent passing the Number 200 sieve. Gradation shall be as specified in the following paragraphs.
- B. Joint Filler and Bedding: Gradation shall conform to size number 8 coarse aggregate as defined in Table 800.1 and summarized in the following table. For narrow joints, use size number 89 or number 9 coarse aggregate or pre-bagged permeable joint material supplied by the manufacturer if approved by the Owner’s representative.

<u>Sieve Size</u>	<u>Percent Passing, by Weight</u>
1/2 inch	100
3/8 inch	85 - 100
No. 4	10 – 30
No. 8	0 - 10
No. 16	0 - 5

- C. Base: Gradation shall conform to size number 57 coarse aggregate as defined in Table 800.1 and summarized in the following table.

Sieve Size	Percent Passing, by Weight
1 1/2 inch	100
1 inch	95 - 100
1/2 inch	25 – 60
No. 4	0 – 10
No. 8	0 – 5

- D. Subbase: Gradation shall conform to size number 3 coarse aggregate as defined in Table 800.1 and summarized in the following table.

Sieve Size	Percent Passing, by Weight
2 1/2 inch	100
2 inch	90 - 100
1 1/2 inch	35 – 70
1 inch	0 – 15
1/2 inch	0 – 5

2.03 CHOKER COURSE

- A. Choker course material (if required) shall conform to the material specifications in Section 02681.

2.04 EDGE RESTRAINTS

- B. Edge restraints shall conform to the following specifications and as indicated on the Drawings.
1. Manufacturer: *[Specify manufacturer if applicable]*
 2. Material: [Precast concrete] [Cast-in-place concrete] [Cut stone]
- C. Materials for cast-in-place concrete shall consist of: Type I or II Portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and clean water. Mix shall be proportioned such that the 28-day compressive strength of moist-cured laboratory samples achieves not less than 3,000 psi.
- D. *[Specify material requirements for precast concrete or cut stone edge restraints if applicable.]*

2.05 GEOTEXTILE

- A. Geotextile shall be nonwoven geotextile conforming to the following specifications: *[insert geotextile specifications based on recommendations by the concrete paver manufacturer].*

2.06 UNDERDRAIN

- A. Underdrain (if required), including pipe and associated drainage stone, shall conform to the requirements of Section 02681.

PART 3 EXECUTION

3.01 PREPARATION

- A. Excavate and grade subgrade to the lines and grades indicated on the Drawings. Minimize compaction of subgrade soils. Low ground pressure equipment shall be used for excavation. Scarify or till subgrade to a minimum depth of six inches.
- B. Quality control inspection and testing during excavation and subgrade preparation shall include:
 - 1. Proofrolling of the subgrade to determine presence of soft spots or localized pockets of objectionable materials.
 - 2. Infiltration testing to verify the subgrade has not been adversely impacted.
- C. Minimum slope of subgrade shall be no less than 0.5 percent and shall not exceed 12 percent. Where subgrade slopes exceed 2 percent, bench subgrade and provide impermeable flow barriers to slow down flow.
- D. Install underdrains (if required) in trenches filled with drainage stone prior to placement of subbase layer in accordance with the applicable requirements of Section 02681 and as indicated on the Drawings. If required, place a choker course over the exposed uncompacted subgrade bottom.
- E. Place geotextile on the exposed excavated sides prior to placement of subbase material. Overlap adjacent geotextile panels a minimum of 12 inches.
- F. Verify location, installation and elevations of edge restraints around the perimeter of the area.
- G. Areas where pavers are to be installed shall be kept free from sediment during entire duration of installation work. Geotextiles, subbase, base and bedding materials contaminated with sediment shall be removed and replaced with clean materials.
- H. Do not damage underdrain pipes, overflow pipes, observation wells, geotextiles, inlets and other drainage appurtenances during installation. Report any damage immediately to the Owner's representative.

3.02 PLACEMENT OF SUBBASE AND BASE

- A. Coordinate placement of subbase and base with installation of geotextile and underdrain piping.
- B. Place specified subbase and base materials in uniform lifts not greater than four to six inch thickness to the depths and limits indicated on the Drawings. Uniformly grade and level surface of each layer to required elevations.
- C. Compact each lift with at least two passes of a heavy (10 ton) vibratory roller or a minimum 13500 pound-force (lbf) reversible vibratory plate compactor (unless otherwise approved by the Owner's representative). Compact until there is no visible movement of the stone. Do not crush aggregate with the compaction equipment. Use mechanical tampers (jumping jacks) for compaction adjacent to curbs, utility structures, edges and other structures.
- D. Prior to commencement of bedding layer construction, base course shall be inspected and approved by the Owner's representative and paver installer.

3.03 EDGE RESTRAINT CONSTRUCTION

- A. Edge restraints shall be constructed on prepared subgrade (including stone base as required) at the locations, elevations and dimensions indicated on the Drawings.
- B. For cast-in-place concrete edge restraints, install reinforcing steel, mix and place concrete, and construct expansion and contraction joints as required. Exposed top of edges shall receive a broom finish unless otherwise shown on the Drawings. Immediately following concrete placement and finishing operations, cure and protect concrete in conformance with the applicable requirements of ACI 301.

3.04 PLACEMENT OF BEDDING LAYER

- A. Moisten, spread and screed the bedding material over completed base layer to the thickness recommended by the paver manufacturer and as indicated on the Drawings. Use equipment and methods recommended by the manufacturer.
- B. The surface tolerance of the screeded bedding layer shall be plus or minus 3/8 inch under a 10-foot long straightedge.
- C. Do not subject screeded bedding material to any pedestrian or vehicular traffic before paving unit installation begins.

3.05 PAVER INSTALLATION

- A. Verify that paver units are free of foreign materials before installation. Paver installation shall conform to the manufacturer's recommendations and as specified in the following paragraphs.
- B. Lay the pavers in the pattern(s) and joint widths shown on the Drawings. Maintain straight pattern lines. Joints between the pavers shall be as recommended by the manufacturer.
- C. Fill gaps at the edges of the paved area with cut pavers or edge units. Cut pavers subject to tire traffic shall be no smaller than 1/3 of a whole unit.
- D. Cut pavers and place along the edges with a masonry saw.
- E. Fill the openings and joints with specified joint filler material.
- F. Compact and seat the pavers into the bedding material using a low-amplitude, high frequency plate compactor capable of at least 5,000 pound-force (lbf). At least two or three passes of the plate compactor will be required.
- G. Do not compact within six feet of the unrestrained edges of the paving units.
- H. Apply additional joint filler material to the openings and joints if needed, filling them completely. Remove excess material by sweeping. Re-compact the pavers as required for initial compaction.
- I. All pavers within three feet of the laying face shall be left fully compacted with filled joints at the completion of each day.
- J. The final surface elevation of pavers shall be as indicated on the Drawings, shall provide a smooth surface, and shall not deviate more than 3/8 inch under a 10-foot long straightedge.
- K. Sweep off excess stone from the surface when paver installation is complete in each area.
- L. After sweeping the surface clean, check final elevations for conformance to the Drawings.

3.06 FIELD QUALITY CONTROL

- A. Lippage: No greater than 1/8 in. difference in height between adjacent pavers.

- B. The surface elevation of pavers shall be 1/8 to 1/4 in. above adjacent drainage inlets or channels.
- C. Tolerance for bond line in paver courses: Plus or minus 1/2 inch under a 50-foot long string line.
- D. Verify the surface infiltration after installation meets the paver manufacturer's specified infiltration rate using test method ASTM C 1781.

3.07 WASTE DISPOSAL

- A. Remove all excess paver materials and stone at the completion of the Work and place offsite in accordance with all applicable regulations.

3.08 MAINTENANCE AND PROTECTION

- A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.
- B. Work shall be protected against damage and sediment deposition from subsequent construction operations.
- C. Refill paver joints as necessary for a period of 90 days after completion of concrete paver installation work.
- D. The Owner will be responsible for extended maintenance of the paver system after final acceptance of the Work, unless otherwise determined by the Owner.

+++END OF SECTION 02796+++

SECTION 02798
PERVIOUS CONCRETE PAVING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Section includes construction of pervious concrete pavement, including subgrade preparation and aggregate base and subbase layers for subgrade support and stormwater storage.

- B. Related Work Specified Elsewhere in the Green Infrastructure Specifications:
 - 1. Section 02371 – Green Infrastructure Geotextiles
 - 2. Section 02681 – Subdrainage for Stormwater Quality Facilities

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 305.1, Specification for Hot Weather Concreting
 - 2. ACI 306.1, Standard Specification for Cold Weather Concreting
 - 3. ACI 522.1, Specification for Pervious Concrete Pavement

- B. ASTM International:
 - 1. ASTM C 33, Standard Specification for Concrete Aggregates
 - 2. ASTM C 42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 3. ASTM C 94, Standard Specification for Ready-Mixed Concrete
 - 4. ASTM C 150, Standard Specification for Portland Cement
 - 5. ASTM C 171, Standard Specification for Sheet Materials for Curing Concrete
 - 6. ASTM C 172, Standard Practice for Sampling Freshly Mixed Concrete
 - 7. ASTM C 174, Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores

8. ASTM C 260, Standard Specification for Air Entraining Admixtures for Concrete
9. ASTM C 494, Standard Specification for Chemical Admixtures for Concrete
10. ASTM C 595, Standard Specification for Blended Hydraulic Cements
11. ASTM C 618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
12. ASTM C 979, Standard Specification for Pigments for Integrally Colored Concrete
13. ASTM C 1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
14. ASTM C 1116, Standard Specification for Fiber-Reinforced Concrete
15. ASTM C 1157, Standard Performance Specification for Hydraulic Cement
16. ASTM C 1602, Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
17. ASTM C 1688, Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete
18. ASTM C 1701, Standard Test Method for Infiltration Rate of In Place Pervious Concrete
19. ASTM D 994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
20. ASTM D 1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
21. ASTM D 1752, Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
22. ASTM C 1754, Standard Test Method for Density and Void Content of Hardened Pervious Concrete

23. ASTM E 329, Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
- C. Georgia Department of Transportation (GDOT):
1. “Standard Specifications, Construction of Transportation Systems”, Latest Edition (GDOT Standard Specifications)

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the Contract Documents.
- B. Submit the following for review and approval prior to shipment of materials to the Site.
1. Concrete Materials and Mix Design:
 - a. Proposed pervious concrete mixture proportions including all material weights, volumes, design density, water-cementitious ratio, and design void content in accordance with ASTM C 1688.
 - b. Reports covering the source and quality of concrete materials.
 - c. Pigment options for selection by Owner’s representative.
 2. Aggregate Base and Subbase Materials: Washed aggregate type, source, grading and void content (percent porosity).
 3. Qualifications of Contractor as specified in subsection 1.04.
 4. Qualifications of testing agency showing conformance to the requirements of subsection 1.04.E.
 5. Test panel documentation as specified in subsection 1.04.G.
 6. Proposed jointing plan and placing sequence.
 7. Proposed procedures for the production, transportation, placement, protection, curing, and temperature monitoring of concrete during cold and hot weather (as applicable).
- C. Additional Submittals (In-Progress and at Completion):
1. Field quality control test results.

2. Inspection and Maintenance Plan

1.04 QUALITY ASSURANCE

- A. Contractor shall retain the services of an approved independent testing laboratory to determine conformance of the materials and the constructed work with the Specifications.
- B. Pervious concrete pavement shall conform to all requirements of ACI 522.1, except as modified in this Section.
- C. Contractor shall submit evidence of two successful pervious concrete pavement projects completed in the last 24 months, including but not limited to the following:
 - 1. Project name and address, owner name and contact information.
 - 2.
 - 3. Test results must include density and void content of freshly mixed pervious concrete, mixture proportions, thickness, density and void content of cores extracted from the pavement, if tested, when required by the Owner's representative. This requirement may be waived by the Owner's representative provided the Contractor demonstrates successful experience in the concrete industry and constructs test panels for inspection and testing in accordance with subsection 1.04.G.
- D. Contractor shall employ no less than one National Ready Mixed Concrete Association (NRMCA) certified Pervious Concrete Craftsman who shall be on-site, overseeing each placement crew during all concrete placement, or employ no less than three NRMCA Certified Pervious Concrete Installers, who shall be on site working as members of each placement crew during all concrete placement, unless otherwise specified. The minimum number of certified individuals listed above shall be present on each pervious concrete placement including any test panel placements, and a certified individual shall be in charge of the placement crew and procedures.
- E. Testing agencies that perform testing services on concrete materials shall meet the requirements of ASTM C 1077. Agencies inspecting the Work shall meet the requirements of ASTM E 329. Testing agencies performing the testing shall be accepted by the Owner's representative before performing any Work.
- F. Field testing of concrete required in this Section shall be performed by individuals, each of whom is certified as an NRMCA Certified Pervious Concrete Technician, or equivalent, and an ACI Concrete Field Testing Technician - Grade 1, or equivalent.

G. Test Panels:

1. Test panels shall be constructed in accordance with the Drawings and Specifications. Regardless of qualifications, Contractor shall construct two test panels, each approximately 225 square feet, at the design thickness, consolidated, jointed and cured. Panels shall be constructed using materials, equipment, and personnel proposed for the Project, and on the same aggregate base and subbase layers proposed, to demonstrate to the satisfaction of the Owner's representative that in-place unit weights can be achieved and a satisfactory pavement can be installed at the Site. If strength is used in the pavement design, cores from the test panels may be used to confirm that consolidation and infiltration, as well as strength, is consistent with design objectives for the top and bottom of the slab.
2. Quality: Test panels shall have acceptable surface finish, joint details, thickness, porosity and curing procedures and shall comply with the testing and acceptance standards listed in this Section. Test density and void content of fresh concrete for the test panels in accordance with ASTM C 1688. Obtain hardened concrete cores from the test panels in accordance with ASTM C 42, test core thickness in accordance with h ASTM C 174, and density and void content in accordance with ASTM C 1754.
3. Satisfactory performance of the test panels shall be determined in accordance with the following:
 - a. Fresh concrete results:
 - i. Density shall be within plus or minus 5 lb/ft³ of the accepted fresh density from the submitted mixture proportion.
 - ii. Void content shall be within plus or minus 2 percent of the submitted fresh void content.
 - b. Hardened concrete results:
 - i. Compacted thickness no less than ¼ inch less than specified thickness ($T_{\text{compacted}} \geq T_{\text{specified}} - \frac{1}{4} \text{ inch}$).
 - ii. Hardened density plus or minus 5 percent of the design density.
 - iii. Void content shall not be lower than 2 percent below the design void content. Void content shall be calculated as specified in subsection 3.05.G.
4. If test panels are found to be unsatisfactory, they shall be removed at the Contractor's expense and disposed offsite in accordance with applicable regulations. The Contractor shall repeat the test panels until acceptable. If test panels are found to be satisfactory, they may be left in-place and

included in the completed work, at no additional cost to the Project. The average hardened densities from the two accepted test panels shall be the hardened density used as the basis of acceptance for the remainder of the pavement.

H. Pre-Paving Conference:

1. A pre-paving conference with the Owner’s representative shall be held within one week prior to commencement of the pervious concrete. Contractor shall have the pervious concrete supplier, the foreman and the entire concrete crew that will form and place the concrete in attendance at this meeting.
2. As a guide for the meeting, the document “Checklist for the Concrete Pre-Construction Conference” (available from the National Ready Mixed Concrete Association) shall be used to review all requirements of the Project during the meeting. Meeting emphasis shall be on how paving with pervious concrete differs from paving with conventional concrete.

1.05 PROJECT CONDITIONS

- A. Conform to the applicable requirements of Sections 430 and 500 of the GDOT Standard Specifications and ACI 522.1 for required weather conditions and other restrictions for concrete construction.
- B. Concrete shall not be placed on subgrade that is frozen or excessively wet. Concrete shall not be placed during periods of precipitation without adequate protection that meets the approval of the Owner’s representative.
- C. Coordinate concrete construction with other related adjacent site work.

PART 2 PRODUCTS

2.01 BASE

- A. Base material shall be washed stone conforming to the quality requirements of Section 800.2.01 of the GDOT Standard Specifications for “Class A” aggregate. All stone materials shall be washed, with less than 2 percent passing the Number 200 sieve. Gradation shall conform to size number 57 coarse aggregate as defined in Table 800.1 and summarized in the following table.

Sieve Size	Percent Passing, by Weight
1 1/2 inch	100
1 inch	95 - 100
1/2 inch	25 – 60

Sieve Size	Percent Passing, by Weight
No. 4	0 – 10
No. 8	0 – 5

2.02 AGGREGATE SUBBASE / STORMWATER STORAGE

- A. Coarse aggregate for the subbase/stormwater storage layer shall be an open graded, clean coarse aggregate. Gradation shall conform to size number 3 coarse aggregate as defined in Table 800.1 and summarized in the following table.

Sieve Size	Percent Passing, by Weight
2 1/2 inch	100
2 inch	90 - 100
1 1/2 inch	35 – 70
1 inch	0 – 15
1/2 inch	0 – 5

2.03 MISCELLANEOUS MATERIALS

- A. Underdrains: Specified in Section 02681.
- B. Geotextile: Specified in Section 02371.

2.04 PERVIOUS CONCRETE MATERIALS

- A. Comply with ASTM C 94 (except sections identified in ACI 522.1) and the requirements listed in the following paragraphs.
1. Cement: Portland cement Type I, Type II or V conforming to ASTM C 150 and ASTM C 1157 or blended cements conforming to ASTM C 595 and C 1157.
 2. Aggregates: Comply with the requirements of ASTM C 33. Aggregate gradation shall meet the requirements for size number 67 (nominal 3/4-inch to No. 4 sieve sizes), size number 7 (nominal 1/2-inch to No. 4 sieve sizes) or size number 8 (nominal 3/8-inch to No. 8 sieve sizes), unless otherwise approved by the Owner's representative.
 3. Admixtures: Air-entraining admixtures shall comply with ASTM C 260. Chemical admixtures shall comply with ASTM C 494.
 4. Water shall be potable and shall comply with ASTM C 1602.
 5. Fiber Reinforcement: Fibers shall comply with ASTM C 1116, Type III or Type IV.

6. Supplementary Cementitious Materials: Fly ash and pozzolans conforming to ASTM C 618.
7. Pigments: Comply with ASTM C 979.

2.05 PERVIOUS CONCRETE MIXTURE

- A. The Contractor shall furnish a proposed mix design with all proportions of materials prior to commencement of work as required in subsection 1.03. Concrete producers may have mixture proportions for pervious concrete optimized for performance with local materials by use of available software programs such as available through NRMCA.
- B. General mixture proportions shall be as specified in the following paragraphs, unless otherwise approved by the Owner's representative.
 1. Aggregate/cementitious Ratio: Range of 4:1 to 4.5:1.
 2. Concrete Mixture Unit Weight: Range of 115 pounds per cubic foot (lbs/ft³) to 135 lbs/ft³.
 3. Concrete Mixture Void Content: Range of 15 to 25 percent.
 4. Cementitious Content: Range of 450 lbs/yd³ to 700 lb/yd³, total cementitious content.
 5. Supplementary Cementitious Content: Fly ash shall be 25 percent maximum; slag shall be 25 percent maximum; or a combined supplementary cementitious content of 35 percent maximum.
 6. Water/cementitious ratio: Range from 0.27 to 0.40.
 7. Other materials shall be proportioned as determined by the producer to meet design criteria for the Project as approved by the Owner's representative.

2.06 FORMS

- A. Forms shall be constructed of steel, wood, or other materials that are the full depth of the pavement, sufficiently rigid to maintain specified tolerances, and capable of supporting concrete and mechanical concrete placing equipment.

2.07 ISOLATION (EXPANSION) JOINT MATERIAL

- A. Isolation joint materials shall comply with ASTM D 994, ASTM D 1751, or ASTM D 1752.

2.08 CURING MATERIALS

- A. The primary method of curing pervious concrete shall be the placement of a waterproof covering, consisting of clear polyethylene sheeting conforming to ASTM C 171.
- B. Additional curing materials may be used if approved by the Owner's representative.

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide physical barriers or direct traffic to minimize vehicular traffic on the subgrade during construction.
- B. Protect all specified trees, vegetation, and root systems near the area to be paved with pervious concrete. If trees, vegetation, or root systems are damaged, Contractor shall replace materials.

3.02 SUBGRADE PREPARATION

- A. Existing subgrade under subbase areas shall not be compacted or subject to excessive construction equipment traffic prior to coarse aggregate bed placement.
- B. Where erosion of subgrade has caused accumulation of fine materials or surface ponding, this material shall be removed with light equipment and the underlying soils scarified to a minimum depth of six inches.
- C. Bring subgrade of coarse aggregate subbase to line, grade, and elevations required.
- D. Fill and lightly regrade any areas damaged by erosion, ponding, or traffic compaction before the placing of coarse aggregate.

3.03 BASE AND SUBBASE INSTALLATION

- A. Upon completion of subgrade preparation, notify Owner's representative. Subgrade must be approved by the Owner's representative before the Contractor may proceed with subbase installation.

- B. Protect adjacent structural footings and foundations from stored stormwater by installation of a concrete curb wall or impermeable membrane barrier.
- C. Geotextile, underdrain piping, other storage devices, and subbase aggregate shall be placed immediately after approval of subgrade preparation. Any accumulation of debris or sediment which has taken place after approval of subgrade shall be removed at the Contractor's expense.
- D. Place geotextile as specified in Section 02371 and as indicated on the Drawings.
- E. Install specified coarse aggregate for subbase/storage layer in 12-inch maximum lifts. Lightly compact each layer by tamping with the bucket of placement equipment or using manually guided compaction equipment such as vibratory plate compactors. Install aggregate to the elevations indicated on the Drawings.
- F. Install a minimum 4-inch thick base course evenly over the surface of larger-sized aggregate subbase, sufficient to allow placement of pavement, and lightly compact as specified for subbase/storage layer. Notify the Owner's representative for approval.
- G. Following placement of subbase and base aggregate, the geotextile shall be folded back along all edges of the area to protect from sediment washout. At least a 2-foot strip shall be used to protect the area from adjacent bare soil. This edge strip shall remain in place until all bare soils contiguous to the area are stabilized and vegetated. When the site is fully stabilized, excess geotextile along the bed edges may be cut back to coarse aggregate edge.

3.04 PERVIOUS CONCRETE PAVEMENT

- A. Pavement thickness for all applications (excluding heavy traffic loads) shall be as indicated on the Drawings. Pavements for vehicles heavier than single axle service/delivery trucks will require special design thicknesses which may require two-course construction.
- B. The Contractor will be restricted to pavement placement widths of a maximum of 20 feet, unless the Contractor can demonstrate competence to provide pavement placement widths greater than the maximum specified to the satisfaction of the Owner's representative. Large scale mechanized placement of pervious concrete with slipform concrete paving machines, laser screeds or asphalt paving machines may preclude use of fixed forms.
- C. Batching, Mixing and Delivery:
 - 1. Begin mixing immediately after cement has been added to aggregates. Batch and mix in compliance with ASTM C 94, except that discharge shall be

completed within 60 minutes of the introduction of mixture water or aggregate to the cement. Increase time to 120 minutes when using a hydration-stabilizing admixture.

2. Drivers shall not add water unless instructed by the testing agency or certified pervious concrete craftsman. If water is added, the fresh density shall still meet specified requirements after water addition.
3. Discharge: Each truckload shall be visually inspected for consistency of concrete mixture. Discharge shall be a continuous operation and shall be completed as quickly as possible.
4. Concrete shall be deposited as close to its final position as practical and such that discharged concrete is incorporated into previously placed plastic concrete. If consolidation occurs during concrete discharge, placement shall be halted and wet concrete removed.

D. Placing and Finishing:

1. Wet the aggregate base with water before concrete placement such that the material is saturated but without any standing water on the prepared aggregate base immediately before concrete placement.
2. Deposit concrete either directly from the transporting equipment or by conveyor onto the aggregate base, unless otherwise specified.
3. Do not place concrete on frozen subgrade or aggregate base.
4. Deposit concrete between the forms to an approximately uniform height. Spread the concrete using mechanized equipment or hand tools, without segregation.
5. Strike off concrete between forms using a form-riding paving machine, roller screed, or vibrating screed. Other strike-off devices may be used when accepted by the Owner's representative.
6. Finish the pavement to the elevations and thickness indicated on the Drawings within the tolerances specified in Section 3.9 of ACI 522.1.
7. Care shall be taken to prevent closing the void structure of pervious concrete. After mechanical or other approved strike-off and compaction operation, no other finishing operation will be allowed. Internal vibration shall not be permitted. If vibration, internal or surface applied, is used, it shall be shut off immediately when forward progress is halted for any reason.

8. Placed concrete shall not be disturbed while in the plastic state. Low spots after the screeding operation shall be over-filled for surface repair and either tamped to desired elevation with hand tampers or passing the screed a second time to correct the elevation.
9. Hand tampers and an edging tool with $\frac{1}{4}$ in. radius shall be used to compact the concrete along the slab edges immediately adjacent to the forms. After compaction, inspection and surface repair, no further finishing shall be performed on the concrete. Surface curing shall begin immediately as specified in subsection 3.04.F.

E. Jointing:

1. Construct joints at the locations, depths, and with horizontal dimensions indicated on the Drawings. Unless otherwise indicated, contraction (control) joints shall be installed at regular intervals not to exceed 20 feet.
2. Create contraction joints by one of the following methods:
 - a. Tool contraction joints to the specified depth and width in fresh concrete immediately after the concrete is compacted.
 - b. Sawcut concrete after concrete has hardened sufficiently to prevent aggregate from being dislodged and soon enough to control pavement cracking. To minimize drying, ensure that curing materials are removed only as needed to make cuts.
3. Transverse contraction joints shall be installed at $\frac{1}{4}$ the depth of the thickness of the pavement.
4. Transverse construction joints shall be installed whenever concrete placing is suspended for 30 minutes or whenever concrete is no longer workable.
5. Isolation joints shall be used when abutting fixed structures.

F. Curing:

1. Curing procedures shall begin immediately, no later than 10 minutes, from the time the pervious concrete is discharged from the truck. Placing, finishing and tooled jointing and edging must be completed within the 10-minute window from discharge.
2. The pavement surface shall be covered with a minimum of 6 mil thick clear polyethylene sheet or other approved covering material. Prior to covering, an

evaporative reducer shall be sprayed above the surface when required due to ambient conditions (high temperature, high wind, and low humidity). The cover shall overlap all exposed edges and shall be secured (without using dirt or stone) to prevent dislocation due to winds or adjacent traffic conditions.

3. Immediately after screeding, the surface shall be kept moist and evaporation prevented. Immediately after each transverse jointing the polyethylene sheet curing shall be applied then cross rolling shall be performed.
4. The curing cover shall remain securely in place for a minimum of seven days, uninterrupted. No vehicular traffic shall be permitted on the pavement until curing is complete and no truck traffic shall be permitted for at least 14 days. Pedestrian traffic may be permitted on the curing concrete after 24 hours. The Owner's representative may permit earlier traffic opening times.

3.05 FIELD QUALITY CONTROL

- A. Field inspection and testing shall be performed by an approved independent testing agency in accordance with the following requirements, or as otherwise indicated on the Drawings.
- B. Concrete tests shall be performed for each 50 cubic yards, or fraction thereof, with a minimum of one set of tests for each day's placement.
- C. Sample freshly mixed concrete in accordance with ASTM C 172.
- D. Density: Density of the plastic concrete shall be measured in accordance with ASTM C 1688. Density shall be within plus or minus 5 lb/ft³ of the accepted fresh density from the submitted mixture proportion.
- E. Void Content: Void content of the plastic concrete shall be calculated in accordance with ASTM C 1688 and compared to the submitted fresh void content. Unless otherwise specified, void content shall be between 15 and 25 percent. After a minimum of seven days, hardened concrete shall be tested at a rate of one set of three cores per 50 cubic yards of concrete placed on one day, or fraction thereof. Cores shall be drilled in accordance with ASTM C 42. The cores shall be measured for thickness, void structure and unit weight. Cores shall be taken a minimum two feet away from the edge of placement to ensure a representative sample.
- F. Thickness: Untrimmed hardened core samples shall be used to determine placement thickness. The average of all production cores when measured for length shall not be more than ½ inch less than the indicated design thickness.
- G. Core Density and Void Content:

1. The cores shall be tested for average density and void content using ASTM C 1754. Density of cores trimmed and tested in the saturated condition in accordance with ASTM C 1754, shall be plus or minus five percent of the design unit weight or approved hardened density from the test panels. Hardened void content shall be not be lower than two percent below the specified design void content or approved hardened void content from the test panels.

3.06 MAINTENANCE AND PROTECTION

- A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.
- B. Excessive Raveling: Through the end of the warranty period, any areas of excessive surface raveling, as determined by the Owner's representative, shall be removed and replaced or repaired by the Contractor, at no additional cost to the Project.
- C. Surface Drainage: At or before 28 days after placement, either the average infiltration rate of multiple locations or the infiltration rate of a determined localized area of the in-place pervious concrete shall be determined in accordance with ASTM C 1701. Verify the infiltration rate immediately after installation is a minimum of 200inches per hour (or 2 gallons per square foot per minute) as determined using ASTM C 1701. Any areas of insufficient surface infiltration rate, as determined by the Owner's representative, shall be removed and replaced by the Contractor, at no additional cost to the Project.
- D. Inspection and Maintenance Plan: At or before 28 days after placement, the Contractor shall submit to the Owner's representative a written Inspection and Maintenance Plan for implementation by the Owner (or authorized representative) to prevent the clogging of the pervious concrete pavement. The plan shall include periodic testing of the infiltration rate in accordance with ASTM C 1701, and proposed methods to restore porosity if the rate drops below 75 percent of the original determined rate. Acceptable methods to restore levels of porosity shall be described and shall include vacuuming with or without simultaneous power washing of the pervious concrete sections. Fee for preparation of the Inspection and Maintenance Plan shall be at no additional cost to the Project.

+++END OF SECTION 02798+++

SECTION 02900
TREES, SHRUBS, PERENNIALS AND GROUND COVER GENERAL

1.1 DESCRIPTION OF WORK

- A. The work covered under this section applies to furnishing all equipment, materials, and labor necessary for soil preparation; planting of trees, shrubs, herbaceous perennials, ground cover, bare root plants, procurement and proper installation of live stakes, dormant woody cuttings, as applicable; protection, maintenance, guarantee, and replacement of plants; and all related items as shown on the drawings and specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Section 02922 Amended Soil and Mulch
- C. It is not contemplated that planting shall occur where the depth of soil over underground construction or obstructions is insufficient to accommodate the roots or where impervious soil will require drainage. Where such conditions are encountered in excavation of planting areas, other locations for underground construction or for the planting may be designated by the Owner or Owner's Representative.
 - 1. Removal of underground obstructions, relocation of underground construction and provision of drainage for planting areas shall be done only as directed by the Owner or Owner's Representative.
 - 2. If changes in the location of the work or if removal of obstructions involve additional work, the Contractor shall proceed in accordance with the "General Conditions" of the Contract for construction.
- D. All planting shall be performed by personnel with experience with these planting procedures and under the supervision of a qualified planting foreman capable of executing the requirements of this specification.
- E. The Contractor shall take all necessary precautions to avoid damage to existing sidewalks, fencing, paving, curbs, lighting, and other site improvements and Contractor shall replace any existing site improvements damaged by his operations at his own expense to match the pre-damaged condition and to a manner acceptable to the Owner or Owner's Representative.

1.2 QUALITY ASSURANCE

- A. Size, quality, root ball preparation, and grading standards shall conform to the American Association of Nurserymen, Inc., as published in the "American Standard for Nursery Stock," ANSI Z60.1, latest approved revision.

- B. Plant names indicated comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.
- C. The Contractor shall be responsible for all certificates of inspection of plant materials that may be required by federal, state, or other authorities to accompany shipments of plants. All plants must be inspected and approved by the Owner or Owner's Representative before they are planted. Inspection and approval of plants upon delivery shall be for quality, size, and variety only and shall not in any way impair the right of rejection for failure to meet other requirements during progress of the work.
- D. Fertilizer shall conform to the local, state, and federal laws applicable to its manufacture and labeling.

1.3 PLANT GUARANTEE AND REPLACEMENT

A. Guarantee

1. Plants shall be alive, healthy, and vigorous at the end of the guarantee period.
2. The guarantee period all plant material other than trees planted as 'recompense' shall be for a period of one year after installation and Owner final acceptance of the plants. Guarantee period for 'recompense trees' shall be for a period of two years after installation and Owner final acceptance of the plants.
3. Damage to plant material resulting from disease, drought, insect infestation, improper maintenance, winter burn, except breakage resulting from freezing rains or winds of 60 mph and greater, shall be the liability of the Landscape Contractor
4. Contractor is required to control weeds and invasive species that threaten the survival of all installed plantings.

B. Replacement

1. Live stake, bare rooted and containerized plants and shrubs shall have a one year warranty after completion and acceptance of each contract item as listed in bid package. Replacement plants shall then have an additional 60 day warranty.
2. Recompense trees shall have a two year warranty after completion and acceptance of each contract item as listed in bid package. Recompense trees will be inspected after one year. Replacement trees will have an additional one year warranty. Any replacement recompense trees requiring replacement after 2 years will have an additional 60 warranty.

PART 2 PRODUCTS

2.1 PLANTS

- A. The names of plants required under this contract conform to those given in “Standardized Plant Names,” latest edition, prepared by American Joint Committee on Horticultural Nomenclature. Each plant shall be tagged or labeled at the source with full botanical name on a waterproof tag.
- B. Plant specimens shall conform to those indicated on the Drawings and two specimens of each plant shall be furnished for approval unless otherwise noted on the plant list.
- C. Plants shall be nursery grown locally, unless otherwise noted, and have a habit of growth that is normal for the species. They shall be sound, healthy, vigorous, and free from insect pests, plant diseases, and injuries. All plants shall equal or exceed the measurements specified in the Plant List, which are minimum acceptable sizes. They shall be measured before pruning with branches in normal position. No pruning shall be done until the plants have been inspected by the Owner or Owner’s Representative and in no case shall the plants supplied under this contract be pruned back to such an extent that they no longer meet specifications. All trees and shrubs shall have been transplanted or root pruned at least once in the 3 years previous to contract date. Root bound container plants will not be accepted.
- D. Substitutions of genus, species, or variety will be permitted only upon submission of proof, in writing, that the specified plant or its alternative is not obtainable in the continental United States. Written authorization for substitution must be obtained from the Owner or Owner’s Representative.
- E. Bare root plants and plants used for branch layering or live stakes may be field collected in a legal manner.
- F. All balled and burlaped trees shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Balls shall be firmly wrapped with burlap or similar material and bound with twine, cord or wire mesh. Where necessary to prevent breaking or cracking of the ball during the process of planting, the ball may be secured to a platform.
- G. Container grown plants shall be healthy, vigorous, well-rooted, and shall have become established in the container in which they are delivered. These plants shall have been in the established container long enough for the fibrous roots to have developed so that the root mass will retain its shape and hold together when removed from the container. No plants shall be loose in the container and shall not be pot bound. sufficiently rigid to firmly hold the soil protecting the root during transporting, handling, and planting.

2.2 MISCELLANEOUS MATERIALS

- A. Water shall be free from ingredients harmful to plant life. Hose and other watering equipment required for the work shall be furnished by the Contractor.
- B. Mulch shall be shredded hardwood mulch as defined in Section 02922 or tightly baled pine straw which is clean, fresh, dark reddish-brown, and free of branches, cones, foreign matter, insects and disease.
- C. Fertilizer shall be as recommended by soil analysis and as specified within Section 3.3 G and 3.5A, within these specifications.
- D. Stakes for securing container or balled and burlapped trees in the ground shall be a minimum of 24-inches in length, 2-inches x 2-inches wooden stakes. Wooden stakes shall be rot resistant wood, e.g., redwood, oak, western cedar, or pressure treated southern pine.

PART 3 EXECUTION

3.1 SOIL PREPARATION

- A. Prior to planting, soil samples shall be taken within each planting zone (minimum of one per 5,000 square ft.) and include a composite sample of each zone with a minimum of four subsamples per instructions from the UGA Extension Service and be analyzed for the appropriate parameters by the UGA Extension Service or State approved soil analytical laboratory. All soil sample results shall be submitted to the Owner for their records. The Contractor shall add the appropriate amount of the deficient elements to the soil prior to planting.

3.2 TIME OF PLANTING

- A. When other sections of the work have progressed sufficiently to commence the work of planting, and the Owner or Owner's Representative have accepted the preceding work, planting operations shall be conducted immediately under favorable weather conditions. These seasons shall be as follows:
 - 1. Permanent Seed
 - a. Permanent seed shall be planted between March 1 and June 1, or September 1 and October 31, depending on the type of grasses.
 - b. Follow recommendations of seed supplier.
 - 2. Shrubs and Trees (container plantings)

- a. Planting shall occur between November and March, preferably after the first frost
3. Shrubs and Trees (bare root plantings)
 - a. Planting shall occur between November and March, preferably after the first frost
4. Other Ground Cover
 - a. Planting shall occur between November and March
5. At the option and on the full responsibility of the Contractor, planting operations may be conducted under unseasonable conditions without additional compensation.

3.3 PRODUCT HANDLING AND STORAGE

Balled and burlapped plants shall be dug and prepared for shipment in a manner that will not damage roots or branches. The balls or roots of plants not planted immediately on delivery shall be covered with moist soil or mulch, or other protection from drying winds and sun. All plants shall be watered as necessary, until planted. Balled plants shall not be lifted by the trunk of the plant.

3.4 PLANTING OF, TREES, SHRUBS, PERENNIALS, BARE ROOTS, AND GROUND COVER

- A. Except as otherwise specified, the Contractor's work shall conform to accepted horticultural practices as used in the trade.
- B. Live stakes, trees, shrubs, balled and burlapped, containerized plants and seed mixtures shall be planted during the their individual dormant seasons, as directed in the planting schedule, or as advised by a commercial plant supplier. Trees, shrubs, balled and burlapped, containerized plants shall be installed per the recommendations shown on the individual labels and as directed in the planting schedule, or as advised by a commercial plant supplier.
- C. The Owner or Owner's Representative shall verify the staked location of all trees, shrubs, bare root plants and branch layer plants prior to installation with labeled stakes to be furnished for this purpose by the Contractor.
- D. Planting pits shall be dug and soil for planting readied before plants are delivered. Pits shall be at least twice the diameter of the root ball or container. Contractor shall get approval of the planting pit locations from the Owner or Owner's Representative prior to plant installation.
- E. Set plant material in the planting pit to proper grade and alignment. If fabric is used in container plants, remove first before setting in pit. Set plants upright, plum, and no lower than the finished grade or 2-3 inches above finished grade. Add excavated pit

material to fill approximately half of the pit. Fill rest of pit soil and bring to finished grade. Lightly compact fill around root ball and be sure to fill all voids. No filling will be permitted around trunks or stems.

- F. All plants shall be set on prepared soil to such depth that the finished grade level at the plant after settlement will be the same as that at which the plant has grown. They shall be planted upright and plumb. Platforms, wire and burlap for top and sides of the ball as shown on the Details shall be removed. If synthetic fabric is used instead of burlap, all fabric should be removed prior to planting. All broken, frayed, or circling roots shall be cut off cleanly. Soil shall be placed and compacted carefully to avoid injury to roots and to fill voids. When the hole is nearly filled, add water as necessary and allow it to soak away. Fill the hole to finish grade. After the ground settles additional soil shall be filled to the level of the finished grade.
- G. Live stakes shall be installed using a dead blow (shot or sand filled) hammer or rubber mallet to tamp the stakes into the ground, only when the soil is too hard or rocky to allow direct driving of stakes. Stakes should be embedded at least 2/3 of their length.
- H. All trees, shrubs, perennials, ground cover, bare root plants, and branch layer plants shall be installed per the Drawings and Details.
- I. Excess excavated soil from planting operations shall be removed from the site and properly disposed of by the Contractor.
- J. All containerized plants shall be fertilized per soil test recommendations within 2 days of installation. Balled and burlapped trees and shrubs shall not be fertilized for the first year after planting.
- K. If applicable, staking shall be accomplished as shown on Drawings and done only as recommended by Owner or Owner's Representative. Supports shall be removed immediately after the guarantee period..
- L. Unless shown otherwise on the Drawings, all plants shall be mulched with a 3-inch minimum layer of mulch within 2 days of planting. This mulch shall entirely cover the area of the planting pit, bed, or saucer around each plant.
- M. Owner or Owner's Representative shall review and approve method of planting for branch layering and bare planting prior to Contractor beginning installation of these items.
- N. Contractor shall furnish sequencing report to Owner or Owner's Representative for review and approval showing branch layering installation sequencing, including but not limited to, method of creating branch material, soaking timeframe and location, and handling of material prior to being planted.

3.5 PRUNING AND REPAIR

- A. Upon completion of the work under the contract, all new trees and shrubs shall have been pruned and any injuries repaired. The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operations. Pruning shall be done in such a manner as not to change the natural habit or shape of the plant. All cuts shall be made flush, leaving no stubs. On all bruises or scars on the bark and cuts over 3/4-inch in diameter, the injured cambium shall be traced back to living tissue and removed; wounds shall be smoothed and shaped so as not to retain water.

3.6 INSPECTION FOR ACCEPTANCE

- A. Upon completion of all planting and after written notification, inspection of the landscape work to determine partial completion of the contract work, exclusive of maintenance and replacement of plants, will be made by the Owner or Owner's Representative. Inspection of the work will be made again by the Owner or Owner's Representative at the end of the guarantee period.

3.7 MAINTENANCE

- A. Maintenance shall begin immediately after each plant is planted and shall continue until final acceptance is established by the Owner or Owner's Representative. Planting shall be protected and maintained as necessary by watering, fertilizing, and replanting as necessary throughout the guarantee period.

+++END OF SECTION 02900+++

**SECTION 02920
SITE RESTORATION**

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall provide all, labor, materials, equipment and incidentals required for all site restoration and related operations necessary shown on the Drawings or specified in these Specifications.
- B. This section includes disposition of materials and structures encountered in the Work, all cleanup and any other similar, incidental, or appurtenant operations which may be necessary to properly complete the Work.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 - 1. The Contractor shall submit certificates of inspection as required by government authorities. The Contractor shall submit other data substantiating that materials comply with specified requirements.
 - 2. The Contractor shall submit instructions recommending procedures to be established by the City for maintenance of site restoration work for one (1) full year.

1.03 QUALITY ASSURANCE

- A. The Contractor shall ship site restoration materials with certificates of inspection required by authorities having jurisdiction. The Contractor shall comply with regulations applicable to site restoration materials.
- B. If specified site restoration materials are not obtainable, the Contractor shall submit proof of non-availability to the Engineer together with proposal for use of equivalent material.

1.04 SAFETY REQUIREMENTS

- A. Hazards Control:
 - 1. The Contractor shall store volatile wastes in covered metal containers, and remove from the site of the Work daily.

2. The Contractor shall prevent accumulation of wastes that create hazardous conditions.
 3. The Contractor shall provide adequate ventilation during use of volatile or noxious substances.
- B. The Contractor shall conduct cleaning and disposal operations in compliance with local ordinances and environmental laws and regulations.
1. The Contractor shall not burn or bury rubbish and waste materials on the site of the Work without prior written permission from the Engineer.
 2. The Contractor shall not dispose of volatile wastes such as mineral spirits, oil, or fuel in open drainage ditches or storm or sanitary drains.

1.05 DELIVERY

- A. The Contractor shall deliver packaged materials in containers showing weight, analysis, and name of manufacturer. The Contractor shall protect materials from deterioration during delivery and while stored at the site of the Work.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 DISPOSITION OF MATERIALS AND STRUCTURES ENCOUNTERED IN THE WORK

- A. Existing materials or structures that may be encountered (within the lines, grades, or trenching sections established for completion of the Work), if unsuitable or unacceptable to the Engineer for use in the Work, and for which the disposition is not otherwise specified, shall either be disposed of by the Contractor or shall remain the property of the City as further provided in this section.
- B. At the option of the City, any existing materials or structures of "value" encountered in the Work shall remain the property of the City. The term "value" shall be defined by the City.
- C. Any existing materials or structures encountered in the Work, and determined not to be of "value" by the City, shall be disposed of by the Contractor, in an approved manner.

3.02 JOB CONDITIONS

- A. The Contractor shall determine the locations of underground utilities and perform Work in a manner which will avoid possible damage. The Contractor shall hand excavate, as

required. The Contractor shall maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

- B. All bare earth areas within the limit of work shall be grassed, mulched, or covered with other plant material as shown on the Drawings.
- C. On a continuous basis, the Contractor shall maintain the site of the Work free from accumulations of waste, debris, and rubbish caused by his operations.
- D. At completion of the Work, the Contractor shall remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces. The Contractor shall leave the site of the Work clean and ready for occupancy or use.
- E. The Contractor shall proceed with the complete site restoration work as rapidly as portions of the site of the Work become available, working within seasonal limitations for each kind of site restoration work required. The Contractor will not be allowed to postpone cleanup and seeding or sodding until the end of the Work.
- F. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, the Contractor shall notify the Engineer before planting.
- G. The Contractor shall install materials during normal planting seasons for each type of site restoration work.
- H. The Contractor shall plant or replace trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to the Engineer. If planting of trees and shrubs occurs after lawn work, the Contractor shall protect lawn areas and promptly repair damage to lawns resulting from planting operations.
- I. The Contractor may, at his option, employ additional measures (other than those specified) to prevent loss of, or damage to the Work resulting from the effects of wind and/or water. No additional compensation will be made for the employment of such additional measures.

3.03 CLEANUP

- A. During site restoration work, the Contractor shall keep pavements clean and the site of the Work in an orderly condition.
- B. The Contractor shall protect site restoration work and materials from damage due to site restoration operations, operations by other contractors, and trades and trespassers. The Contractor shall maintain protection during installation and maintenance periods. The Contractor shall treat, repair, or replace damaged site restoration work as directed by the Engineer.

- C. Immediately upon completion of any section of the Work and before payment therefore has been made, the Contractor shall remove from the site of the Work all construction equipment, temporary structures, and debris, and shall restore the site of the Work to a condition equal to or better than that which existed prior to construction. Waste materials shall be disposed of at locations satisfactory to the City or affected regulatory agencies.
- D. The Contractor shall not remove barricades and warning and direction signs until directed by the Engineer.
- E. After completion of all Work required by the Contract and before final payment has been made, the Contractor shall make a final cleanup of each separate part of the Work; shall restore all surfaces to a neat and orderly condition; and shall remove all construction equipment, tools, and supplies.

3.04 INSPECTION AND ACCEPTANCE

- A. When site restoration work is completed, including maintenance, the Engineer will, upon request, make an inspection to determine acceptability.
- B. Where inspected site restoration work does not comply with the requirements of the Engineer, the Contractor shall replace rejected work and continue specified maintenance until reinspected by the Engineer and found to be acceptable. The Contractor shall remove rejected plants and materials promptly from the site of the Work.

+++ END OF SECTION 02920 +++

**SECTION 02922
AMENDED SOIL AND MULCH**

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Section includes furnishing and installation of amended soil (engineered soil mix) and mulch for bioretention areas, bioswales and other stormwater quality facilities.
- B. Related Work Specified Elsewhere in the Existing COA DWM Specifications:
 - 1. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control
- C. Related Work Specified Elsewhere in the Green Infrastructure Specifications:
 - 1. Section 02371 – Green Infrastructure Geotextiles
 - 2. Section 02681 – Subdrainage for Stormwater Quality Facilities

1.02 REFERENCES

- A. ASTM International:
 - 1. ASTM C 33, Standard Specification for Concrete Aggregates
 - 2. ASTM D 2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
 - 3. ASTM D 3385, Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer
 - 4. ASTM D 4542, Standard Test Method for Pore Water Extraction and Determination of the Soluble Salt Content of Soils by Refractometer
 - 5. ASTM D 4972, Standard Test Method for pH of Soils
 - 6. ASTM D 5268, Standard Specification for Topsoil Used for Landscaping Purposes

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the Contract Documents.
- B. Submit the following for review and approval prior to shipment of materials to the Site:

1. Written documentation from manufacturers or suppliers for materials to be furnished under this Section. Include description of origin and composition of the materials.
2. Material test results including infiltration rate. Source quality control test results.
3. Minimum 1 gallon samples of proposed materials.

1.04 QUALITY ASSURANCE

- A. Contractor shall retain the services of an approved independent soil testing firm to perform testing of engineered soil mix as specified in this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials in a manner to prevent damage and deterioration.
- B. Engineered soil mix and mulch shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

1.06 PROJECT CONDITIONS

- A. Conform to the specifications in this Section for required environmental conditions for construction work, including site moisture conditions, ambient temperature.
- B. Existing site conditions impacting the work are indicated on the Drawings.

1.07 SCHEDULING

- A. Coordinate furnishing and placement of specified materials with related construction work specified in other referenced specification sections.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

- A. Proposed materials and sources of supply shall be approved by the Owner's representative as specified, prior to use of the materials in the construction.
- B. The independent testing firm shall sample and analyze proposed engineered soil mix as specified in this Section.
- C. Tests on amended soil shall be performed once per location for pH and organic content. Tests for remaining parameters are required for every 500 cubic yards of soil

mix, and at a minimum once per location.

2.02 ENGINEERED SOIL MIX

- A. Engineered soil mix shall consist of a mixture of sand, clay, silt and organic matter meeting the following specifications:
1. Classified as a sandy loam or loamy sand.
 2. Sand Content: 60% to 70% clean washed sand (dry weight basis), conforming to the gradation requirements for fine aggregate in ASTM C 33.
 3. Clay Content: Not greater than 10% including topsoil (dry weight basis).
 4. Topsoil: 8% to 12% (dry weight basis).
 5. Compost: 5% to 10% (dry weight basis).
 6. Infiltration rate: At least 1 inch per hour, and preferred rate of 1 to 2 inches per hour (as determined using ASTM D 3385 or other approved test method).
 7. pH: 5.5 to 6.5 (as determined using ASTM D 4972).
 8. Organic Content: 3 to 10 percent (as determined using ASTM D 2974 or other approved test method).
 9. Concentration of Soluble Salts: Not to exceed 500 ppm (as determined using ASTM D 4542).
- B. Alternate Soil Mix Materials: Engineered soil mixtures utilizing alternate or synthetic materials are acceptable provided the overall composition is completely equivalent to the infiltration performance specifications in paragraph 2.02.A above. Contractor shall submit a request for substitution of materials along with test results for the proposed alternate mix.
- C. Composted Material: Compost shall be a well decomposed, stable, weed-free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials, not including biosolids, meeting the standards developed by the US Composting Council (USCC).
- D. Existing topsoil on the Site may be used as a component of the engineered soil mix. The existing topsoil shall be treated for weeds, tested for pH, organic content, grain size analysis, and permeability to identify necessary amendments. Topsoil shall conform to the requirements of subsection 2.03.
- E. In the event that sufficient topsoil cannot be obtained from on-site excavation, topsoil may be obtained from outside the limits of the Project as approved by the Owner's representative.
- F. Engineered soil mix shall not be incorporated into the Work until it has been approved by the Owner's representative.

2.03 TOPSOIL

- A. Topsoil, as a component of engineered soil mix, shall be natural, friable, fertile, loam, sandy loam, silt loam, or sandy clay loam per USDA soil triangle. It shall be a uniform native upland topsoil, free from subsoil, objectionable weeds, litter, stiff clay, stones larger than one-inch in diameter, stumps, roots, trash, toxic substances, or any other material which may be harmful to plant growth or hinder planting operations.
- B. Composition of topsoil material shall be in accordance with ASTM D5268.

2.04 MULCH

- A. Mulch shall consist of finely shredded (double shredded) hardwood mulch, or equivalent material, and shall be well mixed and homogenous, uniform in color and free of foreign material and viable plant seeds. Mulch shall meet the following criteria:
 - 1. 90% of material passing the 1/2 inch screen.
 - 2. Organic Content: 35% to 65% (dry weight basis).
 - 3. pH: 6.0 to 8.0 (as determined using ASTM D 4972).

2.05 DRAINAGE STONE AND UNDERRDRAIN PIPING

- A. Specified in Section 02681.

2.06 GEOTEXTILE

- A. Specified in Section 02371.

PART 3 EXECUTION

3.01 PREPARATION

- A. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.
- B. Excavate for stormwater quality facilities and construct underdrain system (if required) as specified in Section 02681 and other applicable specification sections.
- C. Prior to placing the underdrain and the engineered soil, the bottom of the excavation (below the bottom of the underdrain and engineered soil mix) shall be roto-tilled or excavated to a minimum depth of 6 inches to alleviate any compaction of the facility bottom. Smooth surface of existing soils. Any substitute method must be approved by the Owner's representative prior to use. Any ponded water shall be removed from the

bottom of the facility and the soil shall be friable before loosening.

- D. Install underdrain, if applicable, as directed in Section 02681.

3.02 GEOTEXTILE INSTALLATION

- A. Specified in Section 02371.

3.03 PLACEMENT OF ENGINEERED SOIL MIX

- A. Engineered soil shall be thoroughly mixed and tested prior to placement.
- B. Place engineered soil mix to the depth and limits indicated on the Drawings. Installation of engineered soil mix, shall be completed in a manner that will ensure preservation of the infiltrative capacity of the underlying soils. The moisture content of the soil shall be low enough to prevent clumping and compaction during placement.
- C. No heavy equipment shall be used within 10 feet of the limits of stormwater quality facilities before, during, or after placement of the engineered soil mix.
- D. The engineered soil mix shall be placed in horizontal layers not to exceed six inches loose depth, and lightly hand-tamped, wetted, or compacted with a small water-filled landscape roller, to reduce the potential for excessive settling.
- E. Uniformly grade engineered soil mix to achieve a smooth surface, free of irregular surface changes. Do not over-work or excessively compact the soil mix. Grade to cross-sections, thickness and elevations indicated on the Drawings. Settling of soil by walking on surface and working with hand equipment is acceptable.

3.04 PLACEMENT OF MULCH

- A. Place mulch on top of completed engineered soil mix and around vegetation plantings to a uniform depth of two to four inches. Place to the full limits of each bioretention area as indicated.
- B. Where possible, do not allow mulch to touch plant foliage.

3.05 FIELD QUALITY CONTROL

- A. Test drainage of amended soil by filling stormwater quality facility with water twice in succession. Notify Owner's representative of water retention exceeding 24 hours.

3.06 MAINTENANCE AND PROTECTION

- A. Remove all debris from within the limits of the constructed stormwater quality facilities.

- B. Protect the constructed areas from erosion and keep free from accumulation of debris. Divert post-construction stormwater runoff around the areas until vegetative cover has been established.
- C. Damage to the constructed areas shall be fully repaired as approved by the Owner's representative.

+++END OF SECTION 02922+++

**SECTION 02933
SEEDING AND SODDING**

PART 1 GENERAL

1.01 SCOPE

- A. The work covered by this Section consists of furnishing all labor, equipment and material required to place topsoil, seed and sod, commercial fertilizer, agricultural limestone and mulch material, including seedbed preparation, harrowing, compacting and other placement operations on graded earthen areas as described herein and/or shown on the Drawings.
- B. The Work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion. Temporary seeding shall be performed at the times and locations as directed by the Engineer.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be submitted:
 - 1. Prior to seeding operations, labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this Section.
 - 2. Prior to topsoil operations, the Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic ignition analysis from the State University Agricultural Extension Services or other certified testing laboratory.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Wood cellulose fiber mulch shall be manufactured by Weyerhaeuser Company or Conway Corporation.

2.02 MATERIALS AND CONSTRUCTION

- A. Topsoil

1. Utilizing designated stockpiles or borrow areas on site, the Contractor shall place a minimum of 6-inches of topsoil over all graded earthen areas and over any other areas to be seeded. Sources of topsoil shall be approved by the Engineer prior to disturbance.
2. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than one half (1/2) -inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements or vegetable debris undesirable or harmful to plant life.
3. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam or a combination thereof. The pH shall range from five and one half (5.5) to seven (7.0). Topsoil shall contain not less than five (5) percent nor more than twenty (20) percent, by weight, of organic matter as determined by loss on ignition of oven dried samples to sixty-five (65) Degrees C.

B. Seed

1. Seed shall be hulled common Bermuda (Cynodon Dactylon) guaranteed by the dealer to be ninety-eight (98) percent minimum purity and ninety (90) percent minimum germination and certified free of giant strain Bermuda.
2. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.
3. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.
4. Seed shall bear the growers analysis testing to ninety-eight (98) percent for purity and ninety (90) percent for germination. At the discretion of the Engineer, samples of seed may be taken for check against the grower's analysis.
5. Species, rate of seeding, fertilization and other requirements are shown in Table 1 of this Section.

C. Fertilizer and Liming Materials

1. Fertilizer and liming materials shall comply with applicable state, local and federal laws concerned with their production and use.
2. Commercial fertilizer shall be a ready mixed material and shall be equivalent to the

grade or grades specified in Table 02933-1. Container bags shall have the name and address of the manufacturer, the brand name, net weight and chemical composition.

3. Agricultural limestone shall be a pulverized limestone having a calcium carbonate content of not less than 85 percent by weight.
4. Fertilizer shall be a complete fertilizer, the content of which shall meet the following minimum requirements: ten (10) percent nitrogen, ten (10) percent phosphoric acid, ten (10) percent potash, available materials. It shall be uniform in composition, dry and free flowing, and shall be delivered to the site in original unopened containers bearing the manufacturer's statement of guarantee.
5. Ammonium Nitrate shall be a standard brand and shall be delivered to the site in original unopened containers. It shall contain not less than thirty-three and one third (33-1/3) percent Nitrogen.

D. Mulch Material

1. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.
2. Mulch shall be composed of wood cellulose fiber, straw or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.
3. Straw mulch shall be partially decomposed stalks of wheat, rye, oats or other approved grain crops.
4. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum or other approved standing field crops.

E. Mulch Binder

1. Mulch on slopes exceeding three (3) to one (1) ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the Engineer.
2. Emulsified asphalt binder shall be Grade SS-1, ASTM D 977. Cutback asphalt binder shall be Grade RC 70 or RC 250.

F. Inoculants for Legumes: All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen fixing bacteria that is adapted to the particular seed involved.

G. Water: Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

H. Sod

1. Sod shall be living, growing sod of Bermuda hybrids "Tifway 419" or Tifgreen 328". This includes sod which is dormant during the cold or dry season and capable of renewing growth after the dormant period. All sod shall be obtained from approved sources. The presence of weeds or other noxious growth or any other foreign material which may be detrimental to the proposed planting will be cause of rejection. At least eighty-five (85) percent of the plants in the sod shall be composed of the designated variety of Bermuda grass.
2. The Engineer shall be notified of sources before it is harvested. Approval of such sources shall not be construed as an acceptance of the material. The sod will be subject to inspection while it is being planted and any material which has been permitted to dry out excessively or exposed to extreme heat, or which is not viable, will be rejected.
3. In the harvesting of the sod, grass more than three (3) -inches tall shall be mowed to a height of three (3) inches, raked and removed before sod cutting begins. The sod shall be cut into square or rectangular sections which may vary in length, but which shall be of uniform width and thickness, and shall have at least one half (½) -inch of soil adhering firmly to the roots. Care shall be exercised at all times to retain the soil on the roots of the sod during the process of cutting, transporting and planting. Sod shall be transplanted within 24 hours from the time it is harvested. All sod stored shall be kept moist, shall be protected from exposure to the air and sun and from freezing, and shall not be stored for more than 10 days. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected.

PART 3 EXECUTION

3.01 GENERAL

- A. In general, seeding operations and installation of sod shall be conducted on all newly graded earthen areas not covered by structures, pavement or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces.
- B. Areas disturbed by borrow activities shall also be seeded according to these Specifications.

3.02 SECURING AND PLACING TOPSOIL

- A. Topsoil shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the Engineer.
- B. The area or areas from which topsoil is secured shall possess such uniformity of soil

depth, color, texture, drainage and other characteristics as to offer assurance that, when removed the product will be homogeneous in nature and will conform to the requirements of these Specifications.

- C. All areas from which topsoil is to be secured, shall be cleaned of all sticks, boards, stones, lime, cement, ashes, cinders, slag, concrete, bitumen or its residue and any other refuse which will hinder or prevent growth.
- D. In securing topsoil from a designated pit, or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the Engineer, the pit shall be abandoned.
- E. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the Engineer.
- F. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.

3.03 SEEDBED PREPARATION

- A. Before liming, fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line from unsightly variation, bumps, ridges and depressions and all detrimental material, roots and stones larger than three (3) -inches in any dimension shall be removed from the soil.
- B. Not earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than two (2) -inches with a weighted disc, tiller, pulvimixer or other equipment, until the surface is smooth and in a condition acceptable to the Engineer.
- C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be cultivated for seeding.
- D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Engineer.

3.04 FERTILIZATION AND LIMING

- A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown in Table 02933-1.
- B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of one half (1/2) -inch.
- C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water

containing fertilizer for more than 30 minutes when a hydraulic seeder is used.

- D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates in Table 02933-1. The specified rate of application of limestone may be reduced by the Engineer if pH tests indicate this to be desirable. It is the responsibility of the Contractor to obtain such tests and submit the results to the Engineer for adjustment in rates.
- E. It is the responsibility of the Contractor to make one application of a maintenance fertilizer according to the recommendations listed in Table 02933-1.
- F. On the approved grade, spread twenty (20) lbs. per one thousand (1,000) sq. ft. of 10-10-10 fertilizer into top three (3) -inches, hand rake and smooth. The surface shall be brought to finish grade requirements, allowance being made for settlement. Finish grades shall be smooth and free from hollows or other inequalities.
- G. Three (3) weeks after construction of lawns add ammonium nitrate at the rate of five (5) lbs. per one thousand (1000) sq. ft. of lawn area, and thoroughly water in.

3.05 SEEDING

- A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in Table 02933-1 unless otherwise approved by the Engineer. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation.
- B. Seed shall be uniformly sown by any approved mechanical method suitable for the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder or approved mechanical power drawn seed drills. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder for seedings at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.
- C. Immediately after sowing, the seeds shall be covered and compacted to a depth of one-eighth (1/8) -inch to three-eighth (3/8) -inch by a cultipacker or suitable roller.
- D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.
- E. Italian rye grass (*Lolium Multiflorum*) shall be evenly seeded with a mechanical spreader at the rate of five (5) lbs. per one thousand (1000) sq. ft. of area, lightly rake, suitably compact and thoroughly water. Before planting the permanent lawn, the rye shall be thoroughly scarified in a manner to incorporate it into the top three inches of the ground.

- F. The planting of bermuda grass shall be done only within the season extending from April 15 to August 1.

3.06 MULCHING

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied so as to permit some sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion and conserve soil moisture. Approximately twenty (25) percent of the ground shall be visible through the mulch blanket.
- B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:

Wood Cellulose Fiber	1,400 pounds/acre
Straw	4,000 pounds/acre
Stalks	4,000 pounds/acre

- C. These rates may be adjusted at the discretion of the Engineer at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.
- D. The Contractor shall cover structures, poles, fence and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.
- E. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates in a manner acceptable to the Engineer.

3.07 WATERING

- A. The Contractor shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain adequate water content in the soil.
- B. Watering shall be accomplished by hoses, tank truck or sprinklers in such a way to prevent erosion, excessive runoff and overwatered spots.

3.08 MAINTENANCE

- A. Upon completion of seeding and sodding operations, the Contractor shall clear the area of all equipment, debris and excess material and the premises shall be restored to its original or better condition.

- B. The Contractor shall maintain all seeded and sodded areas without additional payment until final acceptance of the work by the Owner, and any re-grading, re-fertilizing, re-liming, re-seeding, re-mulching or re-sodding shall be done at Contractor's own expense. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. Damage resulting from erosion, gulleys, washouts or other causes shall be repaired by filling with topsoil, compacting and repeating the seeding work at Contractor's expense.

- C. Contractor's guarantee of 1 year shall also cover a fully rooted stand of grass.

TABLE 02933-1

SEEDING REQUIREMENTS

Area	Sowing Season	Species	Seed	Rates per 1,000 Square Feet		
				Fertilizer	Limestone	Maintenance**
Flat to rolling terrain with slopes less than 3:1	3/1 to 4/15	Rebel II Turf-Type Tall Fescue	6-8 lbs.	30 lbs. 6-12-12	200 lbs.	10 lbs. 10-10-10
	9/1 to 11/15	Rebel II Turf-Type Tall Fescue	6-8 lbs.	30 lbs. 6-12-12	200 lbs.	15 lbs. 10-10-10
Embankments with slopes greater than 3:1	3/1 to 6/1	Crownvetch* Kentucky 31 Fescue Weeping Lovegrass	1 lb. 2 lbs. 1/4 lb.	30 lbs. 6-12-12	200 lbs.	10 lbs. 0-20-20
	8/1 to 11/1	Crownvetch* Kentucky 31 Fescue Annual Ryegrass	1 lb. 2 lb. 2 lb.	30 lbs. 6-12-12	200 lbs.	10 lbs. 0-20-20

* Requires inoculation

** Maintenance fertilizer shall be applied in early spring following initial establishment of cover

+++ END OF SECTION 02933 +++

SECTION 02949
STORMWATER PLANTERS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Section includes fabrication, furnishing and installation of contained landscaped areas designed to receive stormwater runoff from paved surfaces.
- B. Related Work Specified Elsewhere in the Existing COA DWM Specifications:
 - 1. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control
 - 2. Section 02200 – Earthwork
 - 3. Section 02513 – Construction of Sidewalks
 - 4. Section 02900 – Trees, Plants and Ground Covers
 - 5. Division 03 Specifications: For concrete construction
- C. Related Work Specified Elsewhere in the Green Infrastructure Specifications:
 - 1. Section 02371 – Green Infrastructure Geotextiles
 - 2. Section 02681 – Subdrainage for Stormwater Quality Facilities
 - 3. Section 02682 – Pretreatment for Stormwater Quality Facilities
 - 4. Section 02922 – Amended Soil and Mulch

1.02 SYSTEM DESCRIPTION

- A. Stormwater planters shall include the following as indicated on the Drawings:
 - 1. Inlets and flow regulating structures.
 - 2. Pretreatment facilities.
 - 3. Cast-in-place or precast concrete walls and curbs.
 - 4. Drainage stone.
 - 5. Underdrain piping (if required).
 - 6. Impermeable liner and upturned overflow pipe in poor soil conditions.
 - 7. Planter bioretention soils (engineered soil mix).
 - 8. Vegetation.
 - 9. Outflow regulating piping.
- B. System shall be located in consideration of the following, at a minimum:
 - 1. Locate in favorable infiltration areas.
 - 2. Locate in areas that drain stormwater runoff primarily from impervious surfaces.

3. Avoid areas with drainage from adjacent erodible areas and a high potential for heavy sediment loads.
4. Place in area(s) not likely to receive runoff from dumpster pads, materials storage or process areas.
5. Avoid possible conflicts with above and below ground utilities (including septic fields and overhead power lines).
6. Locate at least two feet above the seasonally high groundwater level, outside public rights-of-way (unless an appropriate maintenance agreement is completed), and not on steep slopes.
7. Unless the design includes proper waterproofing, planters shall be located: at least five feet from building foundations, buildings with basements, water wells, and public roadway subgrade.

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the Contract Documents.
- B. Submit the following for review and approval prior to shipment of materials to the Site:
 1. Shop Drawings for system components, showing plans, sections and details to include the following:
 - a. Concrete walls and curbs
 - b. Inlet and outflow structures and piping
- C. Submit the following at completion of the Work:
 1. Field Quality Control: Submit test reports and inspection reports (as applicable)

1.04 QUALITY ASSURANCE

- A. Comply with the requirements of governmental authorities having jurisdiction.

1.05 DELIVERY, STORAGE AND HANDLING

- A. All manufactured products shall be inspected upon delivery to the Site. Damaged or defective materials shall be rejected or repaired as approved by the Owner's representative.
- B. Conform to manufacturer's recommendations for handling and storage of products.
- C. Granular materials of different gradations shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

1.06 PROJECT CONDITIONS

- A. The Contractor is solely responsible for excavation slope stability. Excavation work shall be in compliance with applicable local, state and federal regulations (including OSHA).
- B. Work shall be performed in a manner that does not damage or disturb existing utilities, structures, vegetation, and other site features not indicated to be removed.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate stormwater planter construction with associated work specified in other sections.

PART 2 PRODUCTS

2.01 PRETREATMENT AND FLOW-REGULATING DEVICES

- A. Pretreatment elements and flow-regulating (energy dissipation) devices shall be provided where possible to filter out sediment, trash, floatables and pollutants from runoff prior to entering stormwater planters.
- B. Pretreatment and energy dissipation shall be as indicated on the Drawings and specified in Section 02682.

2.02 INLETS

- A. Inlets shall be provided to direct stormwater into planters as indicated on the Drawings, including one or more of the following:
 - 1. Curb cuts or wall openings at edge of planter area
 - 2. Sheet flow off depressed curbs as shown on the standard details
 - 3. Trench drains that convey flows across a sidewalk from curbs or downspouts

2.03 CONCRETE WALLS AND CURBS

- A. Concrete walls and curbs shall be cast-in-place or precast reinforced concrete constructed to the dimensions indicated on the Drawings and conforming to the following requirements.
- B. Concrete formwork, reinforcement, concrete materials and mix design for concrete walls and curbs shall conform to the applicable requirements of Division 03 Specifications and Section 02521. Unless otherwise specified, minimum compressive strength of concrete shall be 3,000 psi.

2.04 IMPERMEABLE LINER

- A. Impermeable liner to be installed on side or bottom of planters (when required) shall be a 30-mil minimum thickness geomembrane fabricated of linear low density polyethylene

(LLDPE), high density polyethylene (HDPE), flexible polypropylene, polyvinyl chloride (PVC), or other geomembrane material approved by the Owner's representative.

2.05 CHOKER COURSE AND DRAINAGE STONE

- A. Choker course material and drainage stone shall conform to the material specifications in Section 02681.

2.06 GEOTEXTILE

- A. Specified in Section 02371.

2.07 UNDERDRAIN PIPING

- A. Underdrain piping (if required) shall conform to the material specifications in Section 02681.

2.08 ENGINEERED SOIL MIX AND MULCH

- A. Engineered soil mix and mulch layers for planters shall conform to the material specifications in Section 02922.

2.09 OUTFLOW REGULATING DEVICES

- A. Outflow regulating devices shall include non-perforated outlet piping and structures as indicated on the Drawings.
- B. Non-perforated outlet piping shall conform to the material specifications in Section 02681.

2.10 VEGETATION

- A. Furnish native plants, trees, shrubs, and herbaceous vegetation as indicated on the Drawings and specified in Sections 02900

PART 3 EXECUTION

3.01 PREPARATION

- A. Establish required dimensions and elevations for stormwater planter construction.
- A. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.

3.02 EARTHWORK

- A. Excavate in accordance with the applicable requirements of Section 02200 as modified in this Section. Excavate to the required dimensions and depths shown on the Drawings or as otherwise approved by the Owner's representative.

- B. Bottom of the excavation shall be uniformly graded to a level surface within each designated planter area, unless otherwise indicated on the Drawings.
- C. Excavated materials shall be removed from the construction areas and placed in other locations on the site, if needed, or off-site where approved by the Owner's representative.
- D. Protect the prepared bottom of excavation from compaction during construction. If required, the bottom of the excavation shall be scarified (by raking, disking or tilling) to a minimum depth of six inches.

3.03 CONCRETE WALLS AND CURBS

- A. Construct concrete walls and curbs at the required alignment and to the dimensions indicated on the Drawings.
- B. Conform to the applicable requirements of Division 3 Specifications for construction of concrete walls.
- C. Conform to the applicable requirements of Section 02521 for construction of concrete curbs.
- D. Inlet openings shall be provided to the dimensions indicated on the Drawings.

3.04 IMPERMEABLE LINER INSTALLATION

- A. Where required, install impermeable liner over exposed sides or bottom of excavation within the limits of planters. The surface on which impermeable liner is to be placed shall be relatively smooth and uniform, and substantially free of protruding stones and other debris.
- B. Impermeable liner shall be continuous to the full dimensions of the planters as much as practicable. If more than one roll or panel is required, overlap adjacent rolls or panels a minimum of 12 inches and seaming will be required in accordance with the manufacturer's recommendations and as approved by the Owner's representative.

3.05 PLACEMENT OF DRAINAGE BED AND UNDERDRAIN PIPING

- A. Install geotextile (if required) where indicated on the Drawings and as specified in Section 02371.
- B. Place drainage stone and choker course material to the required depths and in the sequence indicated on the Drawings and as specified in Section 02681.
- C. Install underdrain pipe (if required), including cleanouts, at the locations indicated on the Drawings and as specified in Section 02681.

3.06 PLACEMENT OF ENGINEERED SOIL MIX AND MULCH

- A. Place engineered soil mix and mulch to the depth and limits indicated on the Drawing and as specified in Section 02922.
- B. For open bottom planters, installation of soils must be completed in a manner that will ensure preservation of the infiltrative capacity of the underlying soils. The moisture content of the soil shall be low enough to prevent clumping and compaction during placement.

3.07 VEGETATION PLANTING

- A. If placement of engineered soil mix coincides with preferred dates for planting, install plants immediately after completion of the soil mix. Otherwise, place mulch or other approved stabilization material and maintain until planting is completed.
- B. Plant as indicated on the Drawings and specified in Sections 02900 and (as applicable).

3.08 MAINTENANCE AND PROTECTION

- A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.
- B. Remove all debris from within the limits of the constructed stormwater planters.
- C. Protect the constructed areas from erosion and keep free from accumulation of debris. Divert post-construction stormwater runoff around the areas until vegetative cover has been established.
- D. Damage to the constructed areas shall be fully repaired as approved by the Owner's representative.

+++END OF SECTION 02949+++

SECTION 03100
CONCRETE FORMWORK

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install concrete formwork as required by the concrete outlines shown and indicated on the Drawings and specified in this Section, complete. The use of stay in place forms is expressly prohibited.
- B. Notify other contractors in advance of the trades of the formwork to provide the other trades with sufficient time for the installation of items included in their contracts that must be installed with the formwork.
- C. Form Design:
 - 1. Formwork shall comply with ANSI A10.9 and OSHA Construction Standards, Part 1926, Subpart Q, Concrete, Concrete Forms, and Shoring.
 - 2. The form designs shall meet the requirements of ACI 347.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.
- B. Submit for approval copies of manufacturer's data and installation instructions for proprietary materials, including form coatings and releasing agents, manufactured form systems, ties and accessories.
- C. Do not provide submittals for the structural design of forms.

1.03 QUALITY ASSURANCE

- A. Reference Standards: The Contractor shall comply with applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein:
 - 1. ACI 301 - Specification for Structural Concrete
 - 2. ACI 347 - Guide to Formwork for Concrete
- B. Allowable Tolerances:

1. Construct formwork to provide completed concrete surfaces complying with tolerances specified in ACI 347.
 2. Maximum acceptable deflection is 1/8-inch in 5-feet 0-inches on all flat surfaces (ACI 347 Class A Finish).
- C. Notify the Engineer a minimum of 48 hours before closure of forms that would hinder the subsequent inspection to enable the Engineer to inspect the work.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. On delivery to jobsite, place materials in area protected from weather.
- B. Store materials above ground on framework or blocking. Cover wood for forms with protective waterproof covering. Provide for adequate air circulation or ventilation.
- C. Handle materials to prevent damage.

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Forms for Exposed Finish Concrete (Smooth Finish):
 1. Unless otherwise shown or specified, construct formwork for concrete surfaces exposed to view in the finished structure, with plywood, metal, metal-framed plywood-faced or other panel type materials acceptable to Engineer, to provide continuous, straight, smooth as-cast surfaces.
 2. Furnish in largest practical sizes to minimize number of joints and to conform to joint system shown or specified. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- B. Forms for Unexposed Finish Concrete (Rough Finish):
 1. Form concrete surfaces that will be unexposed in the finished structure with plywood, lumber, metal, or other acceptable material.
 2. Provide lumber that is dressed on at least 2 edges and 1 side.
- C. Form Ties:
 1. Provide factory-fabricated, removable or snap off metal form ties designed to prevent form deflection and to prevent spalling of concrete surfaces upon removal. Materials used for tying forms will be subject to approval of the Engineer.

2. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1 inch from the outer concrete surface. Unless otherwise shown, provide form ties that will leave a hole no larger than 1-inch diameter in the concrete surface.
 3. Ties for exterior walls and walls subject to hydrostatic pressure shall have waterstops that are integral with the tie, preferably a solid washer at mid-point of the tie.
 4. Provide wood or plastic cones for ties, where concrete is exposed in the finished structure.
- D. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

PART 3 EXECUTION

3.01 DESIGN OF FORMWORK

- A. Formwork shall be in accordance with ACI 347 and as follows:
1. Design, erect, support, brace and maintain formwork so that it shall safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system or in-place construction that has attained adequate strength for this purpose. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
 2. Design forms and false work to include make full allowance for all of live loads, dead loads, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.
 3. Forms shall conform to shape, lines and dimensions of members indicated and shall be rigid and tight to prevent leakage of mortar. Forms shall be braced or tied together so as to maintain position and shape. Construct forms so that they can be removed readily without hammering or prying against the concrete. Forms shall be carefully made and accurately placed to obtain correct shape and lines.
 4. Joints shall be butted tight. Arrangements of panels shall be orderly and symmetrical, and use of small pieces shall be avoided. Forms shall be chamfered 1-inch for external corners of concrete, including tops of walls, which will be exposed to view in the finished work.

5. Provide adequate formwork in its entirety. Forms shall safely support loads they will sustain and shall maintain their dimensional and surface correctness to produce members required by the Drawings. Form ties shall be spaced close enough to avoid bulges and variations in the required cross-sectional dimensions shown on the Drawings for the members being cast.
6. Box out for chases, recesses or other openings required in the completed work.
7. Install all the items (sleeves, inserts, hangers, anchors, etc.) to be supported by the formwork as required by the work.
8. Install pipe sleeves, wall pipes and wall sleeves, as shown or specified, for all piping penetrating walls and slabs. The use of block-outs in walls is prohibited.
9. Provide a sufficient number of cleanout doors at the base of walls and columns to facilitate cleaning and the application of grout to the base of walls.
10. The use of reinforcing steel, partially embedded in concrete, as toe pins or form spacers is prohibited.

B. Forms for Exposed Concrete

1. Do not use metal cover plates for patching holes or defects in forms.
2. Provide sharp, clean corners at intersecting planes, without visible edges of offsets. Back joints with extra beams to maintain true, square intersections.
3. Use extra beams and bracing to prevent bowing of forms between beams and to avoid bowed appearance in concrete. Do not use narrow strips of form material that will produce bow.
4. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
5. Form molding shapes, recessed and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.
6. Chamfer exposed corners and edges.

C. Corner Treatment

1. Form exposed corners of beams, walls, bases and columns to produce smooth, solid, unbroken lines, except as otherwise shown. Except as specified below for re-entrant or internal corners, exposed corners shall be chamfered.
2. Form chamfers with $\frac{3}{4}$ " by $\frac{3}{4}$ " strips, unless otherwise shown, accurately formed and

surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer strips at changes in direction.

3. Re-entrant or internal corners and unexposed corners may be formed square.

D. Joints

1. Refer to Section 03250 for treatment of joints.
2. Locate joints as shown on the Drawings.

E. Cleaning and Tightening

1. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed.
2. Re-tighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.02 FORM COATINGS

- A. Coat form contact surfaces with a non-staining petroleum free form coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces, which will be bonded to fresh concrete. Apply coating in compliance with manufacturer's instructions.
- B. Volatile organic compound emissions of form releasing agents shall not exceed 2.09 pounds per gallon or that as acceptable in the State, County or District of their intended use, whichever is more stringent.
- C. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork shall not be acceptable.
- D. Form releasing agents shall not impair subsequent treatment of concrete surfaces that depend upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

3.03 INSTALLATION OF EMBEDDED ITEMS

A. General:

1. Set and build into the formwork, anchorage devices and other embedded items, shown specified or required by other Sections. Refer to paragraph 1.01 B herein for the requirements of coordination. Use necessary setting drawings, diagrams, instructions and directions.

2. All embeds should be supported, plumbed and carefully taped or covered to prohibit the infiltration of concrete during the pour.
3. Coat any aluminum or reactive metal inserts with non-reactive coating to isolate the metal surfaces.

B. Edge Forms and Screed Strips for Slabs and Sidewalks:

1. Set edge forms or bulkheads and intermediate screed strips for slabs and sidewalks to obtain required elevations and contours in the finished slab surface. Provide and secure units to support screeds.
2. The screeds may not be tack welded to the rebar embeds, or structural steel.

3.04 FIELD QUALITY CONTROL

- A. Before concrete placement, the Engineer shall inspect all formwork. No concrete shall be poured without the Engineer's approval.
- B. Before concrete placement, the Contractor shall check the formwork, including lines, ties, tie cones, and form coatings. The Contractor shall make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.
- C. During concrete placement, the Contractor shall check formwork and related supports to ensure that forms are not displaced and that completed Work shall be within specified tolerances.
- D. If the Contractor finds that forms are unsatisfactory in any way, either before or during placing of concrete, placement of concrete shall be postponed or stopped until the defects have been corrected and reviewed by the Engineer.

3.05 REMOVAL OF FORMS

- A. Remove forms and false work in a manner that will prevent damage to the concrete and not impair the safety of the structure.
- B. Do not use pinch bars or similar tools to pry against concrete surfaces.
- C. Do not remove forms until concrete has aged as follows:
 1. Elevated slabs and beams: 7 days.
 2. Grade beams, columns, walls, construction and expansion joint bulkheads and other vertical surfaces: 24 hours minimum.

- D. Elevated slabs and beams shall have attained at least 70 percent of the specified 28 day strength before form removal. Determine concrete strength for form removal in conformance with ACI 301.
- E. Reshore elevated concrete elements immediately upon form removal. Shoring shall remain in place until the concrete has attained the specified 28 day design strength.
- F. Maintain shoring of elevated concrete elements which support subsequent construction when the subsequent construction loads exceed the design live load of the elements

3.06 REUSE OF FORMS

Clean and repair surfaces of forms to be re-used in the Work. Split, frayed, delaminated or otherwise damaged form facing material shall not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

1. Plywood surfaced forms must have smooth clean faces for re-use, and may not have excessive knots or tie hole plugs. Forms shall not be used more than (3) times without the Engineer's inspection and approval.
2. Metal surfaced forms shall have a smooth even surface without plate patches.

+++ END OF SECTION 03100 +++

**SECTION 03200
CONCRETE REINFORCEMENT AND DOWELLING**

PART 1 - GENERAL

1.01 SCOPE

- A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide concrete reinforcement and dowelling as shown and specified.
- B. The extent of concrete reinforcement and dowelling is shown on the Drawings.
- C. The Work includes fabrication and placement of reinforcement including bars, ties and supports for concrete and encasements.
- D. Related Work Specified Elsewhere:
 - 1. Section 03100, Concrete Formwork
 - 2. Section 03250, Concrete Joints
 - 3. Section 03300, Cast-In-Place Concrete.
 - 4. Section 03600, Grout.
 - 5. Section 03605, Dowelling Into Existing Concrete.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 - 1. Shop Drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315, Chapters 1 thru 8. Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrications and placement of concrete reinforcement unless otherwise noted. Splices shall be kept to a minimum. Show construction joints.
 - 2. Copies of manufacturer's specifications and installation instructions for all materials and reinforcement accessories.
 - 3. 5 copies of steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel.

1.03 QUALITY ASSURANCE

- A. Contractor shall examine the substrate and the conditions under which concrete reinforcement is to be placed, and notify the Engineer in writing of unsatisfactory

conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

B. Reference Standards: Comply with all Federal and State laws or ordinances, as well as all applicable codes, standards, regulations and/or regulatory agency requirements including the partial listing below:

1. Concrete Reinforcing Steel Institute, "Manual of Standard Practice", includes ASTM standards referred to herein.
2. ACI 318, "Building Code Requirements for Reinforced Concrete".
3. ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
4. ACI 350, Environmental Engineering concrete structures.
5. Concrete Reinforcing Steel Institute, Placing Reinforcing Bars.
6. AWS D.1, Structural Welding Code.

C. Minimum Concrete Cover for Reinforcement: Comply with ACI 350, except as shown on Drawings:

D. Splices other than lap splices shall not be used except where permitted in writing by the Engineer.

E. Reinforcement which arrives on the jobsite which is not tagged as specified in Paragraph 1.04A shall be rejected by the Engineer and removed at the Contractor's expense.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver concrete reinforcement materials to the site bundled, tagged and marked. Use metal tags indicating bar size, length, and other information corresponding to markings shown on placement diagrams.

B. Store concrete reinforcement material at the site to prevent damage and accumulation of dirt or excessive rust. Store on heavy wood blocking so that no part of it will come in contact with the ground.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars and Dowelling: ASTM A 615, Grade 60, where welding is not required, or ASTM A706, Grade 60, for reinforcing to be welded.

B. Steel Wire: ASTM A82.

C. Welded Smooth Wire Fabric: ASTM A185:

1. Furnish in flat sheets, not rolls.
- D. Supports for Reinforcement: Bar supports coming into contact with forms shall be CRSI Class 1 plastic protected or Class 2 stainless steel protected and shall be located in accordance with CRSI MSP-1 and placed in accordance with CRSI PRB. Precast concrete block supports shall be provided for reinforcing in concrete cast against grade.
- E. Mechanical Connections:
1. Metal Sleeve. Steel sleeve with cast filler metal, capable of developing, under tension or compression, 125 percent of specified yield strength of the reinforcing bar. Metal sleeve shall be as manufactured by:
 - a. Erico Products, Inc., Cleveland, OH.
 - b. Or equal.
 2. Mechanical Threaded Connection. Metal coupling sleeve with internal threads which engage threaded ends of bars to be spliced, and develops under tension or compression, 125 percent of the specified yield strength of the bar. Mechanical threaded connection shall be as manufactured by:
 - a. Erico Products, Inc., Cleveland, OH, Lenton Reinforcing Steel Couplers.
 - b. Richmond Screw Anchor Co., Inc., Fort Worth, TX, Richmond DB-SAE Dowel Bar Splicers.
 - c. Or equal.
- F. High Strength Bars. High strength bars shall be 150 KSI steel conforming to ASTM A-722, threaded full length. Anchor nuts shall be manufacturer's standard designed for use with bars. Mechanical couplers, when required, shall be capable of developing 100% of guaranteed ultimate strength of the bars.

2.02 FABRICATION

- A. General: Fabricate reinforcing bars and dowelling to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice" and ACI minimums. In case of fabricating errors, do not re-bend, retemper, heat, deform or straighten reinforcement.
- B. Unacceptable Materials: Reinforcement with any of the defects listed below will not be permitted in the Work:
1. Bar lengths, bends, and other dimensions exceeding specified fabrication tolerances.
 2. Bends or kinks not shown on approved Shop Drawings.
 3. Bars with reduced cross-section due to excessive rusting or other cause.

4. Surface contamination that would affect the bond i.e. grease, dirt, paint, rust etc.
5. Heat deformed or torched bars.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with the applicable recommendations of specified codes and standards, and CRSI "Placing Reinforcing Bars" and ACI requirements for details and methods of reinforcement placement and supports.
- B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcement and dowelling against displacement during formwork construction or concrete placement and grouting operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required. No wood blocks allowed for rebar support.
 1. Place reinforcement to obtain the minimum concrete coverages as shown and as specified in ACI 350. Arrange, space, and securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
 2. Reinforcing steel shall not be secured to forms with wire, nails or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.
- D. Install welded wire fabric in as long lengths as practical. Lap adjoining pieces at least one full mesh and lace splices with 16 gauge wire and tie.
- E. Provide sufficient numbers of supports of strength required to carry reinforcement without sagging. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- F. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars.
- G. Dowels to be embedded a minimum of 8 inches into existing concrete unless otherwise specified on the drawings. Grout with an approved epoxy grout, per Section 03605 of these Specifications.
- H. Existing concrete which is shown to remain but is removed in error or must be removed to install new Work, is to be reinforced to the extent as required and

approved by the Engineer. This work will be performed with no additional compensation to the Contractor.

- I. Do not straighten or rebend reinforcing.
- J. Reinforcement Around Openings: Place an equivalent area of steel around the pipe or openings and extend on each side sufficiently to develop bond in each bar. See the Details on the Drawings for bar extension length each side of openings. Where welded wire fabric is used, provide extra reinforcing using fabric or deformed bars.
- K. Welded Reinforcement: Welding shall not be permitted unless the Contractor submits detailed shop drawings, qualifications, and radiographic nondestructive testing procedures for review by the Engineer. Reinforcing bars to be welded shall conform to ASTM A706; other bars shall not be welded. The Contractor shall obtain the Engineer's approval prior to proceeding. The basis for the Contractor submittals shall be The Structural Welding Code, Reinforcing Steel, AWS D1.4-79, published by the American Welding Society and the applicable portions of ACI 318, current edition. The Contractor shall test 10 percent of all welds using radiographic, nondestructive testing procedures referenced in this code.

3.02 INSPECTION OF REINFORCEMENT

- A. After the rebar, appliance, anchors and embedments have been installed and checked, the Contractor shall review all aspects of the pending concrete pour and initial those items on its pour card. Contractor shall notify the Engineer no less than 24 hours prior to the pour, so that the Engineer may check the area and pour. No concrete shall be placed until this is complete.
- B. Concrete shall not be placed until the reinforcing steel is inspected and permission for placing concrete is granted by the Engineer. All concrete placed in violation of this provision will be rejected. Rejected concrete shall be removed and replaced at no cost to the City.

+++ END OF SECTION 03200 +++

**SECTION 03250
CONCRETE JOINTS**

PART 1 - GENERAL

1.01 SCOPE

- A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide concrete joints as shown and specified.
- B. The types of concrete joints required include the following:
 - a. Construction joints.
 - b. Expansion joints and fillers.
 - c. Waterstops.
- C. General: All joints subject to hydrostatic pressure shall be provided with continuous waterstop.
- D. Related Work Specified Elsewhere:
 - 1. Section 03100, Concrete Formwork.
 - 2. Section 03200, Concrete Reinforcement and Dowelling
 - 3. Section 03300, Cast-In-Place Concrete.
 - 4. Section 07900, Caulking and Sealants.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 - 1. Product data for all materials stating the location where product is to be used.
 - 2. Certification that materials meet the specifications.
 - 3. Manufacturer's application and installation instructions.
 - 4. Samples of water stops, concrete roughener, joint fillers, caulk and bonding agent if requested by the Engineer.

1.03 QUALITY ASSURANCE

- A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:
 - 1. ACI 301, Specifications for Structural Concrete for Buildings, Chapter 6, Joints and Embedded Items.
 - 2. ACI 350, Environmental Engineering concrete structures, Chapter 2.8, Joints.

3. ASTM D 1752, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- B. All manufactured items shall be installed in accordance with manufacturer's instructions.
- C. Construction and expansion joints shall not be added or relocated without the approval of the Engineer.

PART 2 - PRODUCTS

2.01 JOINT SEALER

- A. Materials shall be two component, polyurethane meeting ASTM-C-920 and FED SPEC TT-S-00227E specifications. Materials shall have \pm 50% movement.
- B. Manufacturer and Product shall be:
 1. Horizontal Joint - Sikaflex 2C Self Leveling by Sika Corp or equal.
 2. Vertical Joint - Sikaflex 2C Non-Sag by Sika Corp or equal.

2.02 CONSTRUCTION JOINTS

- A. Bonding Agent - Shall meet ASTM C 881 with a bond strength of 1500 psi minimum. Agent shall be capable of spraying in inaccessible locations, if necessary.
 1. Manufacturer and Product shall be:
 - a. Sika Armatic 110 by Sika Corp.
 - b. Sikadur 32 Hi-Mod by Sika Corp.
 - c. Or equal.

2.03 JOINT FILLER

- A. Expansion Joint Material: Type I, preformed sponge neoprene expansion joint filler conforming to AASHTO Designation M-153.

2.04 WATERSTOPS

- A. Waterstop shall be PVC (Polyvinylchloride) meeting ASTM D-638 test method for tensile strength of 2020 psi and ultimate elongation of 370.
 1. Construction joints:
 - a. Serrated with center bulb, 3/8" thick by 6" minimum width, Greanstreak #706 or equal.
 - b. Preformed plastic adhesive waterstop, Synko-Flex Products or equal. Use

only where shown on Drawings.

2. Expansion Joints: Serrated with center bulb, 3/8" thick by 9" minimum width, Greanstreak #738 or equal.

PART 3 - EXECUTION

3.01 CONSTRUCTION JOINTS

A. General:

1. Comply with ACI 301, Chapter 6, and ACI 350, Chapter 2.8.3 and as specified below.
2. Provide waterstops in construction joints as shown and as specified in this Section.
3. All joints between new and existing concrete to comply with Article 3.01 of this Section.

B. Installation:

1. Brush blast new and existing concrete surfaces at joint and surrounding area. Dry, oil-free air to be used for blasting operation. Blasting to be sufficient to remove laitance and solid contaminants, open up surface voids, bugholes, air pockets and other subsurface irregularities but not expose underlying aggregate. The abrasive shall be dry and clean and will pass through a 16 mesh screen. After blast cleaning is completed, residual abrasive dust and loose particles are to be removed from the surface by vacuuming or by compressed air. Blasting operation is to be repeated if requested by the Engineer at no additional compensation to the Contractor.
2. Install waterstop and bonding agent per manufacturer recommendations and this Section. Spray on epoxy bonding agent in inaccessible areas per manufacturer's recommendations.
3. Place a 6-inch grout charge of similar proportions to the cement in the concrete, over the damp, clean horizontal contact surface of the old concrete. Place fresh-concrete before the grout has attained its initial set. Grout shall be ordinary cement-sand grout as specified in Section 03600.
4. When concrete has been placed and the form removed, wash loosened material off with high pressure water spray to obtain roughened surface subject to approval by Engineer, prior to rub finish.
5. Cure concrete sufficiently prior to placement of joint filler and epoxy coating to obtain optimum bond as per manufacturer's recommendations.

6. Apply approved epoxy joint filler per Section 07900.
7. Apply epoxy coating approved by the Engineer.
8. Install appliances per drawings and specifications.

3.02 WATERSTOPS

A. General:

1. Comply with ACI 301, Chapter 6, Section 3.01 B and as specified below. All joints shall be made in accordance with manufacturer's instructions.
2. Obtain Engineer's approval for waterstop locations not shown.

B. Polyvinyl Chloride Waterstop:

1. Tie waterstop to reinforcement so that it is securely and rigidly supported in the proper position during concrete placement to insure their proper positioning. Puncturing waterstop with tire wire to secure it to reinforcement is prohibited.
2. Waterstops shall be fused using equipment as supplied by or recommended by the manufacturer. Heat welded at all splice points.
3. Provide sufficient bed of epoxy grout, after sandblasting, cleaning roughening and priming the surface, so as to fill all voids including the "V" at the split.
4. Install split-bulb PVC waterstop onto the non-shrink, non-metallic grout bed. Mount waterstop to wall using two (2) 1/4" x 2" type 316 stainless steel strips on either side of the waterstop anchored with 1/2" diameter type 316 stainless steel anchor bolts on 12" centers.
5. Fill all voids between the waterstop and the concrete with approved epoxy grout with no additional compensation to the Contractor if injection method is used.
6. Obtain final Engineer's approval of the waterstop installation prior to placing concrete.

+++END OF SECTION 03250+++

**SECTION 03300
CAST-IN-PLACE CONCRETE**

PART I - GENERAL

1.01 SCOPE

A. General

1. The work covered under this section includes furnishing all labor, materials, equipment, and incidentals needed to provide formwork, reinforcement, concrete including all concrete joints, grout, and incidentals required to complete the Work as shown on the Plans and specified in these Specifications.
2. The Work includes providing concrete consisting of Portland cement, fine and coarse aggregate, water, and approved admixtures combined, mixed, transported, placed, finished, and cured. The Work also includes:
 - a. Providing openings in concrete to accommodate the Work under this and other sections and building into the concrete all items such as sleeves, frames, anchor bolts, inserts, and all other items to be embedded.
 - b. Providing openings in concrete to accommodate the work under other contracts and building into the concrete all items such as sleeves, frames, anchor bolts, inserts, and all other items required to be embedded under other contracts.

B. Coordination:

1. The Contractor shall review installation procedures under other sections and coordinate the installation of items that must be installed in the concrete as a prime responsibility of the Contractor.
2. The Contractor shall notify other contractors in advance of the placement of concrete to provide the other contractors with sufficient time for furnishing of items included in their contracts that must be installed in the concrete.
3. Require City formal pour card with all required signatures.

C. Classes of Concrete:

1. Class "A" concrete 4,000 psi compressive strength at 28 days shall be steel reinforced and includes the following:

- a. Foundations
 - b. Walls
 - c. Slab on grade
 - d. Beams
 - e. Elevated concrete floors
 - f. Columns
2. Class "B" concrete 3,000 psi compressive strength at twenty-eight (28) days shall be placed without forms or with simple-forms with little or no reinforcing, except as required per detail and includes the following:
- a. Sidewalks
 - b. Curbs
 - c. Pavement patch
 - d. Thrust blocking
 - e. Fence Post footing
 - f. Mud Slabs
 - g. Fill concrete
3. Class "C" concrete shall attain 1,500 psi compressive strength at twenty-eight (28) days, shall be placed without forms or with simple forms, with little or no reinforcing, and includes the following:
- a. Concrete encasement for pipe.
 - b. Only where specifically shown on the Drawings.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.
- B. Samples: Submit samples of materials as specified and as otherwise may be requested by the Engineer, including names, sources and descriptions.

- C. Shop Drawings: Submit for approval the following:
1. List of concrete materials and concrete mix designs proposed for use. Include the results of all tests performed to qualify the materials and to establish the mix designs.
 2. Copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.
- D. Laboratory Test Reports: Submit copies of laboratory test reports for concrete cylinders, materials and mix design tests. Engineer's review will be for general information only. Production of concrete to comply with specified requirements is the responsibility of the Contractor. Submit the testing laboratory's average strength curve from the design mix proportions of the approved materials.
- E. Submit notarized certification of conformance to referenced standards to the Engineer and a copy of the batch plant's most recent scale calibration.
- F. Delivery Tickets: Furnish to Engineer copies of all delivery tickets for each load of concrete delivered to the site. Provide items of information as specified in ASTM C94, Section 14.

1.03 QUALITY ASSURANCE

- A. Reference Standards: Comply with the applicable provisions and recommendations of the latest edition following, except as otherwise shown or specified.
1. ACI 301, Specification for Structural Concrete for Buildings, (includes ASTM Standards referred to herein).
 2. ACI 304, Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 3. ACI 305, Recommended Practice for Hot Weather Concreting.
 4. ACI 306, Recommended Practice for Cold Weather Concreting.
 5. ACI 308, Standard Practice for Curing Concrete.
 6. ACI 309, Recommended Practice for Consolidation of Concrete.
 7. ACI 318, Building Code Requirements for Reinforced Concrete.

8. ACI 350, Code Requirements for Environmental Engineering Concrete Structures.
9. ACI 347, Recommended Practice for Concrete Formwork.
10. ASTM C31, Standard Method of Making and Curing Concrete Test Specimens in the Field.
11. ASTM C33, Standard Specification for Concrete Aggregates.
12. ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
13. ASTM C40, Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
14. ASTM C42, Standard Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
15. ASTM C94, Standard Specification for Ready-Mixed Concrete.
16. ASTM C138, Standard Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete.
17. ASTM C143, Standard Test Method for Slump of Portland Cement Concrete.
18. ASTM C150, Standard Specification for Portland Cement.
19. ASTM C157, Standard Test Method for Length Change of Hardened Cement Mortar and Concrete.
20. ASTM C171, Standard Specification for Sheet Materials for Curing Compounds.
21. ASTM C172, Standard Method of Sampling Freshly Mixed Concrete.
22. ASTM C173, Standard Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
23. ASTM C192, Standard Method of Making and Curing Concrete Test Specimens in the Laboratory.
24. ASTM C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

25. ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
26. ASTM C494, Standard Specification for Chemical Admixtures for Concrete.
27. ASTM C827, Standard Test Method for Early Volume Change of Cementitious Mixtures.
28. Federal Specification CCC-C-467C: Cloth, Burlap Jute or Kenaf.

B. Concrete Testing Service:

1. By Contractor's Testing Laboratory:

- a. The Contractor shall employ, at his/her own expense, a testing laboratory, approved by the Engineer and experienced in design and testing of concrete materials and mixes to perform material evaluation tests and to design concrete mixes.
 - i. Testing agency shall meet the requirements of ASTM E329.
 - ii. Submit a written description of the proposed concrete testing laboratory giving qualifications of personnel, laboratory facilities and equipment, and other information which may be requested by the Engineer.
 - iii. Submit certification that the testing facility meets the requirements of ASTM E329.
 - iv. Selection of a testing laboratory must be approved by the Engineer.
- b. Materials and installed Work may require testing and retesting, as directed by the Engineer, at any time during the progress of the Work. The Contractor shall allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be done at the City's expense, including the retesting of rejected materials and installed Work, shall be done at the Contractor's expense.

2. By Independent Testing Laboratory

- a. Testing for concrete field quality control as specified in this section, shall be performed by an independent testing laboratory approved by the Engineer. The cost of all concrete testing for field quality control, except as otherwise specified, shall be paid from the Concrete Testing Allowance included in this Contract and shall not be included in the Contractor's base

bid. The Contractor shall be responsible for notifying the independent testing laboratory to schedule the testing as specified.

C. Qualifications of Water-Reducing Admixture Manufacturer.

1. Water-reducing admixtures shall be manufactured under strict quality control in facilities operated under a quality assurance program. The Contractor shall furnish a copy of the manufacturer's quality assurance handbook to document the existence of the program. The manufacturer shall maintain a concrete testing laboratory which has been approved by the Cement and Concrete Reference Laboratory at the Bureau of Standards, Washington, D.C.
2. The Contractor shall provide a qualified concrete technician employed by the admixture manufacturer to assist in proportioning the concrete for optimum use of the admixture. The concrete technician, when requested, shall advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing conditions at the site of the Work.

D. Test for Concrete Materials:

1. The Contractor shall submit written reports to the Engineer, for each material selected and tested, prior to the start of Work. The Contractor shall provide the Project identification name and number, date of report, name of the Contractor, name of concrete testing laboratory, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each materials, and test results. The Contractor shall indicate acceptability of materials for intended use.
2. The Contractor shall have the approved testing laboratory run a sample load of the design mix and make a minimum of 12 test cylinders, then have the laboratory do cylinder breaks at 3, 7, 21, and 28 days and plot an average strength curve for the mix design. The Contractor shall submit the average strength curve to Engineer prior to any concrete pour.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

All materials used for concrete must be kept clean and free from all foreign matter during transportation and handling and kept separate until measured and placed in the mixer. Bins or platforms having hard clean surfaces shall be provided for storage. Suitable means shall be taken during hauling, piling, and handling to insure that segregation of the coarse and fine aggregate particles does not occur and the grading is not affected.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement:

1. Portland cement, ASTM C 150, Type II.
2. The Contractor shall use portland cement made by a qualified, acceptable manufacturer and produced by not more than 1 plant.
3. The Contractor shall not use cement which has deteriorated because of improper storage or handling.
4. Type I cement NOT PERMITTED.

B. Aggregates: ASTM C33 and as herein specified.

1. The Contractor shall not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces. Slag materials are not allowed.
2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps, or other deleterious substances.
 - a. Dune sand, bank run sand, and manufactured sand are not acceptable.
3. Coarse Aggregate: Clean granitic, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter as follows:
 - a. Crushed stone, processed from natural rock or stone.
 - b. Coarse Aggregate Size: Size shall be ASTM C33, Nos. 57 or 67, except that No. 467 may be used for footings, foundation mats and walls 16 inches or greater in thickness.

C. Water: Clean, free from injurious amounts of oils, acids, alkalis, organic materials, or other substances that may be deleterious to concrete or steel.

2.02 CONCRETE ADMIXTURES

- A. The Contractor shall provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instruction. The Contractor shall not use admixtures which have not been incorporated and

tested in the accepted mixes, unless otherwise authorized in writing by the Engineer.

B. Air-Entraining Admixtures: ASTM C260:

1. Product and Manufacturer: The Contractor shall provide one of the following:
 - a. Daravair as manufactured by Grace Construction Products.
 - b. MB-VR as manufactured by Master Builders Company.
 - c. Sika AER as manufactured by Sika Chemical Corporation.
 - d. Air Entraining Agent as manufactured by W. R. Meadows.
 - e. Or approved equal.
2. Air entrainment required for all concrete used on this Project.

C. Water-Reducing Admixture: ASTM C494, Type A.

1. The Contractor shall proportion all concrete with non-air entraining, normal setting, water-reducing, aqueous solution of a modification of the salt of polyhydroxylated organic acids. The admixture shall not contain more chloride ions than are contained in municipal drinking water. The Contractor shall provide one of the following:
 - a. WRDA-86 as manufactured by Grace Construction Products.
 - b. Pozzolite by Master Builders Company.
 - c. Plastocrete 161 as manufactured by Sika Chemical Corporation.
 - d. Or approved Equal.
2. Water-reducing admixture required for all type A and B concrete unless directed otherwise by the Engineer.

D. Calcium Chloride: The Contractor shall not use calcium chloride in concrete.

E. The Contractor shall not use a retarder in the concrete, unless written permission is given by Engineer.

2.03 PROPORTIONING AND DESIGN OF MIXES

A. The Contractor shall prepare design mixes of concrete. The Contractor shall use the same design mix for both classes of concrete. Mixes will be subject to the following limitations:

1. Specified 28 day Compressive Strength:
 - a. Class A - 4,000 psi.
 - b. Class B - 3,000 psi.
2. Maximum Water-Cement Ratio by Weight: 0.45.

Coarse Aggregate Number	Minimum Cement Content, Pounds Per Cubic Yard	Percent Air Content
57, 67	564	6 ± 1%
467	517	5 ½ ± 1%

B. The Contractor shall use an independent testing laboratory approved by the Engineer for preparing and reporting proposed mix designs.

1. The testing laboratory shall not be the same as used for field quality control testing.
2. Calibration charts on the laboratory equipment shall be submitted to the Engineer.

C. The Contractor shall proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for concrete required. The Contractor shall comply with ACI 211.1 and report to the Engineer the following data:

1. Complete identification of aggregate source of supply.
2. Tests of aggregates for compliance with specified requirements.
3. Scale weight of each aggregate.
4. Absorbed water in each aggregate.
5. Brand, type, and composition of cement.
6. Brand, Type, and amount of each admixture.

7. Amounts of water used in trial mixes,
 8. Proportions of each material per cubic yard .
 9. Gross weight and yield per cubic yard of trial mixtures.
 10. Measured slump.
 11. Measured air content
 12. Compressive strength developed at 3, 7, 21, and 28 days, from not less than three (3) test cylinders cast for each seven (7) day and twenty-eight (28) day test, and for each design mix.
- D. The Contractor shall submit written reports to the Engineer of proposed mix of concrete at least fifteen (15) days prior to start of Work. The Contractor shall not begin concrete production until mixes have been approved by the Engineer.
- E. Laboratory Trial Batches: When laboratory trial batches are used to select concrete proportions, the Contractor shall prepare test specimens and conduct strength test as specified in ACI 301, Chapter 3 - Proportioning, Method 1. Four Thousand (4,000) psi concrete mixes need not be designed for greater than four thousand and six hundred (4,600) psi regardless of the production facilities standard deviation.
- F. Field Experience Method: When field experience methods are used to select concrete proportions, the Contractor shall establish proportions as specified in ACI 301, Chapter 3, Method 2.
- G. Water-Cement Ratio Methods: If suitable data from field experience or laboratory trial batches cannot be obtained, concrete proportions may be established as specified in ACI 301, Chapter 3, Method 3.
- H. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the City and as accepted by Engineer. Laboratory test data for revised mix designs and strength results shall be submitted to the Engineer for acceptance before using the revised mixes.
- I. Admixtures:
1. The Contractor shall use air-entraining and water reducer admixtures in all concrete. The Contractor shall add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the prescribed limits.

2. The Contractor shall use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. The Contractor shall adjust quantities and types of admixtures as required to maintain quality control.

J. Slump Limits:

The Contractor shall proportion and design mixes to result in concrete slump at the point of placement as follows:

- a. For footings and substructure walls, not less than one (1) inch and not more than three (3) inches.
- b. For slabs on grade, elevated concrete floor, beams, walls, and columns, not less than one (1) inch and not more than four (4) inches.

2.04 CONCRETE COATINGS

The Contractor shall provide concrete coating TNEMEC Series 61, TNEMEC Liner or equal.

2.05 EPOXY BONDING AGENT

The Contractor shall provide an epoxy-resin bonding agent as specified in Section 03250, Concrete Joints of these Specifications, everywhere new concrete is poured against old or when the new concrete has been left thirty (30) days or more without the following new pour placed against it.

2.06 CONCRETE CURING MATERIALS

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately ten (10) ounces per square yard and complying with AASHTO M t 82, Class 3.
- B. Moisture-Retaining Cover: One of the following, complying with ASTM C171.
 1. Waterproof paper.
 2. Four (4) mil polyethylene.
- C. Curing and Sealing Compound: ASTM C309.

Product and Manufacturer: The Contractor shall provide one of the following:

- a. Res-X curing compound as manufactured by the Burke Company.

- b. Masterkure as manufactured by Master Builders Company.
- c. Concrete Curing Compounds as manufactured by W. R. Meadows, Inc.
- d. Or approved equal.

PART 3 - EXECUTION

3.01 CONCRETE MIXING

A. General:

1. Concrete may be produced at batch plants or it may be produced by the ready-mixed process. Batch plants shall comply with the recommendations of ACI 304, and shall have sufficient capacity to produce concrete of the qualities specified, in quantities required to meet the construction schedule. All plant facilities are subject to testing laboratory inspection and acceptance of the Engineer.
2. Mixing:
 - a. The Contractor shall mix concrete with an approved rotating type batch machine, except where hand mixing of very small quantities may be permitted.
 - b. The Contractor shall remove hardened accumulations of cement and concrete frequently from drum and blades to assure acceptable mixing action.
 - c. The Contractor shall replace mixer blades when they have lost ten (10) percent of their original height.
 - d. The Contractor shall use quantities such that a whole number of bags of cement is required, unless otherwise permitted.

B. Ready-Mix Concrete:

The Contractor shall comply with the requirements of ASTM C94, and as herein specified. Proposed changes in mixing procedures, other than herein specified, must be accepted by the Engineer before implementation.

- a. Plant equipment and facilities: The Contractor shall conform to National Ready Mix Concrete Association "Plant and Delivery Equipment Specification".

- b. The Contractor shall mix concrete in revolving type truck mixers which are in good condition and which produce thoroughly mixed concrete of the specified consistency and strength.
 - c. The Contractor shall not exceed the proper capacity of the mixer.
 - d. The Contractor shall mix concrete for a minimum of two (2) minutes after arrival at the site of the Work, or as recommended by the mixer manufacturer.
 - e. The Contractor shall not allow the drum to sit while in transit.
 - f. The Contractor shall mix at proper speed until concrete is discharged.
 - g. The Contractor shall maintain adequate facilities at the site of the Work for continuous delivery of concrete at the required rates.
 - h. The Contractor shall provide access to the mixing plant for the Engineer at all times.
- C. The Contractor shall maintain equipment in proper operating condition, with drums cleaned before charging each batch. The Contractor shall schedule rates of delivery in order to prevent delay of placing the concrete after mixing, or holding dry-mixed materials too long in the mixer before the addition of water and admixtures.

3.02 TRANSPORTING CONCRETE

- A. The Contractor shall transport and place concrete not more than sixty (60) minutes after water has been added to the dry ingredients.
- B. The Contractor shall take care to avoid spilling and separation of the mixture during transportation.
- C. The Contractor shall not place concrete in which the ingredients have been separated.
- D. The Contractor shall not retemper partially set concrete, and shall not add any water at the site.
- E. The Contractor shall use suitable and approved equipment for transporting concrete from mixer to forms.

3.03 CONCRETE PLACEMENT

A. General: The Contractor shall place concrete continuously so that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. Where new concrete is placed next to existing, or a section cannot be placed continuously, the Contractor shall provide construction joints. The Contractor shall apply approved epoxy bonding agent and waterstop as close as possible to time of actual concrete placement. The Contractor shall not allow epoxy bonding agent to dry. The Contractor shall deposit concrete as nearly as practical in its final location to avoid segregation due to re-handling or flowing. The Contractor shall not subject concrete to any procedure which will cause segregation.

1. The Contractor shall screed concrete which is to receive other construction to the proper level to avoid excessive skimming or grouting.
2. The Contractor shall not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials. The Contractor shall not use re-tempered concrete. The Contractor shall remove rejected concrete from the site of the Work and dispose of it in an acceptable location.
3. The Contractor shall not place concrete until all forms, bracing, reinforcement, and embedded items are in final and secure position.
4. Unless otherwise approved, the Contractor shall place concrete only when Engineer is present.

B. Concrete Conveying:

1. The Contractor shall handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practical by methods which will prevent segregation and loss of concrete mix materials.
2. The Contractor shall provide mechanical equipment for conveying concrete to ensure a continuous flow of concrete at the delivery end. The Contractor shall provide runways for heeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. The Contractor shall keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.
3. The Contractor shall not use chutes for distributing concrete unless approved in writing by the Engineer.

- a. The Contractor shall provide sketches showing methods by which chutes will be employed when requesting such approval.
 - b. The Contractor shall design chutes, if permitted, with proper slopes and supports to permit efficient handling of the concrete.
4. Pumping of concrete is permitted; however, The Contractor shall not use aluminum piping to convey the concrete.

C. Placing Concrete in to Forms:

1. The Contractor shall deposit concrete in forms in horizontal layers not deeper than eighteen (18) inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, the Contractor shall place concrete at such a rate that concrete which is being integrated with fresh concrete is still plastic with adequate vibration.
2. The Contractor shall not permit concrete to free fall within the form from a distance exceeding four (4) feet. The Contractor shall use "elephant trunks" and tremies to prevent free fall and excessive splashing on forms and reinforcement.
3. The Contractor shall remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
4. The Contractor shall consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. The Contractor shall use equipment and procedures for consolidation of concrete in accordance with the applicable recommended practices of ACI 309. Vibration of forms and reinforcing will not be permitted, unless otherwise accepted by the Engineer.
5. The Contractor shall not use vibrators to transport concrete inside of forms. The Contractor shall insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. The Contractor shall place vibrators to rapidly penetrate the layer of concrete and at least six (6) inches into the preceding layer. The Contractor shall not insert vibrators into lower layers of concrete that have begun to set. At each insertion, the Contractor shall limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.
6. The Contractor shall force concrete under pipes, sleeves, openings, and inserts from one side until visible from the other side to prevent voids.

D. Placing Concrete Slabs and Sidewalks:

1. The Contractor shall deposit and consolidate concrete slabs in a continuous operation, within the limits of expansion joints, until the placing of a panel or section is completed.
2. The Contractor shall consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into comers.
3. The Contractor shall bring slab surfaces to the correct level. The Contractor shall smooth the surface, leaving it free of humps or hollows. The Contractor shall not sprinkle water on the plastic surface. The Contractor shall not disturb the slab surfaces prior to beginning finishing operations.

E. Bonding for Next Concrete Pour: Comply with Division 03250 and 03300 of these Specifications.

F. Quality of Concrete Work:

1. The Contractor shall make all concrete solid, compact and smooth, and free of laitance, cracks, and cold joints.
2. All concrete for liquid retaining structures, and all concrete in contact with earth, water, or exposed directly to the elements shall be watertight.
3. The Contractor shall cut out or chip out and properly replace to the extent ordered by the Engineer, or repair to the satisfaction of the Engineer, surfaces which contain cracks or voids, are unduly rough, or are in any way defective. Thin patches or plastering will not be acceptable.
4. All leaks through concrete, cracks, holes, or other defective concrete in areas of potential leakage, shall be repaired and made watertight by the Contractor.
5. Repair, removal, and replacement of defective concrete as ordered by the Engineer shall be at no additional cost to the City.

G. Cold Weather Placing:

1. The Contractor shall protect all concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as specified in this section.

2. When the air temperature has fallen to or maybe expected to fall below forty (40) degrees F, provide adequate means to maintain the temperature, in the area where concrete is being placed, at between fifty (50) degree F and seventy (70) degree F for at least seven (7) days after placing. The Contractor shall provide temporary housings or coverings including tarpaulins or plastic film. The Contractor shall maintain the heat and protection, if necessary, to insure that the ambient temperature does not fall below thirty (30) degree F in the twenty-four (24) hours following the seven (7) day period. The Contractor shall avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.
3. When air temperature has fallen to or is expected to fall below forty (40) degree F uniformly, the Contractor shall heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than fifty-five (55) degree F and not more than ninety (90) degree F at point of placement.
4. The Contractor shall not use frozen materials containing ice or snow. The Contractor shall ascertain that forms; reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow, and ice before placing concrete.
5. The Contractor shall not use salt and other materials containing anti freeze agents or chemical accelerators, or set-control admixtures, unless approved by the Engineer, in mix designs.

H. Hot Weather Placing:

1. When hot weather conditions exist that would seriously impair the quality and strength of concrete, the Contractor shall place concrete in compliance with the requirements of ACI 305 and as specified in this section.
2. The Contractor shall cool ingredients before mixing to maintain concrete temperature at time of placement below ninety (90) degree F when the temperature is rising and below eighty-five (85) degree F when the temperature is falling. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature, provided that the water equivalent of the ice is calculated by the Engineer in the total amount of mixing water.
3. The Contractor shall cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
4. The Contractor shall wet forms thoroughly before placing concrete.

5. The Contractor shall not place concrete at a temperature so as to cause difficulty from loss of slump, flash set, or cold joints.
6. The Contractor shall not use set-control admixtures unless approved by the Engineer in mix designs.
7. The Contractor shall obtain the Engineer's approval of other methods and materials proposed for use.

3.04 FINISH OF FORMED SURFACES

A. Rough Form Finish:

1. Standard rough form finish shall be the concrete surface having the texture imparted by the form material used. For vertical surfaces, all tie holes and defective areas to be repaired and patched with mortar of one (1) part cement to one and one and one-halves (1-1/2) parts sand and all fines and other projections exceeding one-fourth (1/4) inch in height rubbed down or chipped off.
2. The Contractor shall use rough form finish for the following:
 - a. Exterior vertical surfaces up to one (1) foot below grade.
 - b. Interior exposed vertical surfaces of liquid containers up to operating floor level except areas to receive sealers and/or coatings.
 - c. Undersides of breakaway of slabs.
 - d. Other areas shown on the Plans or directed by the Engineer.

B. Smooth Form Finish:

1. The Contractor shall produce smooth form finish by selecting form materials which will impart a smooth, hard, uniform texture. The Contractor shall arrange panels in an orderly and symmetrical manner with a minimum of seams. The Contractor shall repair and patch defective areas as above with all fins or other projections completely removed and smoothed.
2. The Contractor shall use smooth form finish for surfaces that are to be covered with a coating material. The material may be applied directly to the concrete or may be a covering bonded to the concrete such as waterproofing, damp proofing, painting, or other similar system.

C. Smooth Rubbed Finish:

1. The Contractor shall provide smooth rubbed finish, in accordance with the requirements of ACI 301-84, to concrete surfaces which have received smooth form finish and receive as follows:
 - a. Rubbing of concrete surfaces not later than the day after form removal.
 - b. Moistening of concrete surfaces and rubbing with carborundum brick or other abrasive until a uniform color and texture is produced. The Contractor shall not apply cement grout other than that created by the rubbing process, unless the Engineer review and approves.
2. Except where surfaces have been previously covered as specified above, the Contractor shall use smooth rubbed finish for the following:
 - a. Exterior exposed walls and other vertical surfaces down to 1 foot below grade.
 - b. Exterior horizontal surfaces, except exterior exposed slabs and sidewalks.
 - c. Interior exposed vertical surfaces.
 - d. Other areas shown on the Plans or directed by the Engineer.

D. Related Unformed Surfaces:

At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces the Contractor shall strike off smooth and finish with a texture matching the adjacent fanned surfaces. The Contractor shall continue the final surface treatment of formed surfaces uniformly across the adjacent unformed surfaces, unless otherwise shown on the Plans or directed by the Engineer.

3.05 MONOLITHIC SLAB FINISHES

A. Float Finish:

After placing concrete slabs, the Contractor shall not work the surface further until ready for floating. The Contractor shall begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently. The Contractor shall use a wood float only. The Contractor shall check and level the surface plane to a tolerance not exceeding one-fourth (1/4) inch in ten (10) feet when tested with a ten (10) foot straightedge placed on the surface at not less than two (2) different angles. The Contractor shall cut down high spots and fill all low spots. The

Contractor shall uniformly slope surfaces to drains. Immediately after leveling, the Contractor shall refloat the surface to a uniform, smooth, granular texture.

B. Trowel Finish:

1. After floating, the Contractor shall begin the first trowel finish operation using a power-finish trowel. The Contractor shall begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.
2. The Contractor shall consolidate the concrete surface by final hand troweling. Finish shall be free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding one-eighth (1/8) inch in ten (10) feet when tested with a ten (10) foot straight edge, and all edges adjacent to walls will have a struck, tooled intersection joint. The Contractor shall apply trowel finish to operating floor slab.

C. Non-Slip Broom Finish:

1. The Contractor shall apply non-slip broom finish to exterior concrete platforms, sidewalks, drives, interior drive areas and elsewhere as shown on the Plans or in schedules.
2. Immediately after trowel finishing, the Contractor shall slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route. The Contractor shall use fiber-bristle broom unless otherwise directed by the Engineer. The Contractor shall coordinate the required final finish with the Engineer before application.

3.06 CONCRETE CURING AND PROTECTION

A. General:

1. The Contractor shall protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature or the period of time necessary for hydration of the cement and proper hardening of the concrete.
2. The Contractor shall start initial curing after placing and finishing concrete as soon as free moisture has disappeared from the concrete surface. The Contractor shall keep concrete continuously moist for not less than seventy-two (72) hours.
3. The Contractor shall begin final curing procedures immediately following initial curing and before the concrete has dried. The Contractor shall continue final curing for at least seven (7) days and in accordance with the requirements

of ACI 301 procedures. The Contractor shall avoid rapid drying at the end of the final curing period.

B. Curing Methods:

1. The Contractor shall perform curing of all concrete by moist curing or by moisture retaining cover curing. The Contractor shall use curing compound when approved by the Engineer and as specified in this section. For curing, the Contractor shall use water that is free of impurities which could etch or discolor exposed, natural concrete surfaces.
2. The Contractor shall provide moisture curing by any of the following methods:
 - a. Keeping the surface of the concrete continuously wet by covering with water,
 - b. Continuous water-fog spray.
 - c. Covering the concrete surface with the specified absorptive cover, thoroughly saturating the cover with water, and keeping the absorptive cover continuously wet with sprinklers or porous hoses. The Contractor shall place absorptive cover so as to provide coverage of the concrete surfaces and edges, with a four (4) inch lap over adjacent absorptive covers.
3. The Contractor shall provide moisture-retaining cover curing as follows: Cover the concrete surfaces with the specified moisture-retaining cover for curing concrete, placed in the widest practical width with sides and ends lapped at least three (3) inches and sealed by waterproof tape or adhesive. The Contractor shall immediately repair any holes or tears during the curing period using cover material and waterproof tape.
4. The Contractor shall provide liquid curing compound as follows: Apply the specified curing and sealing compound to all exposed slabs not receiving chemical hardener or epoxy floor sealer. The compounds shall be applied immediately after final finishing in a continuous operation by power spray equipment in accordance with the manufacturer's directions. The Contractor shall recoat areas which are subjected to heavy rainfall within three (3) hours after initial application. The Contractor shall maintain the continuity of the coating and repair damage to the coat during the entire curing period. For concrete surfaces which will be in contact with potable water, the manufacturer shall certify that the curing compound used is nontoxic. Liquid curing compound will only serve as the initial step. The Contractor shall final

cure by providing a moisture-retaining cover. Curing compound with petroleum or wax bases is not acceptable.

C. Curing Formed Surfaces:

The Contractor shall cure formed concrete surfaces, including the walls, supported slabs, and other similar surfaces by moist curing with the forms in place for the full curing period or until forms are removed. If forms are removed, the Contractor shall continue curing by methods specified above, as approved by the Engineer.

D. Curing Unformed Surfaces:

1. The Contractor shall initially cure unformed surfaces, such as slabs, sidewalks, and other flat surfaces by applying the specified curing compound.
2. The Contractor shall final cure unformed surfaces, unless otherwise specified, by moisture-retaining cover curing.
3. The Contractor shall provide moisture curing for surfaces receiving chemical hardener or epoxy floor sealer.

E. Temperature of Concrete during Curing:

1. When the atmospheric temperature is forty (40) degree F and below, the Contractor shall maintain the concrete temperature between fifty (50) degree F and seventy (70) degree F continuously throughout the curing period. When necessary, the Contractor shall make arrangement before concrete placing for heating, covering, insulation, or housing as required to maintain the specified temperature and moisture conditions continuously for the concrete curing period. The Contractor shall provide cold weather protection complying with the requirements of ACI 306.
2. When the atmospheric temperature is eighty (80) degree F and above, or during other climatic conditions which will cause too rapid drying of the concrete, the Contractor shall make arrangements before the start of concrete placing for the installation of wind breaks or shading, and for fog spraying, wet sprinkling, or moisture-retaining covering. The Contractor shall protect the concrete continuously for the concrete curing period. The Contractor shall provide hot weather protection complying with the requirements of ACI 305, unless otherwise specified.
3. The Contractor shall maintain concrete temperature as uniformly as possible, and protect from rapid atmospheric temperature changes. The Contractor shall

avoid temperature changes in concrete which exceed five (5) degree F in any one (1) hour and fifty (50) degree F in any twenty-four (24) hour period.

F. Protection from Mechanical Injury:

During the curing period, the Contractor shall protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water. The Contractor shall protect all finished concrete surfaces from damage by subsequent construction operations.

3.07 FIELD QUALITY CONTROL

A. Contractor shall perform concrete field quality control testing as specified in Section 01400 - Quality Assurance/Quality Control. The Engineer will direct the number of slump tests and cylinders required. The Contractor shall make standard compression test cylinders and entrained air tests as specified below, under the direct inspection by the Engineer. The Contractor shall furnish all necessary assistance required by the Engineer. The Contractor shall also furnish all labor, material, and equipment required including cones, rods, molds, air tester, thermometer, curing in an insulated storage box that is heated if necessary, and all other incidentals required. The above will be subject to approval by the Engineer. The Contractor shall furnish all necessary storage, curing, and transportation required by the testing laboratory.

B. Quality Control Testing During Construction:

1. The Contractor shall perform sampling and testing for field quality control during the placement of concrete, as follows:
 - a. Sampling Fresh Concrete: ASTM C172.
 - b. Slump: ASTM C143; one for each set of compressive strength test specimens. Every truck shall be tested for slump.
 - c. Air Content: ASTM C231; 1 for each set of compression cylinders cast. An air test shall be performed for every 16 cubic yards placed and for each set of cylinders cast.
 - d. Compressive Strength Tests: ASTM C39; one set of compression cylinders for each fifty (50) cubic yards or fraction thereof, of each mix design placed in any one (1) day; one (1) specimen tested at three (3) days, two (2) specimen tested at seven (7) days, two (2) specimens tested at twenty-eight (28) days, and two (2) specimens shall be used when the twenty-eight (28) day compressive strength is not obtained.

- i. The Contractor shall adjust mix if test results are unsatisfactory and resubmit for Engineer's approval.
 - ii. Concrete which does not meet the strength requirements is subject to rejection and removal from the Work, or to other such corrective measures as directed by the Engineer, at the expense of the Contractor.
 - e. Compression Test Specimens: ASTM C39; make one set of six (6) standard cylinders for each compressive strength test, unless otherwise directed by the Engineer.
 - f. Concrete Temperature: Test hourly when air temperature is forty (40) degree F and below, when eighty (80) degree F and above, and each time a set of compression test specimens is made.
2. The testing laboratory shall submit certified copies of test results directly to the Engineer and the Contractor within twenty-four (24) hours after tests are made.

C. Evaluation of Quality Control Tests:

1. The Contractor shall not use concrete delivered to the final point of placement which has slump temperature or total air content outside the specified values.
2. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of three (3) consecutive compressive strength tests equal or exceed the twenty-eight (28) day design compressive strength of the type or class of concrete; and no individual strength test falls below the required compressive strength by more than 500 psi.
 - a. Where questionable field conditions may exist during placing concrete or immediately thereafter, strength tests of specimens cured under field conditions will be required by the Engineer to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded at the same time and from the same samples as the laboratory cured specimens.
 - i. The Contractor shall provide improved means and procedures for protecting concrete when the twenty-eight (28) day compressive strength of field-cured cylinders is less than percent of companion laboratory cured cylinders.
 - ii. When laboratory-cured cylinder strengths are appreciably higher than the minimum required compressive strength, field-cured cylinder

strengths need not exceed the minimum required compressive strength by more than 500 psi even though the eighty-five (85) percent criterion is not met.

- iii If individual tests of laboratory-cured specimens produce strengths more than 500 psi below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection and curing, the Contractor shall provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question will be required at the Contractor's expense.
- b. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to replacement, reconstruction, or to other action approved by the Engineer, and shall be done at the Contractors expense.

D. Testing Concrete Structure for Strength:

- 1. When there is evidence that the strength of the in-place concrete does not meet Specifications requirements, the Contractor shall employ at his expense the services of a concrete testing service to take cores drilled from hardened concrete for compressive strength determination. Tests shall comply with the requirements of ASTM C42 and the following:
 - a. The Contractor shall take at least three (3) representative cores from each member or suspect area at locations directed by the Engineer.
 - b. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least eighty-five (85) percent and no single core is less than seventy-five (75) percent of the twenty-eight (28) day required compressive strength, and at least 100 percent by 56 days.
 - c. The Contractor shall report test results in writing to the Engineer on the same day that tests are made. The Contractor shall include in test reports the Project identification name and number, date, name of the Contractor, name of the concrete testing service, location of test core in the structure, type of class of concrete represented by core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength, and type of break (corrected for length-diameter ratio), direction

of applied load to core with respect to horizontal plane of the concrete as placed, and the moisture condition of the core at time of testing.

2. The Contractor shall fill core holes solid with patching mortar, and finish to match adjacent concrete surfaces.
3. The Contractor shall conduct static load test and evaluations complying with the requirements of ACI 318 if the results of the core tests are unsatisfactory, or if core tests are impractical to obtain, as directed by the Engineer.

E. Testing for Watertightness of Concrete Structures.

1. All concrete structures designed to contain or convey fluid shall be tested for watertightness by the Contractor prior to earth backfilling by filling with water to levels approximating what will be attained during operation and measuring the drop in level due to leakage, if any. These tests shall be made under the direction of the Engineer, and if necessary the tests shall be repeated until watertightness is insured. The Contractor shall perform tests prior to backfilling below grade structures and prior to installations of any coating.
2. Rate of filling shall be limited to minimize shock-effect to new concrete construction. Water shall be held under each condition long enough to satisfy the Engineer that the structures are watertight. Structures shall be free of internal or external water leakage.
3. The total loss of water-level in any basin or flume shall not exceed one-half (1/2) inch depth in twenty-four (24) hours. Leakage shall be located and stopped and the structure again tested until this requirement is met. If the structure does not meet the test, the Contractor shall repair or replace at his own expense, such part of the work as may be necessary to secure the desired results, as approved by the Engineer.
4. Regardless of the rate of leakage, there shall be no visible leakage from any concrete structure.

3.08 MISCELLANEOUS CONCRETE ITEMS

Filling-In:

1. The Contractor shall fill in holes and openings left in concrete structures for the passage of work by other contractors and as indicated on the plans, with non-shrink nonmetallic grout per Section 03600 – Grout.
2. Dry packing will be approved by the Engineer on a case by case basis.

3.09 CONCRETE REPAIRS

A. Repair of Formed Surfaces:

1. The Contractor shall repair exposed -to-view fanned concrete surfaces that contain defects which adversely affect the appearance of the finish. Surface defects that require repair include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, and holes left by the tie rods and bolts; fins and other projections on the surface; and stains and other discolorations that cannot be removed by cleaning.
2. The Contractor shall repair concealed formed concrete surfaces that may contain defects that adversely affect the durability of the concrete. Surface defects that require repair include cracks in excess of 0.01 inch wide, cracks of any width and other surface deficiencies which penetrate to the reinforcement or completely through non-reinforced sections, honeycomb, rock pockets, holes left by tie rods and bolts, and spalls except minor breakage at corners.
3. The Contractor shall pressure grout structural cracks, and cracks in water-holding structures, using one of the following:
 - a. Sikadur 35, Hi-Mod LV Gel by Sika Chemical Company.
 - b. 881 LPL Epoxy by the Burke Co.
 - c. Or approved equal.
4. The Contractor shall repair and patch defective areas with sand cement mortar immediately after removal of forms and as directed by Engineer.
5. The Contractor shall cut out or chip out honeycomb, rock pockets, voids over one-half (1/2) inch diameter, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than one (1) inch. The Contractor shall make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, the Contractor shall thoroughly clean, dampen with water, and brushcoat the area to be patched with the specified bonding agent.
 - a. For exposed-to-view surfaces, the Contractor shall blend white portland cement and standard portland cement so that, when dry, the patching mortar color will match the color of the surrounding concrete.
 - b. The Contractor shall impart texture to repaired surfaces to match texture of existing adjacent surfaces. The Contractor shall provide test areas at inconspicuous locations to verify mixture, texture, and color match before

proceeding with the patching. The Contractor shall compact mortar in place and strike off slightly higher than the surrounding surface.

6. The Contractor shall fill holes extending through concrete by means of a plunger-type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to insure complete filling.
7. The Contractor shall sandblast exposed-to-view surfaces that require removal of stains, grout accumulations, sealing compounds, and other substances marring the surfaces. The Contractor shall use sand finer than No. 30 and air pressure from fifteen (15) to twenty-five (25) psi.

B. Repair of Unformed Surfaces:

1. The Contractor shall test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish. The Contractor shall correct low and high areas as specified in this section.
2. The Contractor shall test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. The Contractor shall correct high and low areas as specified in this section.
3. The Contractor shall repair finish of unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects, include crazing, cracks in excess of 0.01-inch wide or which penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
4. The Contractor shall grout structural cracks, and cracks in water holding structures, using one of the following;
 - a. Sikadur 35, Hi-Mod LV Gel by Sib Chemical Company.
 - b. 881 LPL Epoxy by the Burke Co.
 - c. Or approved equal.
5. The Contractor shall correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to the adjacent area.
6. The Contractor shall correct low areas in unformed surfaces during, or immediately after, completion of surface finishing operations by cutting out

the low areas and replacing with fresh concrete. The Contractor shall finish repaired areas to blend into adjacent concrete. The Contractor shall use one of the following:

- a. Mastertop MP by Master Builders.
 - b. Sika top by Sika Chemical Company.
 - c. Or approved equal.
7. The Contractor shall repair defective areas, except random cracks and single holes not exceeding one (1) inch diameter, by cutting out and replacing with fresh concrete. The Contractor shall remove defective areas to sound concrete with clean, square cut, and expose reinforcing steel with at least three-quarters (3/4) inch clearance all around. The Contractor shall dampen all concrete surfaces in contact with patching concrete and brush with the specified bonding agent. The Contractor shall place patching concrete before grout takes its initial set. The Contractor shall mix patching concrete of the same materials and proportions to provide concrete of the same type or class as the original adjacent concrete. The Contractor shall place, compact, and finish concrete as required to blend with adjacent finished concrete. The Contractor shall cure in the same manner as adjacent concrete.
8. The Contractor shall repair isolated random cracks, and single holes not over one (1) inch diameter, by the dry-pack method. The Contractor shall groove the top of cracks, and cut out holes to sound concrete and clean of dust, dirt, and loose particles. The Contractor shall dampen all cleaned concrete surfaces and brush with the specified bonding agent. The Contractor shall place dry-pack before the cement grout takes its initial set. The Contractor shall mix dry-pack, consisting of one (1) part portland cement to two and one-half (2-1/2) parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. The Contractor shall compact dry-pack mixture in place and finish to match adjacent concrete. The Contractor shall keep patched areas continuously moist for not less than seventy-two (72) hours.
9. Repair methods not specified above may be used if approved by the Engineer.

+++ END OF SECTION 03300 +++

SECTION 03460
PRECAST METER VAULTS – LARGE METERS

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall provide all labor, materials, equipment and incidentals required to furnish and install precast meter vaults complete at the locations shown on the Drawings and as specified herein.
- B. The precast meter vaults specified in this section are intended for use with water meters ranging in size from 3-inches to 12-inches in diameter.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 - 1. Shop Drawings: Furnish complete details of design, manufacture, fabrication, installation and erection. Location of all inserts and openings shall be shown.
 - 2. Design Calculations: Submit manufacturer's design calculations used in design of the precast meter vaults and certification, signed and sealed by a Professional Engineer registered in the State of Georgia that the structure design and construction comply with the specified design conditions and the referenced ASTM specifications.

1.03 QUALITY ASSURANCE

- A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.
 - 1. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
 - 2. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
 - 3. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage

1. Precast structures and sections shall be inspected upon delivery to the jobsite and stored in a manner that will prevent staining and damage.
2. Substantially damaged, cracked or broken structures and sections which are deemed unsuitable for the intended use shall be rejected and removed from the jobsite.
3. The Engineer's decision will be final in determining unsuitable structure sections.

PART 2 PRODUCTS

2.01 MATERIALS AND DESIGN

A. Design

1. Precast meter vaults shall comply with ASTM C858 except as modified herein.
2. The meter vaults shall have the inside dimensions and minimum thickness of concrete as indicated on the Drawings. Minimum vault wall and slab thickness shall be 6-inches if not indicated otherwise.
3. The structural analysis and design of the structures as well as lifting devices for all precast meter vault sections shall be performed by the manufacturer of the precast materials and subject to approval of the Engineer.
4. Design loads
 - a. Design live and dead loads shall be in accordance with ASTM C857 and shall consist of dead load, live load, and impact load, water table hydrostatic load, and any other special loads that may be imposed upon the vault. Final design shall be based upon the governing live load that produces the maximum shear and bending moment in the given structure.
 - b. Precast top slabs shall be designed for an HS-20 wheel loading.
5. Provide openings in precast meter vaults for piping and access. No field coring of openings will be allowed.
6. Before shipment, all precast meter vaults shall be inspected to determine that materials and workmanship conform to the requirements of these specifications.
7. Precast vault top and wall sections shall be jointed with either an O-ring type joint or tongue and groove joint complete with a flexible gasket.

- a. The O-ring type joint shall consist of a round compression ring of neoprene material set into an annular space cast into the joint. The ring shall be uniformly compressed between the positioned sections so as to form a watertight joint. After the sections are assembled, the remaining space in the joint shall be pointed up and filled with a dense mortar and finished so as to make a smooth continuous surface inside and outside the wall sections.
 - b. The tongue and groove joint shall be sealed with a flexible plastic gasket manufactured by K.T. Snyder and Sons or approved equal. After the vault sections have been assembled, the gasket shall completely fill the joint.
- B. The interior and exterior surfaces of the vault shall have a smooth hard finish, and shall be free from cracks, chips, and spalls.
- C. Access hatches for vaults shall be as specified in Section 08305, Access Hatches.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Precast meter vaults shall be aligned true to the curb line or nearest visual line.
- B. Vault sections shall be set vertical and with sections in true alignment. The outside and inside joint shall be filled with mortar (1 part cement and 2 parts mortar). Allow the joints to set for 24 hours before backfilling.
- C. Holes in the precast vault sections required for handling or other purposes shall be plugged with non-shrink grout or with grout in combination with concrete.
- D. The precast vault shall be placed on a 12-inch deep base of no. 57 stone to provide even bearing, leveling and drainage. Extend stone to 12-inches beyond the edge of the vault.

3.02 BACKFILL

- A. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides.
- B. The Contractor shall place and compact backfill materials, in the area of excavation surrounding the vaults in accordance with the requirements of Section 02225, Trench Excavation and Backfill.

3.08 CLEANUP

- A. After the manhole installation work has been completed and all testing accepted

by the Engineer, the Contractor shall cleanup the area. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor. Disturbed grassed areas shall be seeded or sodded. Site restoration shall be performed in accordance with the requirements of Section 02920, Site Restoration.

+++ END OF SECTION 03460 +++

SECTION 03461
PRECAST METER VAULTS – SMALL METERS

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall provide all labor, materials, equipment and incidentals required to furnish and install precast meter vaults complete at the locations shown on the Drawings and as specified herein.
- B. The precast meter vaults specified in this section are intended for use with water meters ranging in size from 1 1/2-inches to 2-inches in diameter.

1.02 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

- 1. Shop Drawings: Furnish complete details of design, manufacture, fabrication, installation and erection. Location of all inserts and openings shall be shown.
- 2. Design Calculations: Submit manufacturer's design calculations used in design of the precast meter vaults and certification, signed and sealed by a Professional Engineer registered in the State of Georgia that the structure design and construction comply with the specified design conditions and the referenced ASTM specifications.

1.03 QUALITY ASSURANCE

Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

- 1. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
- 2. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
- 3. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures

1.04 DELIVERY, STORAGE AND HANDLING

Delivery and Storage

1. Precast structures and sections shall be inspected upon delivery to the jobsite and stored in a manner that will prevent staining and damage.
2. Substantially damaged, cracked or broken structures and sections which are deemed unsuitable for the intended use shall be rejected and removed from the jobsite.
3. The Engineer's decision will be final in determining unsuitable structure sections.

PART 2 PRODUCTS

2.01 MATERIALS AND DESIGN

A. Design

1. Precast meter vaults shall comply with ASTM C858 except as modified herein.
 2. The meter vaults shall have inside dimensions to match the vault cover as shown in the Standard Details. Vault cover shall be furnished by the City. Minimum vault wall and slab thickness shall be 6-inches if not indicated otherwise.
 3. The structural analysis and design of the structures as well as lifting devices for all precast meter vault sections shall be performed by the manufacturer of the precast materials and subject to approval of the Engineer.
 4. Design loads: Design live and dead loads shall be in accordance with ASTM C857 and shall consist of dead load, live load, and impact load, water table hydrostatic load, and any other special loads that may be imposed upon the vault. Final design shall be based upon the governing live load that produces the maximum shear and bending moment in the given structure.
 5. Provide openings in precast meter vaults for piping and access. No field coring of openings will be allowed.
 6. Before shipment, all precast meter vaults shall be inspected to determine that materials and workmanship conform to the requirements of these specifications.
- B. The interior and exterior surfaces of the vault shall have a smooth hard finish, and shall be free from cracks, chips, and spalls.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Precast meter vaults shall be aligned true to the curb line or nearest visual line.
- B. Vault shall be set vertical and in true alignment.
- C. Holes in the precast vault sections required for handling or other purposes shall be plugged with non-shrink grout or with grout in combination with concrete.
- D. The precast vault shall be placed on a 12-inch deep base of no. 57 stone to provide even bearing, leveling and drainage. Extend stone to 12-inches beyond the edge of the vault.

3.02 BACKFILL

- A. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides.
- B. The Contractor shall place and compact backfill materials, in the area of excavation surrounding the vaults in accordance with the requirements of Section 02225, Trench Excavation and Backfill.

3.03 CLEANUP

After the meter vault installation work has been completed and all testing accepted by the Engineer, the Contractor shall cleanup the area. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor. Disturbed grassed areas shall be seeded or sodded. Site restoration shall be performed in accordance with the requirements of Section 02920, Site Restoration.

+++ END OF SECTION 03461 +++

SECTION 03600 GROUT

PART 1 - GENERAL

1.01 SCOPE

- A. The work covered under this Section includes furnishing all labor, materials, equipment, and incidentals required to provide grout as shown and specified.

- B. The types of grout include the following:
 - 1. Non-shrink, epoxy type.
 - 2. Non-shrink, non-metallic type.
 - 3. Ordinary cement-sand.
 - 4. Refer to Section 03300 for pressure grouting applications.

- C. Related Work Specified Elsewhere:
 - 1. Section 03200, Concrete Reinforcement and Dowelling.
 - 2. Section 03300, Cast-In-Place Concrete.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 - 1. Copies of manufacturer's specifications and installation instructions for all proprietary materials.
 - 2. Reports and Certificates:
 - a. For proprietary materials, submit copies of reports on quality control tests.
 - b. For nonproprietary materials, submit certification that materials meet specification requirements.

1.03 QUALITY ASSURANCE

- A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
 - 1. ASTM C 150, Portland Cement.
 - 2. ASTM C 109, Compressive Strength of Hydraulic Cement Mortars (using 2-in. or 50 mm. Cube Specimens).
 - 3. ASTM C 191, Time of Setting of Hydraulic Cement by Vicat Needle.

4. CRD-C 588, Specifications for Non-Shrink Grout.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Grout materials from manufacturers shall be delivered in unopened containers and shall bear intact manufacturer's labels.
- B. Storage of Materials: Grout materials shall be stored in a dry shelter and shall be protected from moisture.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Non-metallic, cartridge style, 100 percent solids, high strength epoxy grout.
 1. Product and Manufacturer: Speed Bond #1 as manufactured by Prime Resins Inc.
 2. Or Equal.
- B. Non-Shrink, Non-Metallic Grout:
 1. Pre-mixed non-staining cementitious grout requiring only the addition of water at the jobsite meeting ASTM C-827 and CRD C-621.
 2. Product and Manufacturer:
 - a. Sikagrout 212 by Sika Corp.
 - b. Masterflow 713 by Master Builders Company.
 - c. Non-Ferrous Non-Shrink Grout by the Burke Company.
 - d. Non-Shrink, Non-Metalic Grout as manufactured by W. R.Meadows.
 - e. Or Equal.
- C. Ordinary Cement-Sand Grout:
 1. Except where otherwise specified use 1 part cement to 3 parts sand complying with the following:
 - a. Cement: ASTM C 150, Type II.
 - b. Sand: ASTM C 33.
 2. For water repelling and shrinkage reducing requirements use admixtures.
 - a. Product and Manufacturer:
 1. Integral Waterpeller by The Euclid Chemical Company.
 2. Omicron, Type OM by Master Builders Company.
 3. Hydrocide Powder by Sonneborn-Contech.
 4. Or Equal.
 3. For use at horizontal waterstops only.

- D. Water:
 - 1. Use clean, fresh, potable water free from injurious amounts of oils, acids, alkalies or organic matter.

- E. Epoxy Resin Adhesive:
 - 1. Two part mix 1:1
 - 2. Manufacturer: Sika Corp - Sikadur 32, Hi-Mod (Horizontal joints), Sikadur 31 Hi-Modgel (Vertical joints) or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Place grout as shown and in accordance with manufacturer's instructions. If manufacturer's instructions conflict with the Specifications do not proceed until Engineer provides clarification.
 - 2. Drypacking will not be permitted unless approved by the Engineer.
 - 3. Manufacturers of proprietary products shall make available upon 72 hours notification the services of a qualified, full time employee to aid in assuring proper use of the product under job conditions.
 - 4. Placing grout shall conform to temperature and weather limitations in Section 03300.
 - 5. Surface to be grouted is to be adequately cured, cleaned dampened and roughened per manufacturer recommendations to insure adequate bonding.

- B. Pipe Railings:
 - 1. After posts have been properly inserted into the holes or sleeves, fill the annular space between posts and sleeve with the non-shrink, non-metallic grout. Bevel grout at juncture with post so that moisture flows away from post.
 - 2. Do not grout railing designated as "removable sections".

- C. Grout for Dowelling and Anchor Bolts:
 - 1. Grout shall be introduced at the bottom of the drill holes using a caulking tube or other injection means. The hole shall be blown out or pumped dry prior to the introduction of grout into the hole. Care shall be taken to adequately fill the hole with grout before the dowel or anchor rod is inserted, to insure complete contact with the anchor for its full length.
 - 2. A plug shall be placed in the top of the hole to hold the bars securely until the grout sets. Special care shall be taken to insure against any movement of the bars which have been placed.
 - 3. Epoxy resin Adhesive may be used in accordance with manufacturer's recommended application.

- D. Grouting for Waterstops:
1. Grout for PVC waterstops to be the non-shrink, non-metallic type. Refer to Section 03250 for installation procedures.
 2. Grout from Redi-mix plant conforming to applicable requirements of Section 03300 may be substituted at no additional compensation to the contractor.
- E. Grouting for Weir and Slide Gates:
1. Provide minimum of 1" thickness of non-shrink, non-metallic grout under frames. Gates to be coated with an approved epoxy coating prior to installing and grouting.
- F. Grouting for Bearing Plates and Equipment:
1. Use non-shrink, non-metallic grout for setting bearing plates and equipment. Provide a minimum grout thickness of 1".
- G. Patchwork at Demolition Areas:
1. Furnish and install non-shrink, non-metallic grout for dry packing as required to patch all mechanical, electrical and miscellaneous penetrations which are either designated to be patched or are the result of abandoned, removed or relocated material and equipment. Prepare surface and place grout as recommended by manufacturer and as specified. Finish grout off flush with existing surface.
 2. Reinforce with approved wire mesh and use approved structural concrete for penetrations larger than 1/2 square feet. Conform to requirements of Sections 03100, 03200 and 03300.

+++ END OF SECTION 03600 +++

SECTION 03605
DOWELING INTO EXISTING CONCRETE

PART 1 GENERAL

1.01 SCOPE

Contractor shall furnish all labor, materials, equipment and incidentals required to place reinforcing dowels into existing concrete using a two-component epoxy adhesive as shown and specified herein.

1.02 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Product Data: Furnish technical data for epoxy adhesives, grouts, and bonding agents suggested for the project work including installation instructions, independent laboratory test results and handling and storage instructions.
2. Samples: Furnish two random samples of each batch of products delivered to project site, for independent testing.
3. Quality Control Submittals: Furnish the following:
 - a. Manufacturer's past project experience data on at least three similar projects supplied with proposed products within the last 3 years, to include client name, address, contact person, phone number, project location, and description of work.
 - b. Batch test reports for each batch of product delivered to site. Provide manufacturer's written certification that each batch delivered meets these Specifications, the intended uses on project, including capability to bond to damp or wet concrete surfaces. Certification shall include batch test results for each product.
 - c. Manufacturer's written letter of certification identifying Contractor's employees qualified for operation of manufacturer's equipment and certified for installation of products, trained through jobsite instruction conducted by manufacturer.
 - d. Copy of manufacturer's equipment service and repair manuals for each type of equipment delivered to project site.
 - e. Copy of manufacturer's service agreement with Contractor for each type of equipment.

- f. Procedures for testing and verifying product meets specified requirements.
- 4. Special Inspection: Provide detailed step-by-step instructions for the special inspection procedure as required by ICBO reports and Section 306 of the Uniform Building Code.

1.03 QUALITY ASSURANCE

- A. Contractor shall examine the conditions under which reinforcing dowels are to be placed into existing concrete, and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.
- B. Reference Standards: Comply with applicable provisions and recommendations of the latest editions of the following standards except as otherwise shown on the Drawings or specified herein:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 305 - Hot Weather Concreting.
 - 3. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures.
 - 4. ACI 347 - Recommended Practice for Concrete Formwork.
 - 5. ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - 6. ASTM D648 – Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.
 - 7. ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics.
 - 8. ICBO Report No. 4398, April 1988 for Adhesive Technology Corp.

1.04 MANUFACTURER’S SERVICES

Furnish manufacturer's representative to conduct jobsite training for proper installation, handling, and storage of each product delivered to project site, for personnel who will perform actual installation. Engineer will attend training sessions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Items of Materials: End products shall be from one manufacturer in order to achieve structural compatibility, singular responsibility, and standardization for maintenance and replacement.
- B. Epoxy Adhesive for Doweling:
 - 1. Epoxy adhesive shall conform to the requirements of ASTM C881, Type 1, Grade 3, Class A, B, or C, depending on site conditions.
 - 2. Adhesive shall be a two-component, 100 percent solids, nonsag, paste, insensitive to moisture, designed to be used in adverse freeze/thaw environments and gray in color.
 - 3. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
 - 4. Container Markings: Include manufacturer's name, product name, batch number, mix ratio by volume, product expiration date, ANSI hazard classification, and appropriate ANSI handling precaution.
- C. Component "A" Base Resin:
 - 1. Modified biphenyl-A type epoxy.
 - 2. Viscosity: Light paste, 350 cps maximum prior to mixing to ensure proper wetting of moist concrete surfaces.
 - 3. Fillers: 100 percent solids, fumed silica and selected annular micro silica powders. Do not use micro spheres, fly ash, or asbestos.
 - 4. Color: White.
- D. Component "B" Hardener or Curing Agent:
 - 1. Viscosity: Light paste.
 - 2. Fillers: 100 percent solids, fumed silica and selected annular micro silica powders. Do not use micro spheres, fly ash, or asbestos.
 - 3. Color: Black.
- E. Mixed Epoxy Adhesive:

1. Adhesive shall have a non sag light paste consistency with ability to remain in a 1-inch diameter overhead drilled hole without run out, holding the following properties:
 - a. Slant Shear Strength, ASTM C881/882, No Failure in Bond Line, Dry/Moist Conditions: 5,000 psi.
 - b. Compressive Strength, ASTM D695: 14,000 psi, minimum.
 - c. Tensile Strength, ASTM D695: 4,500 psi.
 - d. Heat Deflection Temperature, ASTM D648: 135 degrees F, minimum.
2. Manufacturers:
 - a. Adhesives Technology Corp, Anchor-It Fastening Systems, HS 200 Epoxy Resin.
 - b. Or equal.

PART 3 EXECUTION

3.01 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Store epoxy components on pallets or shelving in a covered storage area with locking door.
- B. Control temperature above 60 degrees F and dispose of product if shelf life has expired.
- C. If stored at temperatures below 60 degrees F, test components prior to use to determine if they still meet specified requirements.

3.02 GENERAL

- A. Dispensing, Metering, or Mixing Epoxy Adhesive Components: Use portable, automatic metering and mixing device or machine capable of maintaining prescribed mix ratio within deviation of 5 percent or less, by volume.
- B. Dispense epoxy components through specially designed static mixing nozzle that thoroughly mixes epoxy components and places mixed epoxy at base of predrilled hole.
- C. Mixing Nozzles: Disposable, manufactured in several sizes to accommodate size of reinforcing dowels.
- D. Where large meter and mixing pumps are impractical, provide epoxy adhesive packaged as follows:

1. Disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio, and fit into a manually or pneumatically operated caulking gun.
2. Dispense components through a mixing nozzle that thoroughly mixes components and places epoxy at base of predrilled hole.
3. Mixing Nozzles: Disposable, manufactured in several sizes to accommodate sizes of reinforcing dowels.

3.03 TESTING OF AUTOMATIC METERING AND MIXING DEVICES

A. Tests for Proper Ratio:

1. Retain small amount of dispensed adhesive for inspection after each time the pump is refilled.
2. Operator shall check these samples for color change.
3. Should change in color occur, operator shall follow manufacturer's service instructions to obtain proper operation.

B. Frequency of Tests: Make full ratio check after each 100 gallons of adhesive is dispensed or if color of mixed adhesive becomes noticeably darker or lighter.

C. Ratio Check Procedure:

1. Disconnect dispensing head behind ON/OFF valve.
2. Place a 1-cup volume container and a 2-cup volume container under the "B" and "A" component hose ends.
3. Actuate the pump until both cups are filled to a proper proportion of 2:1 by volume.

3.04 DOWEL SIZING AND INSTALLATION

A. Drilling Equipment:

1. Drilling Hammers for Dowel Holes: Electric or pneumatic rotary type with medium or light impact.
2. Hollow drills with flushing air systems are preferred.
3. Where edge distances are less than 2 inches, use lighter impact equipment to prevent micro-cracking and concrete spalling during drilling process.

B. Hole Diameter:

1. As small as possible to allow dowel to be embedded to required depth.
2. Use drill bit diameter meeting ICBO report requirements.
3. Hole Diameter: Dowel diameter plus 1/8-inch for temperature at time of installation above 60 degrees F, or dowel diameter plus ¼-inch for temperature at time of installation below 60 degrees
4. For large reinforcing bars No. 8 or greater embedded 18 diameters or more, verify hole diameter with manufacturer.

C. Obstructions in Drill Path:

1. When existing reinforcing steel is encountered during drilling and when approved by the Engineer, enlarge the hole by 1/8-inch, core through the existing reinforcing steel at the larger diameter, and resume drilling at original hole diameter; or re-drill hole 1- inch from original location, beginning in the same line at the surface, redirecting the drill to miss reinforcing steel.
2. Place dowels in both the mis-drilled hole and the new one.
3. Dowels may be pre-bent prior to installation to 15 degrees to align with other bars. Do not heat dowels to bend.
4. If bars have fused epoxy coating and coating is damaged, recoat damaged area with epoxy.
5. Bent Bar Dowels: Where edge distances are critical, and striking reinforcing steel is likely, drill hole at 10 degree angle or less and use pre-bent reinforcing bars.
6. Conform to details shown.
7. Do not install prior to receiving manufacturer onsite training.

D. Dowel Embedment Depth: Install to depth and spacing as shown.

+++ **END OF SECTION 03605** +++

**SECTION 04000
MASONRY**

PART 1 GENERAL

1.01 SCOPE

- A. Furnish all labor, materials, equipment and incidentals required to construct all masonry work as shown on the Drawings and specified herein.
- B. The work under this Section includes, but is not necessarily limited to, the following:
 - 1. Concrete masonry units (CMU)
 - 2. Common brick for back up work
 - 3. Masonry reinforcing, ties and anchors
 - 4. Patching existing brick masonry removed or damaged during construction
 - 5. Grouting required throughout the project

1.02 SUBMITTALS

- A. Submit two samples each of concrete masonry units.
- B. Masonry Mortar: Submit manufacturer's specifications and Instructions for each manufactured product. Indicate that a copy of each applicable instruction has been distributed to the Masonry Installer if other than the Contractor.

1.03 QUALITY ASSURANCE

- A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards except as otherwise shown on the Drawings or specified herein.
 - 1. ASTM C62 – Standard Specification for Building Brick (Clay or Shale).
 - 2. ASTM C90 – Standard Specification for Load Bearing Concrete Masonry Units.
 - 3. ASTM C140 – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 - 4. ASTM C144 – Standard Specification for Aggregate for Masonry Mortar.
 - 5. ASTM C150 – Standard Specification for Portland Cement.

6. ASTM C207 – Standard Specification for Hydrated Lime for Masonry Purposes.
7. ASTM C270 – Standard Specification for Mortar for Unit Masonry.
8. ASTM C404 – Standard Specification for Aggregates for Masonry Grout.
9. ASTM C426 – Standard Specification for linear Drying Shrinkage of Concrete Masonry Units.
10. ASTM C476 – Standard Specification for Grout for Masonry.
11. NCMA – National Concrete Masonry Association.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All perishable materials for the work of this Section shall be delivered, stored, and handled so as to preclude damage of any nature. Manufactured materials, such as cement and lime, shall be delivered and stored in their original containers, plainly marked with identification of material and maker. Materials in broken containers, or in packages showing water marks or other evidence of damage, shall not be used and shall be removed from the site.
- B. All masonry shall be shipped, stacked with hay or straw protection or other suitable protective device, and shall be similarly stacked off the ground on the site. In addition, all masonry stored on the site shall be protected from the weather and staining with the use of tarpaulins or other covering approved by the Engineer.
- C. Mason's sand shall be protected during shipping, storage and while on the job site to prevent contamination.

1.05 COLD WEATHER CONSTRUCTION

- A. Masonry construction in cold weather shall conform to the applicable requirements of "Cold Weather Concrete Masonry" of the National Concrete Masonry Association (NCMA).

1.06 WARRANTY

- A. Provide a warranty against defective equipment and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Masonry Units:

1. Concrete masonry units (CMU) shall conform to ASTM C90, light weight, Grade N, Type I, hollow, load bearing units of 8-inch x 16-inch nominal face size. All exposed vertical corners shall be bull nosed.
2. CMU shall be free from substances that will cause staining or pop-outs, and shall be fine, even texture with straight and true edges. All units shall have been cured in an autoclave in an atmosphere steam at a pressure and temperature of approximately 150 psig. and 360 deg. F. Units shall have a maximum linear drying shrinkage of 0.25 percent (ASTM C426) and have a moisture content of time of delivery not exceeding 30 percent of total absorption.
3. Units shall be obtained from one manufacturer to insure even color and texture.

B. Brick:

1. Common brick shall conform to the requirements of ASTM C62.
2. Brick for manholes, junction boxes, catch basins and inlets shall be as specified by the Engineer.

2.02 REINFORCING, TIES, ANCHORS AND MISCELLANEOUS

- A. Wire joint reinforcement shall be welded wire units prefabricated in straight lengths of not less than 10 ft. with matching corner and tee units fabricated from cold-drawn steel wire complying with ASTM A82, with deformed continuous side rods and plain cross-rods, crimped for cavity wall construction.
- B. Single wythe reinforcement shall be truss type, fabricated with single pair of galvanized 9 gauge side rods and continuous 9 gauge diagonal cross-rods spaced not more than 16 - inch O.C.
- C. Reinforcing designated No. 3 and larger shall be deformed steel bars as specified in Section 03200.
- D. The Contractor shall provide and install miscellaneous anchors and attachment members, required both for the anchorage of his own work and that of other trades requiring attachment to masonry, which are not specifically provided under separate sections.

- E. Cleaning compound shall be mild, non-caustic detergent solution such as 801 Super Real Clean by Superior Manufacturing Co., or 600 Sureclean by Process Solvent Co., Inc., or equal.

2.03 MORTAR MATERIALS

- A. Portland cement shall conform to ASTM C150 Type II.
- B. Lime for masonry mortar shall be hydrated, conforming to ASTM C207, Type S.
- C. Sand shall be clean, durable particles, free from injurious amounts of organic matter. The sand shall conform to the limits of ASTM C144. Sand for grout shall conform to ASTM C144 or C33 as required.
- D. Water shall be free from injurious amounts of oils, acids, alkalis or organic matter, and shall be clean and fresh.
- E. Mortar shall conform to ASTM C270, Type S, consisting of 1 part portland cement, 1/2 part lime, 4-1/2 parts sand, or as otherwise approved by the Engineer. Ingredients shall be accurately measured by volume in boxes especially constructed for the purpose by the Contractor. Measurement by shovel will not be allowed.

2.04 GROUT MATERIALS

- A. Grout for CMU course and cells shall be the course type in conformance with ASTM C476.
- B. Aggregates for grout, except non-shrink grout, shall consist of inert natural sand and coarse aggregate in conformance with ASTM C404.
- C. Cement, lime and water shall be as specified above for mortar materials.
- D. Grout for setting bearing plates, machinery, or any other equipment shall be mixed as recommended by the manufacturer to give the necessary consistency for placing and to give a minimum compressive strength of three thousand lbs. per square inch in three days.
- E. All other grout shall be one part portland cement and one part sand.
- F. Non-shrink grout shall utilize Embecco Aggregates as manufactured by the Master Builders Company, Ferrolith by Sonneborn, or equal and be proportioned with sand in strict accordance with the manufacturer's instructions for the use intended.

PART 3 EXECUTION

3.01 MORTAR AND GROUT

- A. Mortar shall be machine mixed in an approved type of mixer in which the quantity of water can be accurately and uniformly controlled. The mixing time shall not be less than five minutes, approximately two minutes of which shall be used for mixing the dry materials and not less than three minutes for continuing the mixing after the water has been added. Where hydrated lime is used for mortar requiring a lime content, the contractor will have the option of using the dry-mix method or first converting the hydrated lime into a putty.
- B. Where the dry-mix method is employed, the materials for each batch shall be well turned over together until the even color of the mixed, dry materials indicates that the cementitious material has been thoroughly distributed throughout the mass, after which the water shall be gradually added until a thoroughly mixed mortar of the required plasticity is obtained.
- C. Mortar boxes shall be cleaned out at the end of each day's work, and all tools shall be kept clean. Mortar that has begun to set shall not be used.
- D. Grout for CMU courses and cells shall be machine mixed in an approved type of mixer. All cementitious materials shall be mixed for a minimum period of five minutes, after all materials are placed in the mixer, with the amount of water to produce a minimum eight inch slump.

3.02 MASONRY INSTALLATION

- A. No material which is frozen or covered with frost or snow shall be used in the construction, and no antifreeze salts or ingredients shall be mixed with the mortar. Masonry shall not be laid at temperatures below forty degree F and all work shall be done in such a manner as to insure the proper and normal hardening of all mortar. All masonry work shall be so protected and heated that the temperature at the surface will not fall below fifty degrees F for a period of seventy-two hours after placing. Any completed work found to be affected by freezing shall be taken down and rebuilt by the Contractor at his expense.
- B. All bricks shall be laid in full beds of mortar with shoved joints and with all joints slushed solidly in each course. Bond shall be common bond. Brick with more than eight percent absorption shall be damp when laid, except in freezing weather. All brickwork shall be laid up from an outside scaffold and shall be carried up simultaneously at an approximate level. No brick shall be laid overhand. Face bricks receiving minor handling defects shall be used in nonconspicuous surfaces. Distribution of light and dark bricks shall be as even as possible.
- C. All CMU shall be laid in a full mortar bedding applied to the entire horizontal face of the masonry unit. Butter the vertical joint of unit already set in the wall and all contact faces of the unit to be set. Each unit shall be placed and shoved against the unit previously laid so as to produce a well-compacted vertical mortar joint for the full shell thickness. Units shall set with all cells in a vertical position. The moisture content of the units when laid

shall not exceed thirty-five percent of the total absorption as determined by laboratory test.

- D. All masonry units shall be laid in stretcher (running) bond unless otherwise shown. Tool dense and neat.
- E. Sizes shall be as specified and called for on the Drawings, and where "soaps" and "splits" are used, the space between these members and the backup material shall be slushed full of mortar.
- F. Joints of all masonry shall be tooled in accordance with the following:
 - 1. Wait until unit mortar is thumb-print hard before tooling joint. This may require as much as three hours in the shade and one hour in the sun in the summertime.
 - 2. The required personnel of the Contractor shall be kept on the job after hours, if necessary, to properly tool joints.
 - 3. Both vertical and horizontal joints shall be maintained uniform in spacing.
 - 4. Joints for CMU shall be 3/8-inch.
- G. Surfaces shall be brushed as work progresses and maintained as clean as it is practical. Unfinished work shall be raked back where possible, and toothed only where absolutely necessary. Before leaving fresh or unfinished work, walls shall be fully covered and protected against rain and wind, and before continuing, work previously laid shall be swept clean. The tops of walls or other unfinished work shall be protected against all damage by the elements by means of waterproof paper, tarpaulins, or boards.
- H. All anchorage, attachment, and bonding devices shall be set so as to prevent slippage and shall be completely covered with mortar or grout.
- I. All ties and reinforcing for masonry shall be furnished and installed by the Contractor. Grout solid all courses and cells which are reinforced. Place joint reinforcing (fully embedded in mortar) at 16 inches maximum vertically and lap 6 inches between lengths and corner and tee pieces.
- J. Bed and grout all steel, for equipment and machinery, and items coming in contact with masonry where grouting is required, including door bucks and frames set in masonry. The Contractor shall install all anchor bolts, base plates, and seats in masonry walls, and build in all items required for the completion of the building as they apply to masonry.

3.03 CLEANING

- A. All holes in exposed masonry shall be pointed, and defective joints shall be cut out and repointed with mortar of same color as that of the original and adjoining work.

- B. Exposed masonry shall be protected against staining by wall coverings, and excess mortar shall be wiped off the surface as the work progresses.
- C. All masonry shall be cleaned with approved detergent solution in accordance with manufacturers printed directions. No acid or metal scrapers shall be used on masonry.

+++ END OF SECTION 04000 +++

**SECTION 07900
CAULKING AND SEALANTS**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all materials, labor, equipment, and incidentals required to perform all caulking, and related work necessary for the proper completion of the project as required by the Drawings and as specified herein.
- B. Contract drawings show only functional features and some of the required external connections. They do not show all components required for a complete installation nor exact dimensions particular to any manufacturer's equipment. Contractor shall supply all parts, devices and equipment necessary to meet the requirements of the Contract Documents and shall make all dimensional adjustments particular to the equipment being furnished. All costs associated with such changes and adjustments shall be considered as being included in the price bid for the Work shown and specified.

1.02 APPLICATION SCHEDULE

- A. Caulk all exterior wall joints between frames in openings and adjacent materials, between masonry and cast in place concrete, expansion and control joints and all other joints shown on the Drawings or required for the completion of the work.
- B. Caulk all interior joints between frames and masonry, at tops of masonry walls, between masonry and structural concrete and control joints, exterior window and door frames and all other joints shown on the drawings or required for the completion of the work.
- C. Joints of similar nature to those indicated shall be sealed with same sealer, whether indicated on Drawings to be sealed or not.

1.03 SUBMITTALS

- A. Submit to the Engineer as provided in the General Conditions for shop drawings, detailed information on materials proposed and installation methods.
- B. Product Data: Manufacturer's technical data for each joint sealer product required, including instructions for joint preparation and joint sealer application.
- C. Samples for Color Selection: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- D. Samples for Color Verification: Samples of each type and color of joint sealer required. Install joint sealer samples in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealers in the Work.

1.04 QUALITY ASSURANCE

- A. Applicable standards: Standards of the following, as referenced herein:
 - 1. ASTM C 920-98 Standard Specification for Elastomeric Joint Sealants, 1998.
- B. Preinstallation Meeting: The contractor shall arrange a meeting with installer, sealer manufacturers' representatives, and other trades whose work affects installation of sealers at project site to review procedures and time schedule proposed for installation of sealers which is coordinated with other related work.

1.05 WARRANTY

- A. Provide a warranty against defective equipment and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original unopened containers or bundles with labels showing manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of sealers under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by sealer manufacturer or below 40 degrees F (4.4 degrees C).
 - 2. When substrates are wet due to rain, frost, condensation, or other causes.
- B. Joint Dimension Conditions: Do not proceed with installation of sealers when joint dimensions are less than recommended by joint sealer manufacturer for application indicated.

PART 2 - PRODUCTS

2.01 CAULKING

- A. Caulking Compound: One component, synthetic rubber base sealant, soft curing, nonstaining, conforming to F.S. TT-S-00230 and Thiokol's Building Trade Performance Specifications for Type 1 Class B sealants. Colors shall be selected by the Engineer.
- B. Primer: As recommended by caulking compound manufacturer.
- C. Back-up Material: Closed cell foam polyethylene, or similar non-bituminous material as

recommended by manufacturer of caulking compound and completely compatible with selected compound.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION AND INSTALLATION

- A. Remove dirt, grease, mortar droppings and other foreign matter from substrate.
- B. Require installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not allow joint sealer work to proceed until unsatisfactory conditions have been corrected.

3.02 CAULKING

- A. Surface Preparation: Clean metal surfaces free of grease, oil, wax lacquer, and other foreign residue by wiping with a clean cloth moistened with a suitable solvent. Scape or brush masonry surfaces clean. Apply appropriate primer to contact surfaces.
- B. Joint Preparation: Joints to be caulked having a depth in excess of 3/8-inch shall be packed with back-up material. Round back-up material shall be sized to require 20 percent to 50 percent compression upon insertion. In joints not of sufficient depth to allow packing, install polyethylene bond-breaking tape at back of joint. Avoid lengthwise stretching of back-up material. Cut all corners, avoid wrapping around corners.
- C. Application: Apply compound with pressure flow gun with nozzle of proper size and shape to suit width of joint, promptly after mixing and with sufficient pressure to fill joint. Apply as a continuous operation horizontally in one direction, and vertically from bottom to top, except joints having excessive widths where compound might sag, the joints shall be built up with successive beads. Finish joints smooth and slightly coved.

3.03 PROTECTION AND CLEANING

- A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of substantial completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.
- B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

+++ END OF SECTION 07900 +++

**SECTION 08305
ACCESS HATCHES**

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install all access hatches as shown on the Drawings and specified herein.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be submitted:
1. Manufacturer's data on all materials listed in Part 2 of this Section.
 2. Detail drawings showing sizes of members, method of assembly, anchorage, and connection to other members shall be submitted to the Engineer for review before fabrication.
 3. Structural calculations for hatches designed to support AASHTO H-20 wheel loading. Calculations shall be signed and sealed by a registered professional engineer.

1.03 QUALITY ASSURANCE

- A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.
1. ASTM A36 – Standard Specification for Carbon Structural Steel
 2. ASTM A48 – Standard Specification for Grey Iron Castings
 3. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
 4. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 5. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

6. ASTM A167 – Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
7. ASTM A276 – Standard Specification for Stainless Steel Bars and Shapes
8. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
9. AWS Specifications for Arc Welding

1.04 COORDINATION

- A. The work of this Section shall be completely coordinated with the work of other Sections.
- B. Verify at the site both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.
- C. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

1.05 FIELD MEASUREMENTS

- A. Field measurements shall be taken at the site to verify or supplement indicated dimensions and to insure proper fitting of all items.

1.06 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section, before during and after installation and to protect the work and materials of all other trades.
- B. Delivery and storage: Deliver materials to the jobsite, and store in a safe dry place with all labels intact and legible at the time of installation.
- C. Replacement: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

1.07 WARRANTY

- A. Provide a warranty against defective equipment and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

PART 2 PRODUCTS

- A. Access Hatches

1. General:
 - a. Install Type I access hatches over spaces subject to vehicular traffic (i.e., streets and/or paved areas). Type I access hatches shall be designed to withstand AASHTO H-20 wheel loading.
 - b. Install Type II access hatches over spaces intended to be dry such as pipe and valve vaults. Type II hatches shall be designed to support a live load of 300 psf.
 - c. Install Type III access hatches over spaces intended to be wet such as wet wells, liquid holding tanks, etc. Type III hatches shall be designed to support a live load of 150 psf.
2. Access hatches shall be single or double cover construction in size(s) as shown on the Drawings. Covers shall be aluminum ¼-inch diamond pattern plate. Channel frame shall be ¼-inch aluminum with full anchor flange around the perimeter.
3. Covers shall be equipped with heavy forged brass hinges with stainless steel pins and shall pivot so cover does not protrude into the channel frame. Hinges shall be through bolted to the cover with tamper proof stainless steel lock bolts and shall be through bolted to the frame with stainless steel bolts and lock nuts.
4. Covers shall be equipped with compression springs enclosed in telescopic tubes. Upper tube shall be the outer tube to prevent accumulation of moisture, grit and debris inside the tube assembly. Lower tube shall interlock with a flanged support shoe fastened to a formed ¼-inch gusset support plate.
5. Covers shall be fitted with the required number and size of compression spring operators to afford ease of operation through the entire arc of opening and to act as a check in retarding downward motion when being closed. Covers shall be equipped with a hold-open arm which automatically locks the cover in the open position. A conveniently located handle shall release the covers for closing.
6. A stainless steel snap lock with a fixed turn handle shall be mounted on the underside of the cover. A removable exterior latch shall be provided and the latch release shall be protected by a flush gasketed removable screw plug. Covers shall have a lift handle that is designed to be flush with the walking surface when not in use.
7. A 1-1/2-inch drain coupling shall be welded under the channel frame.
8. All hardware shall be 316 stainless steel.
9. Factory finish shall be mill finish aluminum with bituminous coating applied to

the exterior of the frame.

10. Access hatches shall be equal to Type J or Type JD as manufactured by the Bilco Company.
11. Access hatches installed on air release and vacuum valve vaults shall be vented as specified by the Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all items furnished except items to be imbedded in concrete which shall be installed under Division 3. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown and in accordance with manufacturer's instructions and approved shop drawings. All dimensions shall be verified at the site before fabrication is started.
- C. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to dissimilar metal.
- D. Where aluminum contacts concrete, apply a heavy coat of approved alkali resistant paint to the concrete.

+++ END OF SECTION 08305 +++

**SECTION 15095
PIPE COUPLINGS**

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall furnish labor, materials, equipment and incidentals required to install and test mechanical couplings, complete in place as shown on the Drawings and as specified herein.
- B. Restrained pipe couplings shall be installed together and provide for a leak proof seal at the joint.
- C. Sleeve type couplings shall be installed to join sections of buried pipe together where restraint is not required.

1.02 QUALITY ASSURANCE

Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

- 1. ANSI/ASTM E165 – Standard Practice for Liquid Penetrate Inspection for General Industry
- 2. ANSI/AWS D1.1 - Structural Welding Code – Steel
- 3. ANSI/AWWA C200 - Steel Water Pipe 6 Inches and Larger
- 4. ANSI/AWWA C210 - Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
- 5. ANSI/AWWA C213 - Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
- 6. ANSI/AWWA C219 - Bolted, Sleeve-Type Couplings for Plain-End Pipe
- 7. ANSI/AWWA C227 – Bolted Split Sleeve Restrained and Non Restrained Couplings for Plain-End Pipe
- 8. ANSI C2000 - Classification System for Rubber Products in Automotive Applications

9. AWWA M11 - Steel Water Pipe – A Guide for Design and Installation

1.03 SUBMITTALS

- A. Complete shop drawings and product data for the couplings shall be submitted in accordance with the requirements of the General Conditions of the Contract Documents.
- B. In addition, the Contractor shall submit the following:
 - 1. Certified dimensional drawings of all couplings.
 - 2. Design calculations of each critical section of the coupling thickness, all sufficient to ascertain conformance of the coupling with these Specifications.
 - 3. Material list and schedules which include and describe all materials to be utilized.
- C. The Contractor shall furnish a certified affidavit of compliance for all couplings furnished under this Section, as specified and applicable in ANSI/AWWA Standards and the following supplemental requirements:
 - 1. Physical and chemical properties of all steel.
 - 2. Hydrostatic test reports.

1.04 VERIFICATION

- A. Inspection: All couplings shall be subject to inspection at the place of manufacture in accordance with the provisions of ANSI/AWWA Standards as supplemented by the requirements herein. The Contractor shall notify the Engineer in writing of the manufacturing starting date not less than 3 calendar days prior to the start of manufacture.
- B. During the manufacture of the couplings, the Engineer shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with these Specifications.
- C. Testing Requirements: One coupling of each diameter and pressure class shall be shop tested and certified in accordance with AWWA Standards.

PART 2 PRODUCTS

2.01 COUPLING SYSTEM DESIGN AND COMPONENT UNIT RESPONSIBILITY

- A. Gaskets, bolts, nuts, glands, end rings and hardware for pipe couplings of all types shall be furnished by the pipe coupling manufacturer. Gaskets shall be designed for the

coupling and appropriately sized to provide a watertight seal at the design pressure and temperature.

- B. Gaskets, bolts, nuts, glands, end rings and hardware shall be shipped with the pipe coupling.

2.02 RESTRAINED COUPLINGS

- A. General: Coupling shall be a bolted, split-sleeve type and consist of four basic components: one or two piece housing, gasket assembly, bolts and nuts and restraint rings.

B. Coupling Design

1. Couplings shall be designed to perform under the most critical combination of internal pressure and external loads as determined by the design procedures per AWWA M11 and the requirements of these specifications.
2. Coupling Thickness for Internal Pressure: For resistance to internal pressure, the thickness of the steel coupling shall be as determined by the following formula:

$$t = \frac{P_w D_y}{2F_s}$$

Where: t = Steel coupling thickness, in.

P_w = Design working pressure, psi

D_y = Pipe outside diameter, in.

F_s = 50% of specified minimum yield point of the steel, psi

3. Couplings shall be designed for a working pressure in accordance with AWWA Standards..

C. Coupling Housing

1. Material: Coupling shall be manufactured from ASTM A36 carbon steel.
2. Description: The coupling shall be of the split-sleeve type with a double arch cross section which closes around pipe ends with steel restraint rings affixed for pipe end restraint requirements.
3. As the coupling closes, it shall confine an elastomeric gasket beneath the arches of the sleeve to create a radial seal. The axial seal shall be effected at the sealing plates as the bolts pull the coupling snug around the pipe. The coupling shall permit angular pipe deflection.

D. Gaskets

1. Material: Elastomers shall have properties as designated by ASTM C2000.
2. Description: The sealing members shall be comprised of two O-Ring gaskets and an elastomer-sealing pad bonded to the sealing plate. Internal pressure shall not be required to affect the seal.
3. Service: Gasket supplied shall be Isoprene or EPDM conforming to ASTM D2000 for water service within the temperature range of -20 to 180 degrees Fahrenheit.

E. Bolts, Studs and Nuts

1. Material: Carbon steel bolts shall conform to ASTM A325 with a minimum tensile strength equal to 105,000 psi. Carbon steel studs shall conform to ASTM A193 Grade B7 with a minimum tensile strength of 125,000 psi. Carbon steel nuts shall conform to ASTM A194 Grade 2H.
2. Installation: The coupling shall be assembled with bolts or studs at the closure plates and tightened to assure snug coupling contact with the pipe. Contractor shall follow the manufacturer's written instructions regarding installation and tightening of bolts or studs.

F. Restraint Rings

1. Material: Restraint rings shall be furnished with the couplings. Carbon steel restraint rings shall conform to ASTM A108 grade 1018.
2. Application: Coupling shall provide a fully restrained pipe joint and shall be Type FxF as manufactured by Depend-O-Lok. One restraint ring welded to each of the pipe ends shall fit inside the coupling shoulders and prevent the pipe ends from pulling out of the coupling. The Contractor shall follow the manufacturer's recommendation for the size and amount of welding required to attach the restraint rings.

G. Epoxy Coating: Fusion Bonded Epoxy Coatings: A fusion bonded epoxy coating shall be applied to the inside and outside of the coupling in conformance with ANSI/AWWA C213.

H. Insulation Sleeve: If required due to the material of the pipe to be joined, insulating sleeves shall be supplied to provide for electrical isolation between the two pipe ends. One sleeve shall be provided for each pipe end. The sleeve width shall be equal to $\frac{1}{2}$ the coupling body width plus 1 inch. Thickness shall be $\frac{1}{8}$ -inch. Each sleeve shall have a lip that extends down between the pipe ends that is $\frac{3}{8}$ -inch thick by $\frac{3}{4}$ -inch deep, fully bonded to the sleeve. The insulating sleeve material shall be an EPDM elastomer suitable for potable water services.

- I. Restrained couplings shall be Depend-O-Lok as manufactured by Victaulic Inc. or an approved equal.

2.03 SLEEVE TYPE COUPLINGS

- A. Pipe coupling shall be a gasketed sleeve-type design and shall consist of a steel middle ring, two steel followers and two rubber compounded wedge section gaskets and track head bolts to compress the gaskets.
- B. The middle ring and followers of the coupling shall be true circular sections free of irregularities, flat spots or surface defects. They shall be formed with the follower ring section of such design as to provide containment of the gasket.
- C. Coupling shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
- D. A fusion bonded epoxy coating shall be applied to the inside and outside of the coupling in conformance with ANSI/AWWA C213. Coating shall also be NSF-61 approved.
- E. The coupling shall be provided with high strength low alloy steel bolts and hexagonal semi-finished nuts.
- F. Coupling shall have a minimum working pressure rating in accordance with AWWA Standards.
- G. Sleeve type couplings shall be Dresser Style 38, Smith Blair Style 411 or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION OF RESTRAINED COUPLINGS

- A. The Contractor shall inspect each coupling to insure that there are no damaged portions of the coupling. Particular attention should be paid to the sealing pad/sealing plate area.
- B. Before installation of the couplings, each coupling shall be thoroughly cleaned of any foreign substance, which may have collected thereon and shall be kept clean at all times thereafter.
- C. In no case shall the deflection in the joint between pipe ends exceed the maximum deflection recommended by the manufacturer. No joint shall be misfit any amount that will be detrimental to the strength and water tightness of this finished joint. The couplings shall be assembled and installed in conformity with the recommendations and instructions of the manufacturer.

- D. Wrenches used shall be of a type and size recommended by the manufacturer. Bolts (or studs) shall be tightened so as to secure uniform gasket compression between the coupling and the body of the pipe with all bolts (or studs) tightened approximately the same amount. Final tightening shall be by hand (no air impact wrenches) and shall be complete when the coupling is in uniform contact around the circumference of the pipe.

3.02 INSTALLATION OF SLEEVE TYPE COUPLINGS

- A. Sleeve type couplings shall not be installed in sections of restrained pipelines.
- B. Sleeve type couplings shall be installed in non-restrained sections of pipelines. Sleeves shall only be installed in locations as directed by the Engineer.
- C. Prior to the installation of sleeve type couplings, the pipe ends shall be cleaned. A follower and gasket shall be slipped over each pipe and the middle ring shall be placed on the all ready laid pipe end until it is centered over the joint. The other pipe end shall be inserted into the middle ring and brought into proper position in relation to the pipe all ready laid. The gaskets and followers shall then be placed evenly and firmly into the middle ring flares. After the bolts have been inserted and all nuts have been made finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint by use of a torque wrench of the appropriate size and torque for the bolts.

3.03 TESTING

Pressure test the pipeline in accordance with Section 02665, Water Mains and Accessories. There shall be no visible leakage allowed at any pipe joints that utilize couplings. Any visible leaks at coupled pipe joints shall be repaired to the satisfaction of the Engineer.

3.04 CLEANING

Prior to acceptance of the work of this Section, thoroughly clean all installed materials, equipment and related areas.

+++ END OF SECTION 15095 +++

**SECTION 15100
VALVES AND APPURTENANCES**

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.
- B. Items included under this Section are:
 - 1. Gate Valves
 - 2. Butterfly Valves
 - 3. Insert Valves
 - 4. Valve Boxes
 - 5. Tapping Sleeves and Gate Valves
 - 6. Meter Box Sampling Station
 - 7. Flange Insulating Gasket Kits
 - 8. Electronic Locating and Marking Systems

1.02 DESCRIPTION OF SYSTEMS

All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of water.

1.03 QUALITY ASSURANCE

- A. Reference Standards: The design, manufacturing and assembly of elements of the products herein specified shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or otherwise specified.
 - 1. ANSI/AWWA C504 – Rubber-Seated Butterfly Valves
 - 2. ANSI/AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service

3. ANSI/AWWA C515 – Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
4. ANSI/AWWA C550 – Protective Epoxy Interior Coatings for Valves and Hydrants.
5. ANSI/AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
6. ANSI/NSF Standard 61 – Drinking Water System Components – Health Effects

1.04 SUBMITTALS

- A. Submittals shall be in compliance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 1. Complete shop drawings of all valves and appurtenances
 2. Manufacturer’s certificate certifying that the products meet or exceed the specified requirements

1.05 TOOLS

Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. All valves and appurtenances shall be of the size shown on the Drawings and all equipment of the same type shall be from one manufacturer.
- B. All valves and appurtenances shall have the name of the maker and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

2.02 GATE VALVES (GV)

- A. 20-Inches in Diameter and Smaller:
 1. Gate valves shall be resilient seated type conforming to the requirements of AWWA C509 or AWWA C515.
 2. Valves shall have a minimum working pressure of 250 psi.

3. Valve manufacturer shall submit an affidavit to the Engineer indicating valve compliance with all applicable AWWA standards.
4. Valves less than 4-inches in diameter shall have threaded ends. Larger valves shall be mechanical joint unless shown otherwise on the Drawings.
5. Valve shall be non-rising stem type with a 2-inch square operating nut and shall open right (clockwise).
6. All internal and external ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall conform to ANSI/AWWA C550 and shall be applied electrostatically prior to assembly. Epoxy shall be NSF61 approved.
7. Valve shall have a ductile iron body, bonnet and stuffing box. All joints between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be supplied with o-ring seals.
8. Valve wedges shall be symmetrical, made of ductile iron and totally encapsulated in rubber. Rubber shall be permanently bonded to the wedge per ASTM D429.
9. Valves shall be manufactured by American Flow Control, Mueller, or M & H Valve.

B. 24-Inches in Diameter and Larger:

1. Gate valves shall be resilient seated type conforming to the requirements of AWWA C509 or AWWA C515.
2. Valves shall have a minimum working pressure of 250 psi.
3. Valve manufacturer shall submit an affidavit to the Engineer indicating valve compliance with all applicable AWWA standards.
4. Valves shall be designed for horizontal installation with tracks and rollers, bypass valves, and bevel gear type operator.
5. Valve ends shall be mechanical joint type except where restrained joint ends are shown. Flanged joints shall meet the requirements of ANSI B16.1, Class 125.
6. Valve shall be non-rising stem type with a 2-inch square operating nut and shall open right (clockwise).
7. All internal and external ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall conform to ANSI/AWWA C550

and shall be applied electrostatically prior to assembly. Epoxy shall be NSF61 approved.

8. Valve shall have a ductile iron body, bonnet and stuffing box. All joints between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be supplied with o-ring seals.
9. Valve wedge shall be symmetrical, made of ductile iron and totally encapsulated in rubber. Rubber shall be permanently bonded to the wedge per ASTM D429.
10. Valves shall be non-rising stem type with a 2-inch square operating nut and shall open right (clockwise).
11. Valves shall be manufactured by American Flow Control, Mueller, or M & H Valve.

2.03 BUTTERFLY VALVES (BV)

A. Class 150 Valves:

1. Class 150 butterfly valves shall be short body design and shall be designed, manufactured and tested in accordance with the requirements of ANSI/AWWA C504 for Class 150B butterfly valves.
2. Valve bodies shall be ductile iron conforming to ASTM A536, Grade 65-45-12 or ASTM A126, Grade B cast iron. Shafts shall be ASTM A276, Type 304 stainless steel, machined and polished. Valve discs shall be ductile iron, ASTM A536, Grade 65-45-12 or ASTM A126, Grade B cast iron.
3. The valve shall have a resilient seat.

B. Class 250 Valves:

1. Class 250 butterfly valves shall be short body design and shall be designed, manufactured, and tested in accordance with the requirements of ANSI/AWWA C504 for class 250B butterfly valves.
2. Valve bodies shall be ductile iron conforming to ASTM A536, Grade 65-45-12 or ASTM A126, Grade B cast iron. Shafts and shaft hardware shall be ASTM A564, Type 630 stainless steel, machined and polished. Valve discs shall be ductile iron, ASTM A536, Grade 65-45-12.
3. The valve shall have a resilient seat.
4. ANSI/AWWA C504 Section 5.1 testing requirements for class 250 valves shall be modified as follows:

- a. The leakage test shall be performed at a pressure of 250 psi.
 - b. The hydrostatic test shall be performed at a pressure of 500 psi.
 - c. Proof of design tests shall be performed and certification of such proof of design test shall be provided to the Engineer.
- C. 24-inch and larger valves shall have a resilient seat that is located either on the valve disc or in the valve body. The valve seat shall be fully field adjustable and field replaceable.
- D. Valves shall be installed with the valve shafts horizontal. Valves and actuators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.
- E. Actuators
- 1. Valves shall be equipped with traveling nut, self-locking type actuators designed, manufactured and tested in accordance with ANSI/AWWA C504. Actuators shall be capable of holding the valve disc in any position between full open and full closed without any movement or fluttering of the disc.
 - 2. Actuators shall be furnished with fully adjustable mechanical stop-limiting devices to prevent over travel of the valve disc in the open and closed positions. Actuators that utilize the sides of the actuator housing to limit disc travel are unacceptable.
 - 3. Valve actuators shall be capable of withstanding a minimum of 450 foot pounds of input torque in either the open or closed position without damage.
- F. The valve actuator shall be factory mounted on the valve by the valve manufacturer and shipped to the project site as a complete operating unit. Valve shall be designed to open right (counterclockwise).
- G. Valve ends shall be mechanical joint type, except where flanged or restrained joint ends are shown on the Drawings. Flange joints shall meet the requirements of ANSI B16.1, Class 125.
- H. Butterfly valves shall be manufactured by Mueller, Pratt or DeZurik.

2.04 BYPASS VALVES AND PIPING

Where shown on the Drawings, valves 24-inches in diameter and larger shall be installed with bypass piping and valve as specified in the following table:

Valve Diameter (Inches)	Bypass Valve and Pipe Diameter (Inches)
----------------------------	--

24	4
30	4
36	6
42	6
48	8
54	8
60	10

2.05 INSERT VALVES (IV)

- A. Insert valves shall be a resilient seat wedge gate valve. Valve design shall allow the valve to be installed in an existing pressurized pipeline.
- B. The valve shall have a ductile iron body, bonnet and wedge suitable for a design working pressure of 250 psi. Valve shall meet the requirements of ANSI/AWWA C515. Ductile iron shall meet the requirements of ASTM A536, Grade 65-45-12.
- C. Valves 12-inches and smaller shall be capable of working on cast iron or ductile iron, class A, B, C and D pipe diameters without changing either top or bottom portion of the split valve assembly.
- D. Resilient Wedge Gate Assembly
 - 1. The construction of the resilient wedge shall comply with ANSI/AWWA C509.
 - 2. The ductile iron wedge shall be fully encapsulated with EPDM rubber by a high pressure and high temperature compression or injection mold process. There shall be no exposed trim.
 - 3. The resilient wedge shall seat on the valve body and not on the pipe to obtain the maximum seating and flow control results. The resilient wedge shall be totally independent of the carrier pipe. The resilient wedge shall not come into contact with the carrier pipe or depend on the carrier pipe to create a seal.
 - 4. Pressure equalization on the downstream or upstream side of the closed wedge shall not be necessary to open the valve.
 - 5. The wedge shall be symmetrical and seal equally well with flow in both directions.
 - 6. The resilient wedge shall ride inside the body channels to maintain wedge alignment throughout its travel to achieve maximum fluid control regardless of high or low flow pressure or velocity. The resilient wedge shall have more support than the operating stem as the resilient wedge enters and exits the water way.
 - 7. Valve shall have an oversized and unobstructed flow way.

E. Fusion Bonded Epoxy

1. The insert valve shall be fully epoxy coated on the interior and exterior. The fusion bonded coating shall be applied prior to assembly so that all bolt holes and body-to-bonnet flange surfaces are fully epoxy coated.
2. Valve shall be coated with a minimum of 8 mils epoxy in compliance with ANSI/AWWA C550 and certified to ANSI/NSF 61.

F. Gaskets and Triple O-ring Seals

1. The insert valve shall have triple o-ring stem seals. Two o-rings shall be located above and one o-ring located below the thrust collar.
2. The lower two o-rings shall provide a permanently sealed lubrication chamber. The upper o-ring shall insure that sand, dirt or grit cannot enter the valve to cause damage to the lower o-rings.
3. Side flange seals shall be of the o-ring type of either round, oval or rectangular cross-sectional shape.

G. Valve Stem and Thrust Washers

1. The gate valve stem and wedge nut shall be copper alloy in accordance with Section 4.4.5.1 of ANSI/AWWA C515
2. The stem shall have an integral thrust collar in accordance with Section 4.4.5.3 of ANSI/AWWA C515. Two piece stem collars are not acceptable. The wedge nut shall be independent of the wedge and shall be held in place on three sides by the wedge to prevent possible misalignment.
3. Two thrust washers shall be used One shall be located above the stem thrust collar and the other below the stem collar.
4. The stem shall be non-rising type with AWWA standard turns.
5. Valve operating nut shall be 2-inches square in accordance with ASTM A126, Class B. Valve shall open right (clockwise)

H. Hardware: Hardware materials shall develop the physical strength characteristics of ASTM A307 with dimensions conforming to ANSI B18.2.1

I. Split Restraint Devices: Split restraint devices shall be as specified in Section 02665.

J. The stuffing box, operating stem and resilient wedge (complete bonnet and moving parts) shall be removable and replaceable under pressure.

2.06 VALVE BOXES (VB) AND EXTENSION STEMS

- A. All buried valves shall be equipped with valve boxes and lids unless access to the valve operator is provided by a manhole or vault.
- B. Valve boxes shall be gray cast iron two-piece screw type with drop lids. Valve boxes shall be adjustable to 6-inches up or down from the nominal required cover over the pipe. Valve boxes shall have a five and one quarter (5-1/4) inch inside diameter. Valve boxes shall be of sufficient length that the bottom flange of the lower belled portion of the box is below the valve operating nut. Cast iron risers shall be provided as necessary. Valve boxes shall be model 8550 as manufactured by East Jordan Iron Works or equal.
- C. Valve box lids shall be gray cast iron and shall have "WATER" cast into the top of the lid in 3/4-inch (minimum) raised letters. Valve box lids shall weigh a minimum of 13 pounds. Valve box lids shall be model 6800 as manufactured by East Jordan Iron Works or equal.
- D. Valve boxes, risers and lids shall be coated with black asphalt.
- E. All valves shall be furnished with extension stems if operating nut is greater than four feet deep, to bring the operating nut to within 24-inches of the top of the valve box. Connection to the valve shall be with a wrench nut coupling and a set screw to secure the coupling to the valve's operating nut. The coupling and square wrench nut shall be welded to the extension stem. Extension stems shall be stainless steel and shall be furnished by the valve manufacturer. Extension stems shall be sized by the valve manufacturer to withstand the maximum valve operator output.
- F. Where pavement exists, the box shall be adjusted to finished grade. When valves are located out of pavement, the box shall be adjusted to finished grade and a concrete pad shall be poured around the box as detailed on the Drawings.
- G. Stem guides shall be fully adjustable stem guides with bronze bushings, and shall be furnished by the valve manufacturer. Stem guides shall be installed as shown on the Drawings and shall conform to the extension guide spacing requirements as specified in AWWA/ANSI C501.

2.07 WRENCHES

Four tee handled wrenches of suitable length shall be furnished to operate all valves.

2.08 VALVE MARKERS (VM)

For installed valves, the Contractor shall furnish and install a concrete valve marker as detailed on the Drawings when directed by the Engineer, except on hydrant isolation valves. Valve markers shall be stamped "WATER".

2.09 TAPPING SLEEVES AND GATE VALVES (TS&V)

- A. Tapping sleeves for mains 12-inches in diameter and smaller shall be ductile iron of the split-sleeve, mechanical joint type. Tapping sleeves shall be equal to Mueller H-615.
- B. Tapping sleeves for mains larger than 12-inches shall be of all stainless steel construction.
- C. The Contractor shall be responsible for determining the outside diameter of the pipe to be connected to prior to ordering the sleeve. The tapping sleeve shall be rated for 250 psi. working pressure
- D. Valves shall be gate valves as specified in Paragraph 2.02 of this Section, with a flanged connection to the tapping sleeve and a mechanical joint connection to the branch pipe. The tapping sleeve shall be supplied by the valve manufacturer.

2.10 METER BOX SAMPLING STATION

- A. Sampling station shall be meter box, retrofit style. Inlet and outlet connections shall be standard ¾-inch meter threads. The station shall consist of a standard meter resetter with the inlet leading up through the water system's residential meter, through a check valve and then out an outlet.
- B. The sampling station shall consist of a ½-inch lockable shut off valve leading to a valve riser and a 3/8-inch male quick disconnect valve. The valve and riser shall be positioned directly in line with the meter setter to avoid turning of the entire sampling station when pushing the sampling rod down on the valve.
- C. Sampling station parts shall be brass.
- D. Sampling station shall be furnished with a plastic PVC push on cap to protect the quick disconnect valve when not in use. The cap shall be sealed watertight with an o-ring below the quick disconnect valve.
- E. A portable sampling rod shall also be provided with each sampling station. The sampling rod shall be furnished with a female inlet which shall couple to the male quick coupling, and a quarter turn valve. The rod shall be brass and shall have two outlets, one for flushing and the other for sampling.
- F. The meter box sampling station and portable sampling rod shall be equal to Kupferle Foundry Company, Model 94WM

2.11 FLANGE INSULATION GASKET KITS

- A. Flange insulating gasket kits shall be installed as required to isolate dissimilar metals when connecting to pipelines of different metal composition.

- B. Flange kits shall consist of insulation gaskets, insulating sleeves and washers, nuts and bolts.

2.12 ELECTRONIC LOCATING AND MARKING SYSTEMS

- A. The Contractor shall furnish and install an electronic locating and marking system for all buried water main piping. System shall consist of electronic markers buried above the water main and stand-alone locators.
- B. The marker shall contain an antenna or three orthogonal tuned circuits. Electronic ball markers shall be made of high strength 4 1/2-inch (maximum) diameter plastic. Electronic non-programmable ball markers shall be 3M TM model 1403-XR as manufactured by 3M, Omni Markers as manufactured by Tempo or approved equal. Electronic programmable ball markers shall be 3M TM model 1423-XR/ID as manufactured by 3M, Omni Markers as manufactured by Tempo or approved equal
- C. Full range markers shall be equal to EMS model 1252 as manufactured by 3M or approved equal.
- D. The Contractor shall also furnish two (2) 3M Dynatel locators. Locators shall be 3M model 2250M-ID/UU3W-RT or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All valves and appurtenances shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the Engineer before they are installed.
- B. Buried flanged or mechanical joints shall be made with cadmium plated bolts.
- C. Prior to installation, valves shall be inspected for direction of opening clockwise, number of turns to open, freedom of operation, tightness of pressure containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks. Defective valves shall be corrected or held for inspection by the Engineer. Valves shall be closed before being installed.

3.02 LAYING AND JOINTING VALVES AND APPURTENANCES

- A. Valves, fittings, plugs, and caps shall be set and joined to the pipe in accordance with the manufacturer's recommendations for cleaning, laying and joining pipe. Twelve (12) inch and larger valves shall be provided with special support, such as crushed stone, concrete pads or a tamped trench bottom so that the pipe will not be required to support the weight of the valve.

- B. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.
- C. A valve box shall be provided on each buried valve. The valve box shall be set over the center of the valve operating nut and plumbed. The box shall not transmit shock or stress to the valve. The bottom portion of the lower belled portion of the box shall be placed below the valve operating nut. The flange shall be set on brick, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. The valve box cover shall be flush with the surrounding surface or such other level as directed by the Engineer.
- D. Underground valves shall be installed in vaults where indicated on the Drawings. The vault shall be precast or cast-in-place concrete as indicated on the Drawings. The valve box shall not transmit shock or stress to the valve and shall be as detailed on the Drawings. The valve vault cover shall be flush with the surface of the finished area or such other level as directed by the Engineer.
- E. Settlement Joints: The first joint on all pipe connected to and outside of a valve vault shall be designed to allow differential settlement. The following joints will be allowed for settlement:
 - 1. Steel Pipe shall use a bolted, sleeve style coupling with joint harness as specified in AWWA M11.
 - 2. Ductile iron pipe shall use standard gasketed joints if unrestrained, or mechanically restrained gasketed joints if required by thrust restraint design.
- F. Pipe within 20 feet of each side of a direct-buried butterfly valve shall be protected from vertical deflection to protect proper function of butterfly valve. Vertical deflection of pipe shall be limited to butterfly valve manufacturer recommendation.

3.03 BLOW-OFFS

Blow-offs shall be installed in locations as directed by the Engineer and as shown on the Drawings. Blow-offs shall not be connected to any sewer, submerged in any stream or creek, or be installed in any manner that will permit back siphonage into the water distribution system.

3.04 ELECTRONIC LOCATING AND MARKING SYSTEM

- A. The Contractor shall install a ball marker at each bend, tee, valve and 500 feet of pipe length installed.
- B. Ball markers shall be installed at a maximum depth of 5 feet.
- C. Ball markers shall be secured to the pipe with cable ties as shown on the Drawings and shall be installed in accordance with the manufacturer's instructions.

- D. Full range markers shall be installed on bends, tees, valves and pipe with 5-feet of cover or greater.

3.05 TESTING

After installation, all valves and appurtenances shall be tested at least 1 hour at 250 psi, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Engineer.

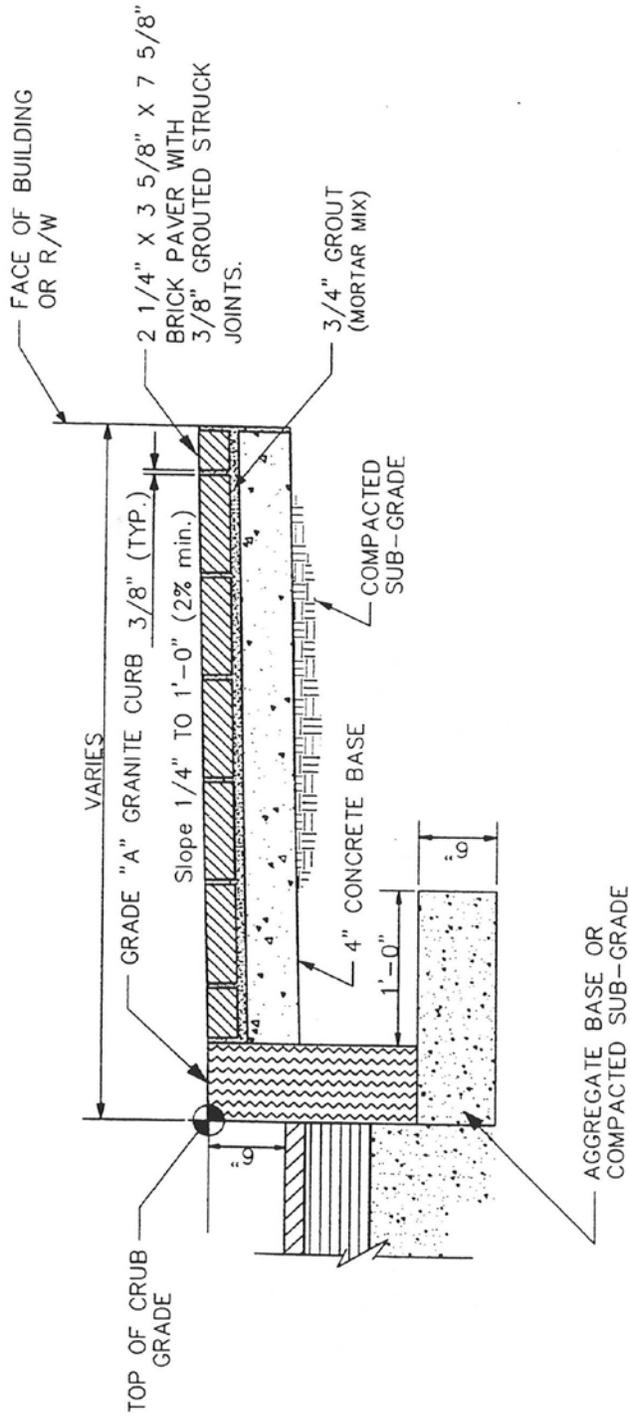
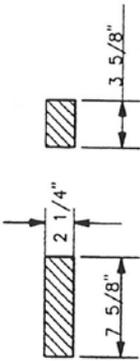
+ + + END OF SECTION 15100 + + +

EXHIBIT F

DRAWINGS

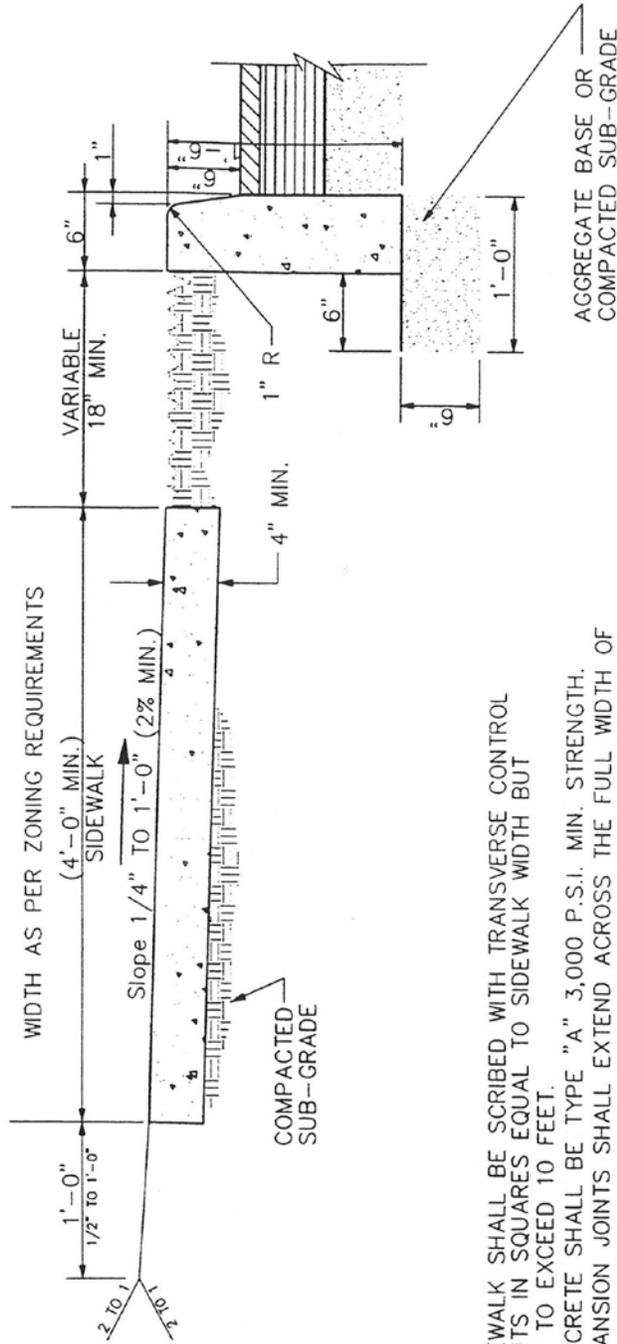
DETAILS
FOR
CONCRETE SIDEWALKS, DRIVEWAYS
& CURBS

COMMON PAVING BRICK



SCALE: AS DIMENSIONED
DATE: JANUARY 1, 1999
DESIGNED: C.C.
CHECKED: I.M.
DRAWN: T.J.
REVISIONS:

CITY OF ATLANTA DEPARTMENT OF PUBLIC WORKS TECHNICAL SERVICES DIVISION
BRICK SIDEWALK

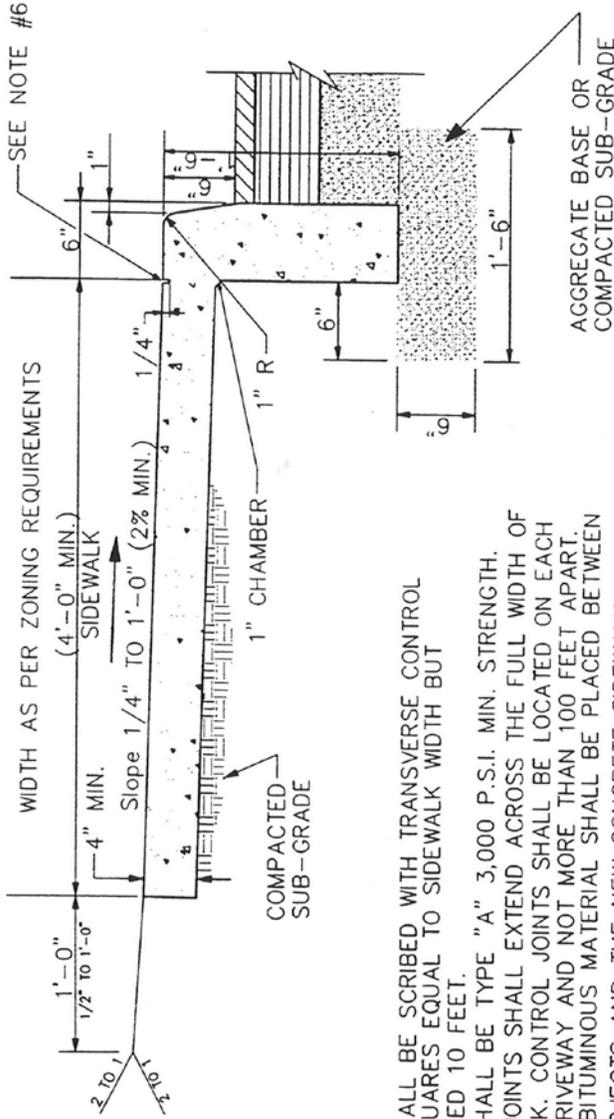


NOTES:

1. SIDEWALK SHALL BE SCRIBED WITH TRANSVERSE CONTROL JOINTS IN SQUARES EQUAL TO SIDEWALK WIDTH BUT NOT TO EXCEED 10 FEET.
2. CONCRETE SHALL BE TYPE "A" 3,000 P.S.I. MIN. STRENGTH.
3. EXPANSION JOINTS SHALL EXTEND ACROSS THE FULL WIDTH OF THE SIDEWALK. CONTROL JOINTS SHALL BE LOCATED ON EACH SIDE OF A DRIVEWAY AND NOT MORE THAN 100 FEET APART.
4. PREFORMED BITUMINOUS MATERIAL SHALL BE PLACED BETWEEN ALL FIXED OBJECTS AND THE NEW CONCRETE SIDEWALK.
5. ALL CONCRETE WORK SHALL BE PER CITY OF ATLANTA STANDARD SPECIFICATIONS FOR CONSTRUCTION.

SCALE: AS DIMENSIONED	CITY OF ATLANTA DEPARTMENT OF PUBLIC WORKS TECHNICAL SERVICES DIVISION STANDARD SIDEWALK AND CONCRETE HEADER CURB
DATE: JANUARY 1, 1999	
DESIGNED: C.C.	
CHECKED: I.M.	
DRAWN: T.J.	
REVISIONS:	

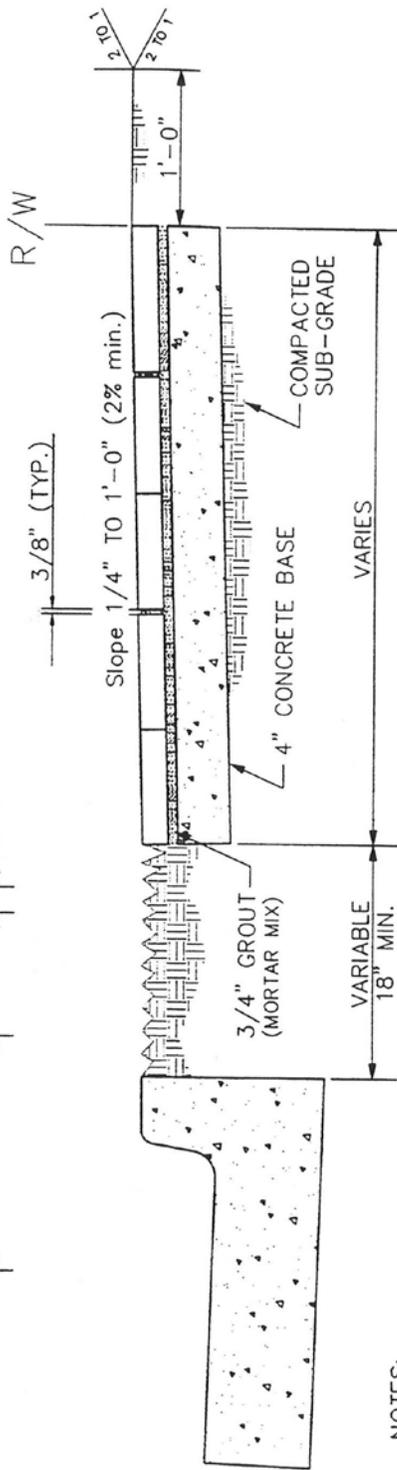
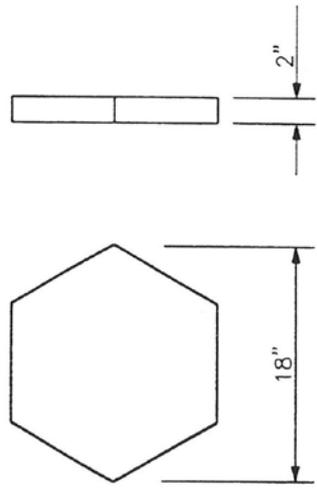
SW-1



NOTES:

1. SIDEWALK SHALL BE SCRIBED WITH TRANSVERSE CONTROL JOINTS IN SQUARES EQUAL TO SIDEWALK WIDTH BUT NOT TO EXCEED 10 FEET.
2. CONCRETE SHALL BE TYPE "A" 3,000 P.S.I. MIN. STRENGTH.
3. EXPANSION JOINTS SHALL EXTEND ACROSS THE FULL WIDTH OF THE SIDEWALK. CONTROL JOINTS SHALL BE LOCATED ON EACH SIDE OF A DRIVEWAY AND NOT MORE THAN 100 FEET APART.
4. PREFORMED BITUMINOUS MATERIAL SHALL BE PLACED BETWEEN ALL FIXED OBJECTS AND THE NEW CONCRETE SIDEWALK.
5. ALL CONCRETE WORK SHALL BE PER CITY OF ATLANTA STANDARD SPECIFICATIONS FOR CONSTRUCTION.
6. 1/4 INCH TOOLED JOINT BETWEEN CURB AND SIDEWALK.

SW-2	
SCALE: AS DIMENSIONED	CITY OF ATLANTA
DATE: JANUARY 1, 1999	DEPARTMENT OF PUBLIC WORKS
DESIGNED: C.C.	TECHNICAL SERVICES DIVISION
CHECKED: I.M.	STANDARD MONOLITHIC
DRAWN: T.J.	SIDEWALK & CURB
REVISIONS:	



NOTES:

1. HEXAGONAL TILE SHALL BE GROUTED IN PLACE.
2. CONCRETE BASE SHALL BE 3,000 P.S.I. MIN.
3. EXPANSION MATERIAL SHALL BE PLACED BETWEEN ALL FIXED OBJECTS (EXCEPT CURB) AND THE NEW CONCRETE SIDEWALK.
4. IF GRASS STRIP IS LESS THAN 18" SIDEWALK SHALL EXTEND TO BACK OF CURB.

SW-3	CITY OF ATLANTA DEPARTMENT OF PUBLIC WORKS TECHNICAL SERVICES DIVISION
SCALE: AS DIMENSIONED	
DATE: JANUARY 1, 1999	
DESIGNED: C.C.	
CHECKED: I.M.	
DRAWN: T.J.	
REVISIONS:	

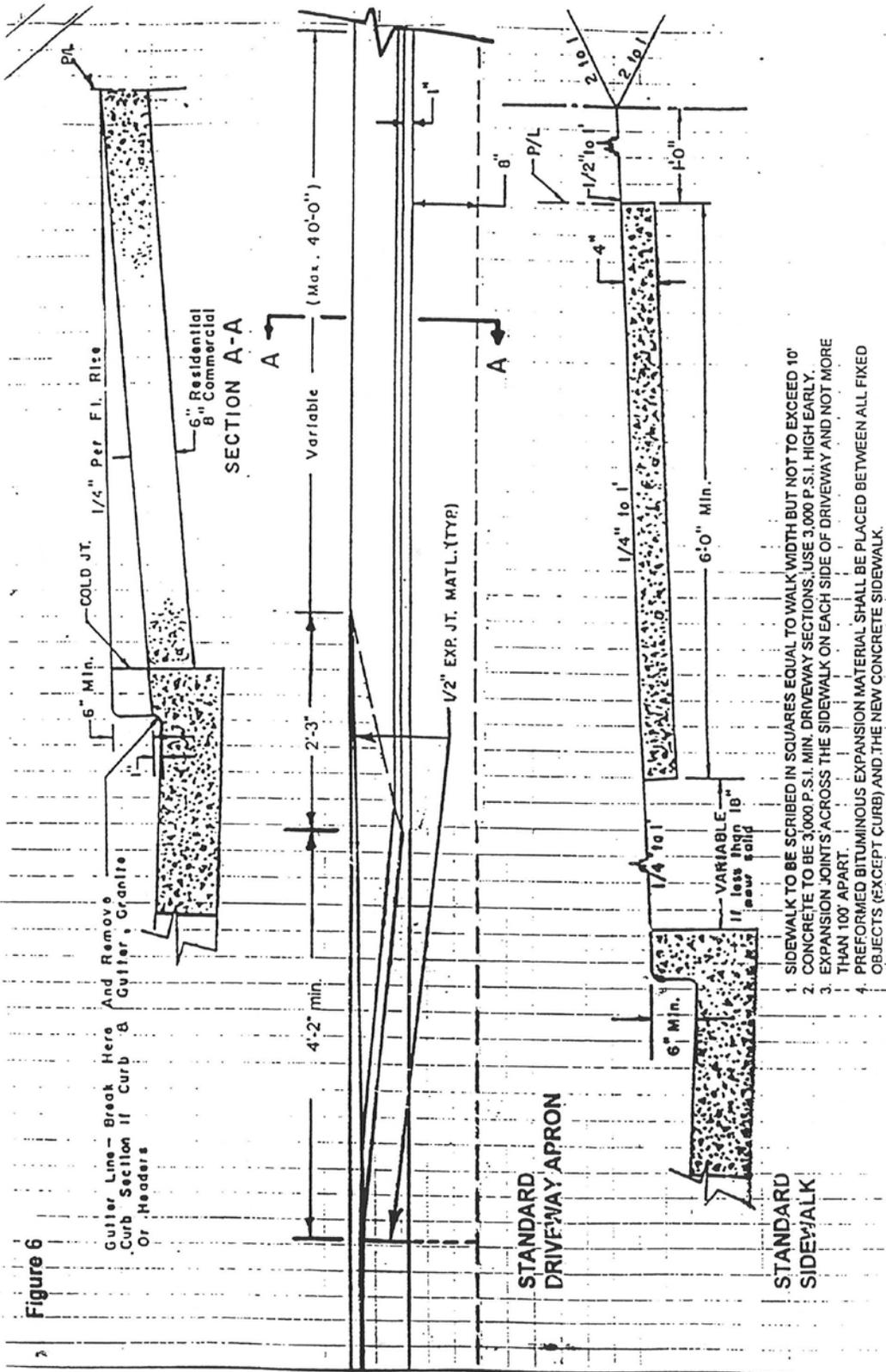


Figure 6

Gutter Line - Break Here
And Remove
Curb Section If Curb &
Gutter, Granite
Or Headers

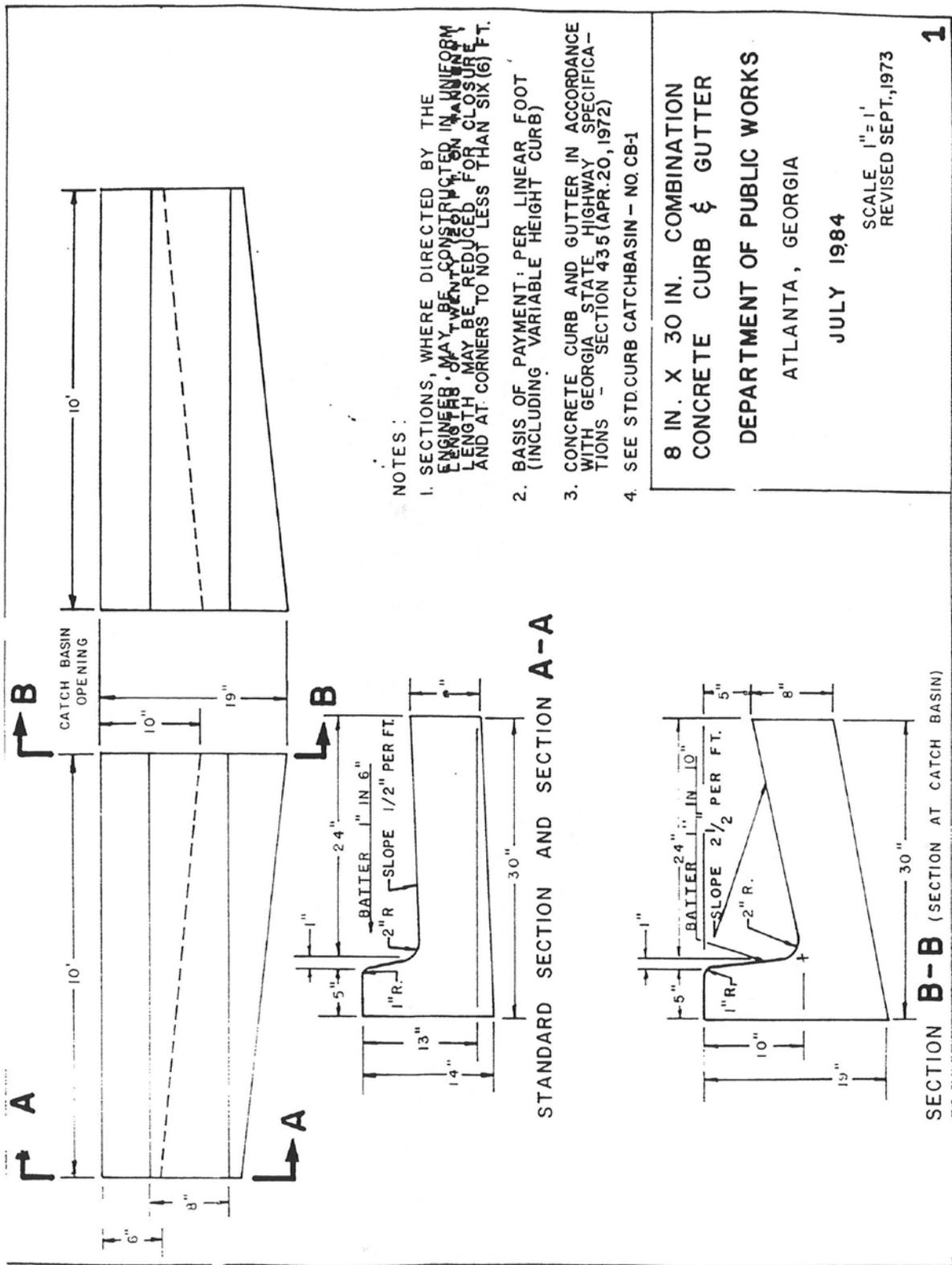
SECTION A-A
6" Residential
8" Commercial

STANDARD
DRIVEWAY APRON

STANDARD
SIDEWALK

1. SIDEWALK TO BE SCRIBED IN SQUARES EQUAL TO WALK WIDTH BUT NOT TO EXCEED 10'.
2. CONCRETE TO BE 3,000 P.S.I. MIN. DRIVEWAY SECTIONS, USE 3,000 P.S.I. HIGH EARLY.
3. EXPANSION JOINTS ACROSS THE SIDEWALK ON EACH SIDE OF DRIVEWAY AND NOT MORE THAN 100' APART.
4. PREFORMED BITUMINOUS EXPANSION MATERIAL SHALL BE PLACED BETWEEN ALL FIXED OBJECTS (EXCEPT CURB) AND THE NEW CONCRETE SIDEWALK.

CITY OF ATLANTA		SCALE: 3/4" = 1'0"
DEPARTMENT OF PUBLIC WORKS		DATE: 12/30/96
TECHNICAL SERVICES DIVISION		DESIGNED.
STANDARDS - DRIVEWAY AND SIDEWALK		CHECKED.
		DRAWN: FC/JRB
		REVISIONS



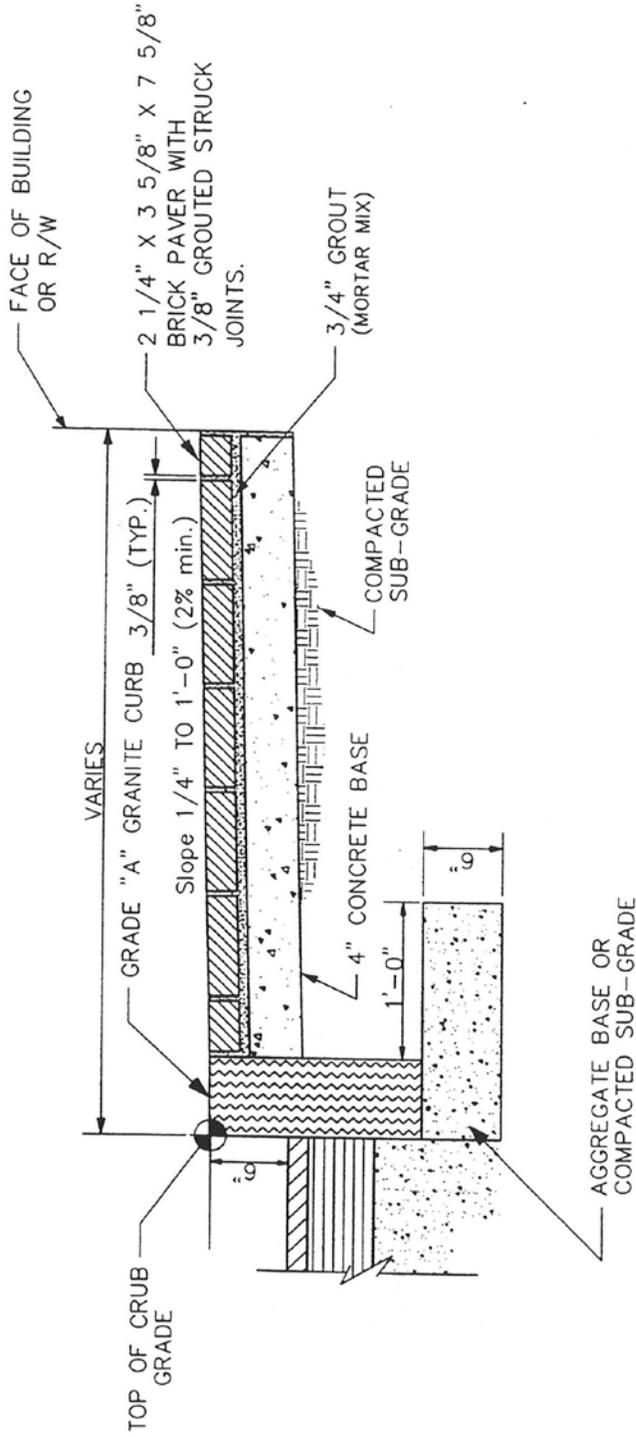
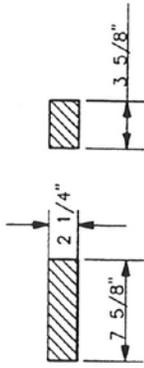
NOTES:

1. SECTIONS, WHERE DIRECTED BY THE ENGINEER, MAY BE CONSTRUCTED IN UNIFORM LENGTH MAY BE REDUCED FOR CLOSURE AND AT CORNERS TO NOT LESS THAN SIX (6) FT.
2. BASIS OF PAYMENT: PER LINEAR FOOT (INCLUDING VARIABLE HEIGHT CURB)
3. CONCRETE CURB AND GUTTER IN ACCORDANCE WITH GEORGIA STATE HIGHWAY SPECIFICATIONS SECTION 435 (APR. 20, 1972)
4. SEE STD. CURB CATCH BASIN - NO. CB-1

STANDARD SECTION AND SECTION A-A

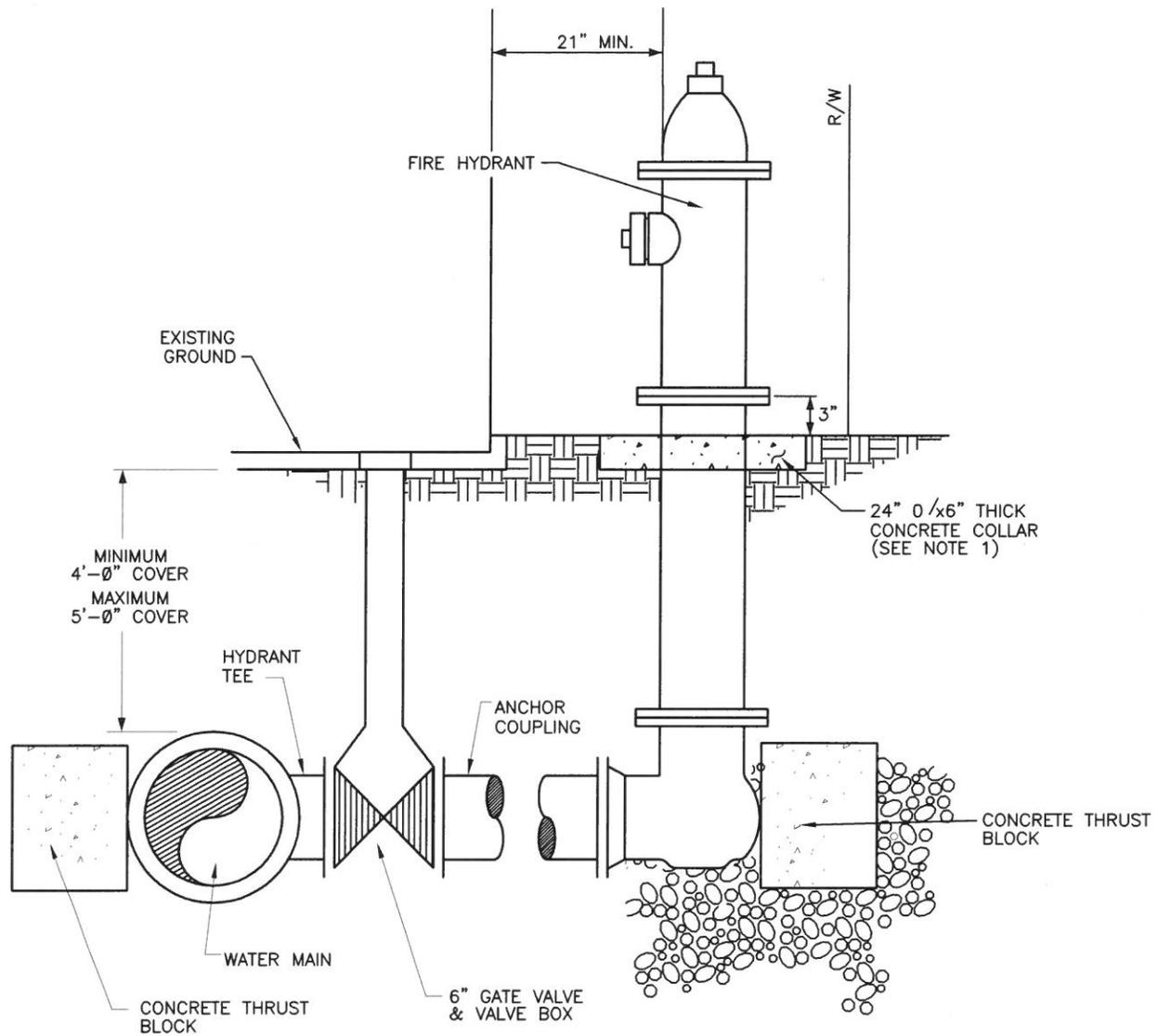
8 IN. X 30 IN. COMBINATION
 CONCRETE CURB & GUTTER
 DEPARTMENT OF PUBLIC WORKS
 ATLANTA, GEORGIA
 JULY 1984
 SCALE 1" = 1'
 REVISED SEPT., 1973

COMMON PAVING BRICK



SCALE: AS DIMENSIONED	CITY OF ATLANTA DEPARTMENT OF PUBLIC WORKS TECHNICAL SERVICES DIVISION BRICK SIDEWALK
DATE: JANUARY 1, 1999	
DESIGNED: C.C.	
CHECKED: I.M.	
DRAWN: T.J.	
REVISIONS:	

For up-to date City of Atlanta Standard details, please visit www.atlantaga.gov, Go to Public Works Page and look for 'Standard Details' link.



NOTES:

1. CONCRETE COLLAR NOT REQUIRED IF HYDRANT IS SURROUNDED BY CONCRETE SIDEWALK.
2. STONE SHALL BE PLACED A MINIMUM 6" ABOVE DRAIN PORTS, A MINIMUM 18" BELOW DRAIN PORTS, 15" Laterally ON EACH SIDE OF SHOE AND 24" FROM BACK OF HYDRANT TOWARD THE MAIN.

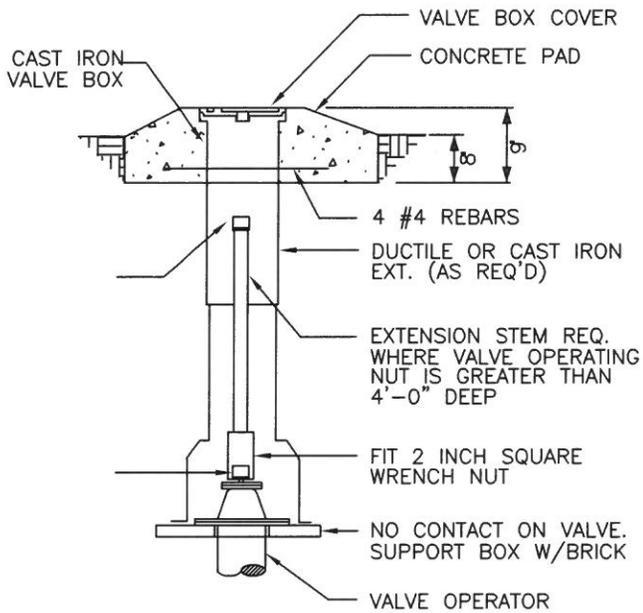
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



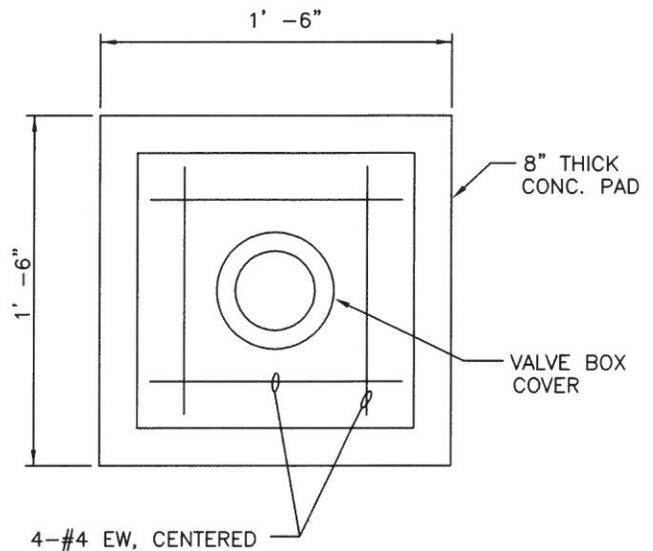
STANDARD DETAILS
**TYPICAL
FIRE HYDRANT**

DATE : DEC. 2012
SCALE : N.T.S.

DETAIL NO. W-1
WR-G_FH001



BURIED GATE VALVE BOX



CONCRETE PAD

TYPICAL BURIED GATE VALVE
BOX AND CONCRETE PAD

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

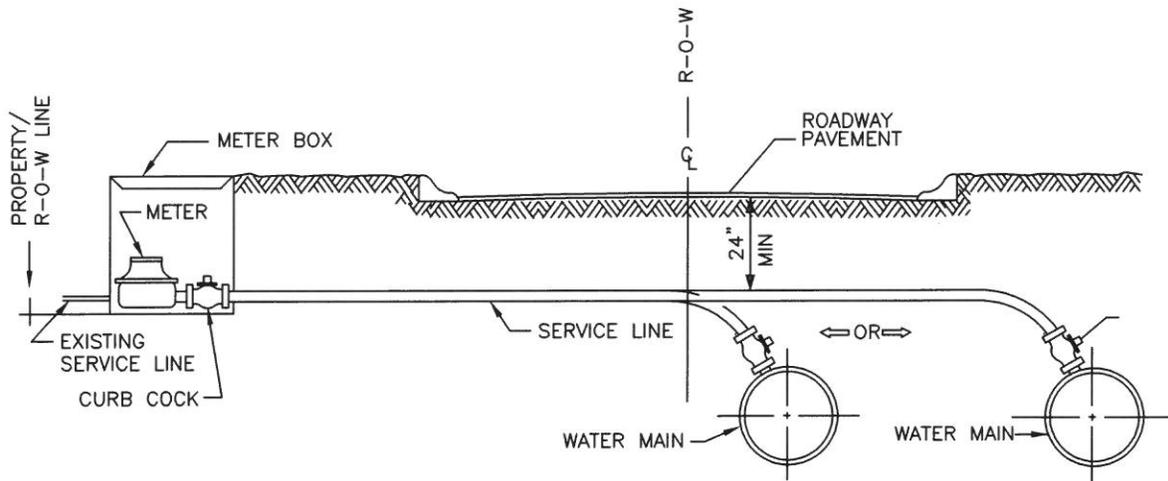


STANDARD DETAILS

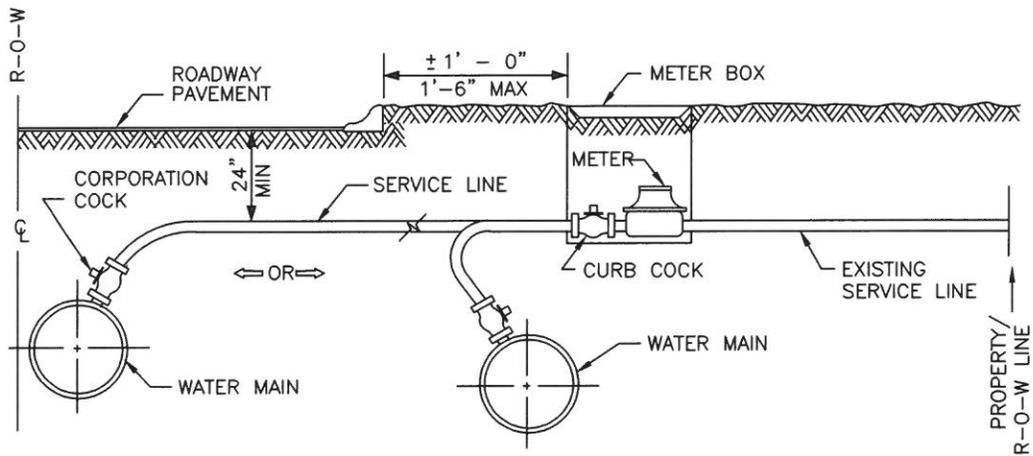
**TYPICAL BURIED GATE VALVE
BOX AND CONCRETE PAD**

DATE : DEC. 2012
SCALE : N.T.S.

DETAIL NO. W-7



TYPICAL LONG SIDE SERVICE



TYPICAL SHORT SIDE SERVICE

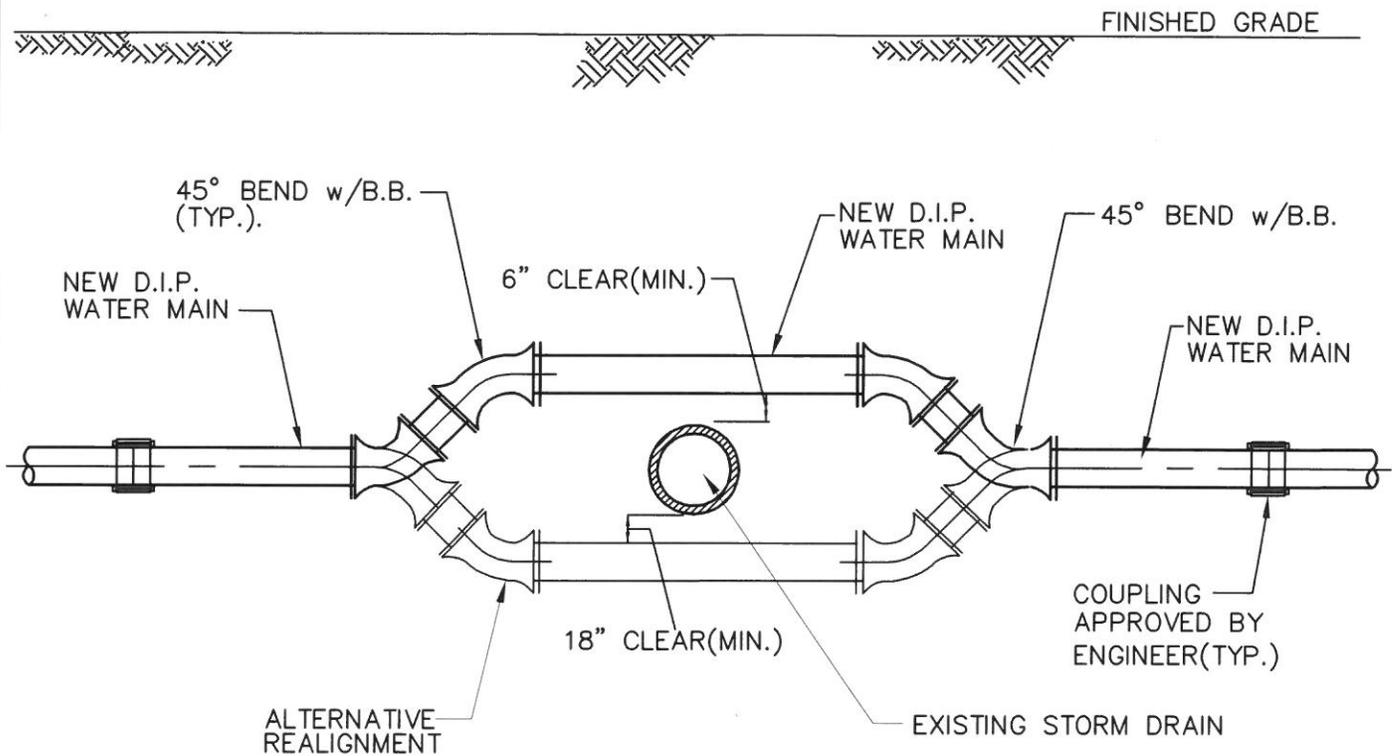
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



STANDARD DETAILS
TYPICAL LONG SIDE
AND SHORT SIDE
SERVICE CONNECTION

DATE : DEC. 2012
SCALE : N.T.S.

DETAIL NO. W-17
WR-G_SV002



NOTES:

REALIGNMENT TO BE USED ONLY WHEN AUTHORIZED BY THE ENGINEER.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



STANDARD DETAILS

**WATER MAIN
REALIGNMENT DETAIL**

DATE : DEC. 2012

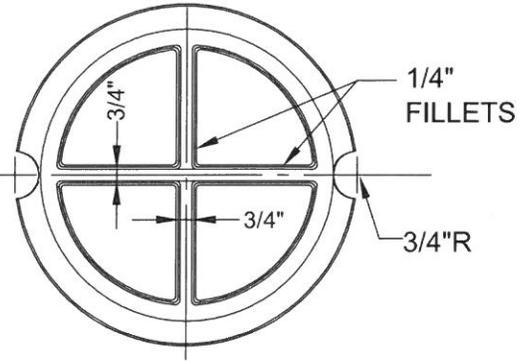
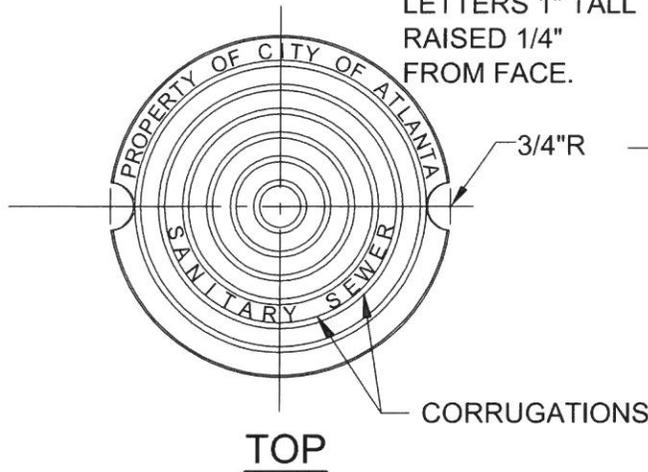
SCALE : N.T.S.

DETAIL NO.

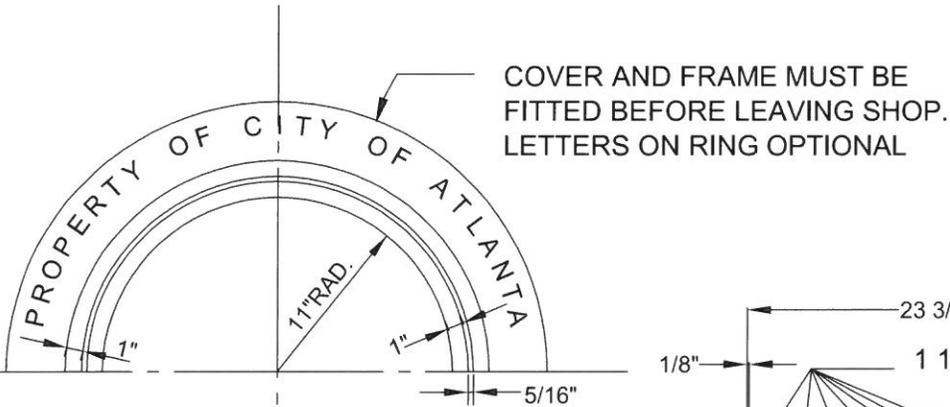
W-63

CORRUGATIONS TO BE 3/8"x 1/4"x 3/16" DEEP.

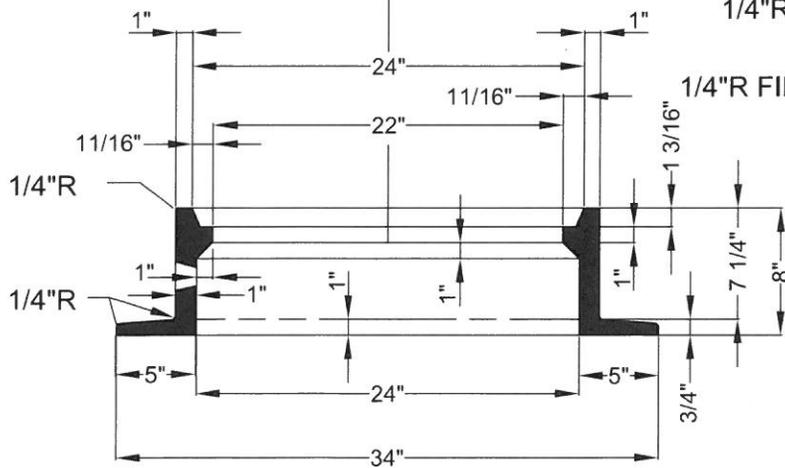
LETTERS 1" TALL RAISED 1/4" FROM FACE.



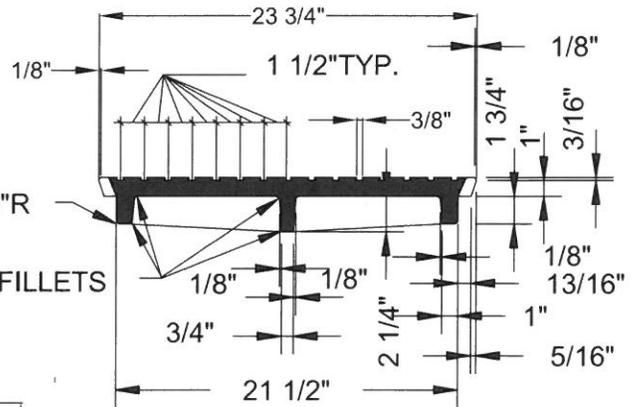
BOTTOM



PLAN



SECTION



SECTION

ESTIMATED WEIGHTS
 FRAME 268 LBS
 COVER 178 LBS.
 TOTAL 446 LBS.

U:\2002 Std Sewer Details\FINISHED\MH-4 GTO01PDG.DWG 12/6/2004 2:30:02 PM EST

City of Atlanta
 Department of Public Works



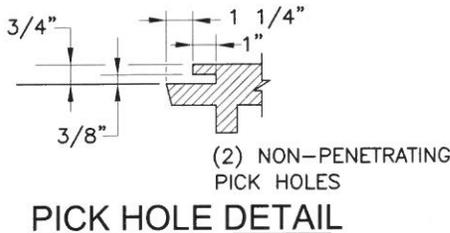
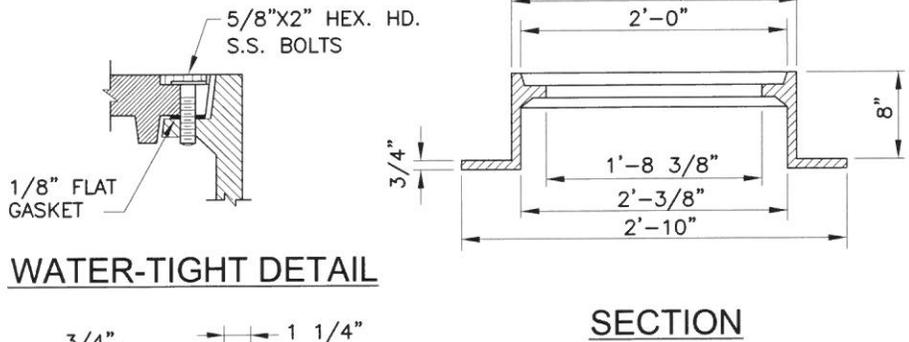
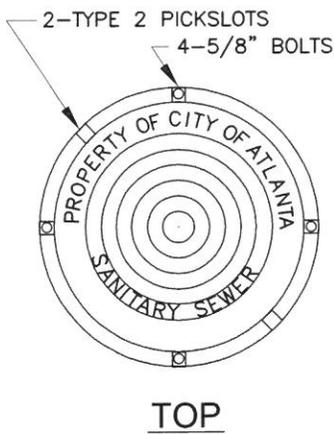
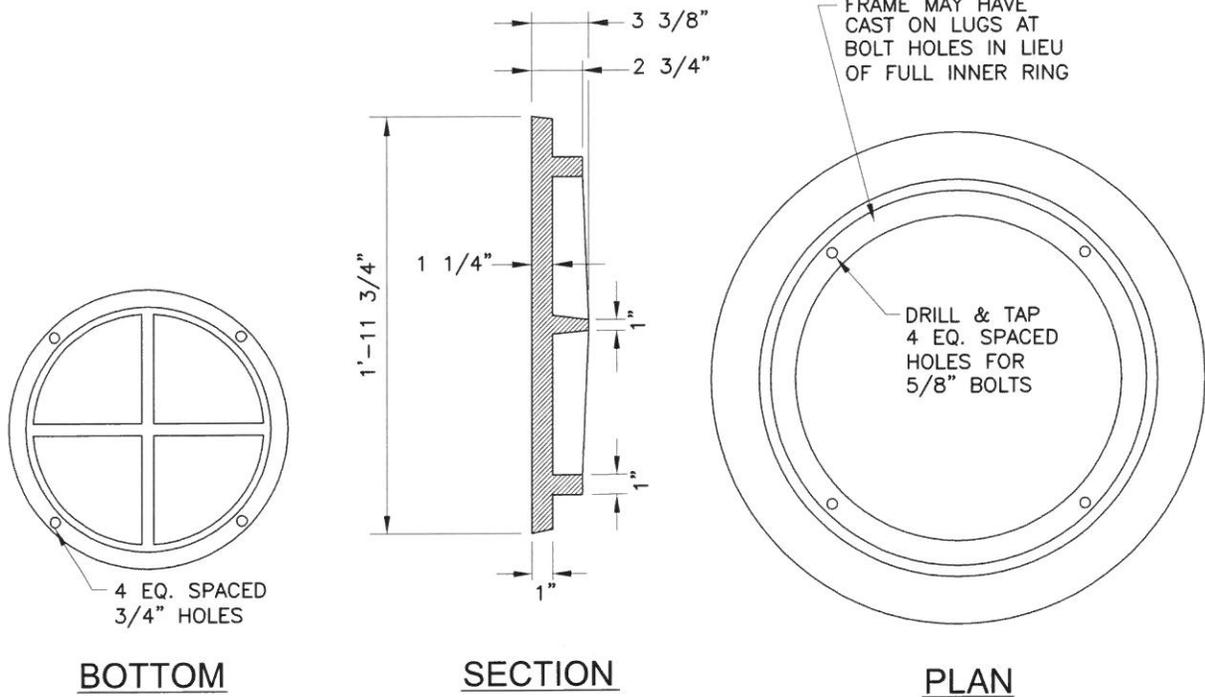
STANDARD DETAILS

**SOLID FRAME
 AND COVER**

DATE : NOV 2004
 SCALE : NONE

DETAIL NO. MH-4

NOTE:
CORRUGATIONS TO BE 3/8"X1/4"X3/16" DEEP.



NOTE: PROVIDE RAISED MATCH MARKS ON FRAME & COVER.
TWO PICK HOLES ON SIDE OF COVER & CORRUGATIONS.
NO PERFORATIONS.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



STANDARD DETAILS

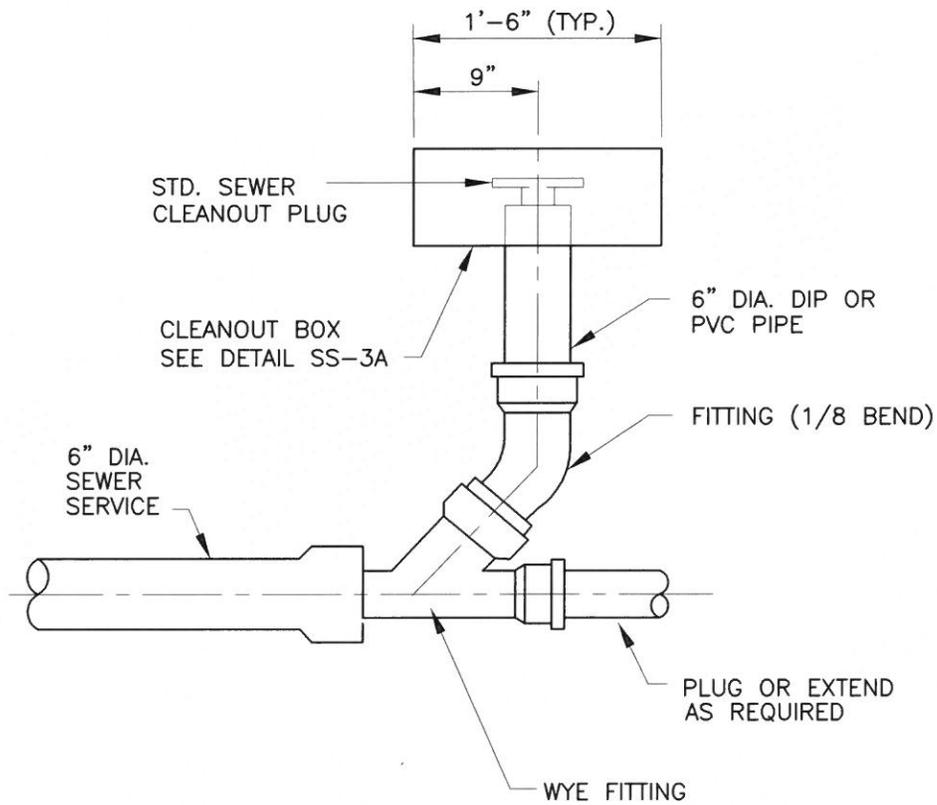
WATERTIGHT FRAME
AND COVER

DATE : FEB 2011
SCALE : N.T.S.

DETAIL NO. MH-5

NOTE:

TOP OF CLEANOUT BOX SHALL BE FLUSH WITH FINAL SURFACE IN SIDEWALKS AND PAVED AREAS.



CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

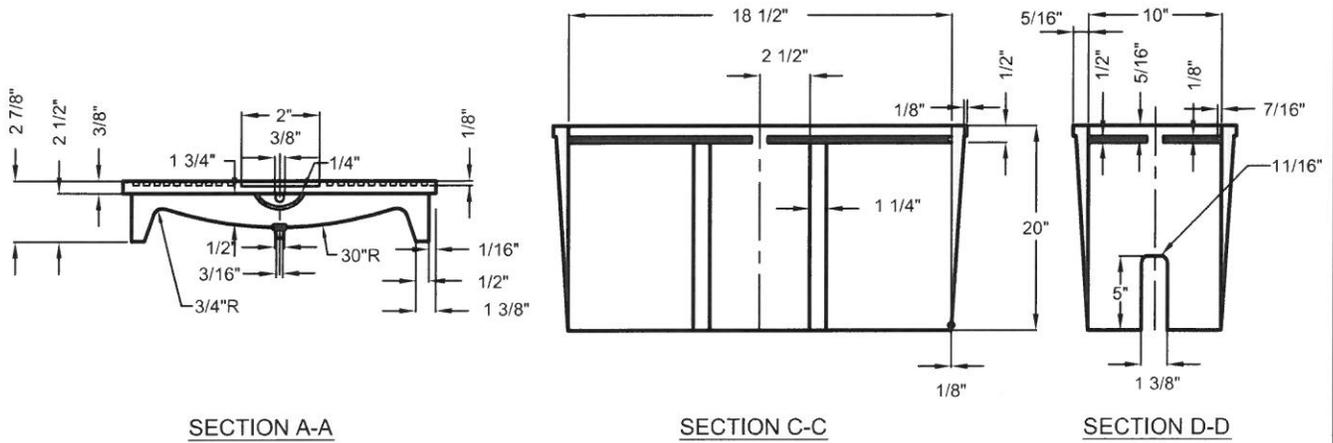
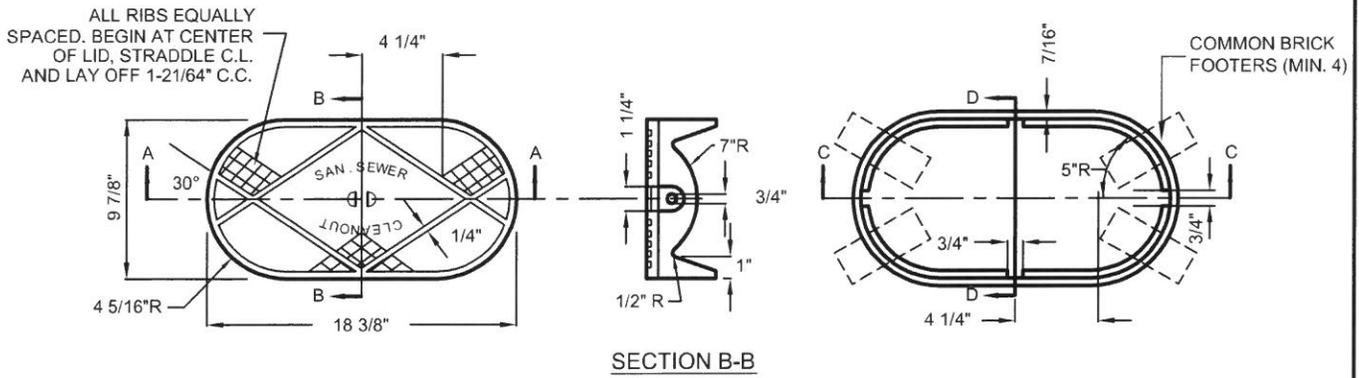


STANDARD DETAILS

SERVICE CONNECTION
CLEANOUT

DATE : FEB 2011
SCALE : N.T.S.

DETAIL NO. SS-3



CLEANOUT BOX LID

CLEANOUT BOX

GENERAL NOTES:

- UNLESS NOTED OTHERWISE, CAST IRON SHALL CONFORM TO A.S.T.M. SPECIFICATIONS A48 LATEST REVISION FOR CLASS 20 GREY IRON CASTINGS.
- CASTINGS SHALL BE TRUE AND FREE OF HOLES. THEY SHALL BE CLEANED ACCORDING TO GOOD FOUNDRY PRACTICE, CHIPPED AND GROUND AS NEEDED TO REMOVE FINIS AND ROUGH PLACES.
- FINISHED CASTINGS SHALL BE COATED INSIDE AND OUTSIDE WITH COAL TAR PITCH VARNISH AS INDICATED IN A.W.W.A. SPECIFICATIONS C110, LATEST REVISION. COATING MAY BE APPLIED COLD AND SHALL BE SMOOTH, GLOSSY, NOT BRITTLE WHEN COLD, NOT STICKY WHEN EXPOSED TO THE SUN, AND SHALL ADHERE TO THE METAL AT ALL TEMPERATURES.
- WHEN COATING IS COMPLETE, LID SHALL FIT SNUGLY WITHOUT ROCKING.

U:\2002 Std Sewer Details\FINISHED\SS-3A.dwg 12/6/2004 2:23:49 PM EST

City of Atlanta
Department of Public Works

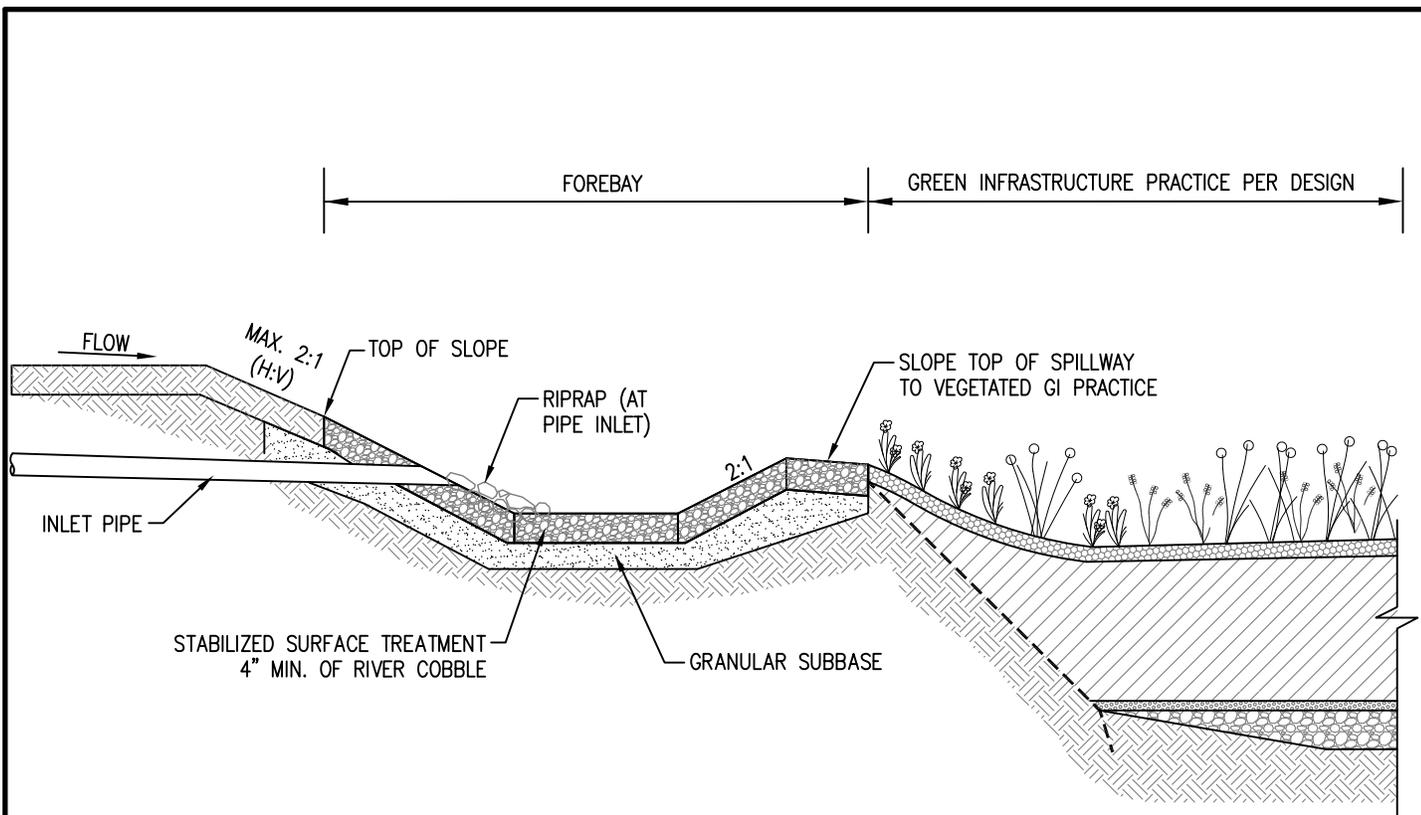


STANDARD DETAILS

SANITARY
CLEANOUT BOX

DATE : NOV 2004
SCALE : NONE

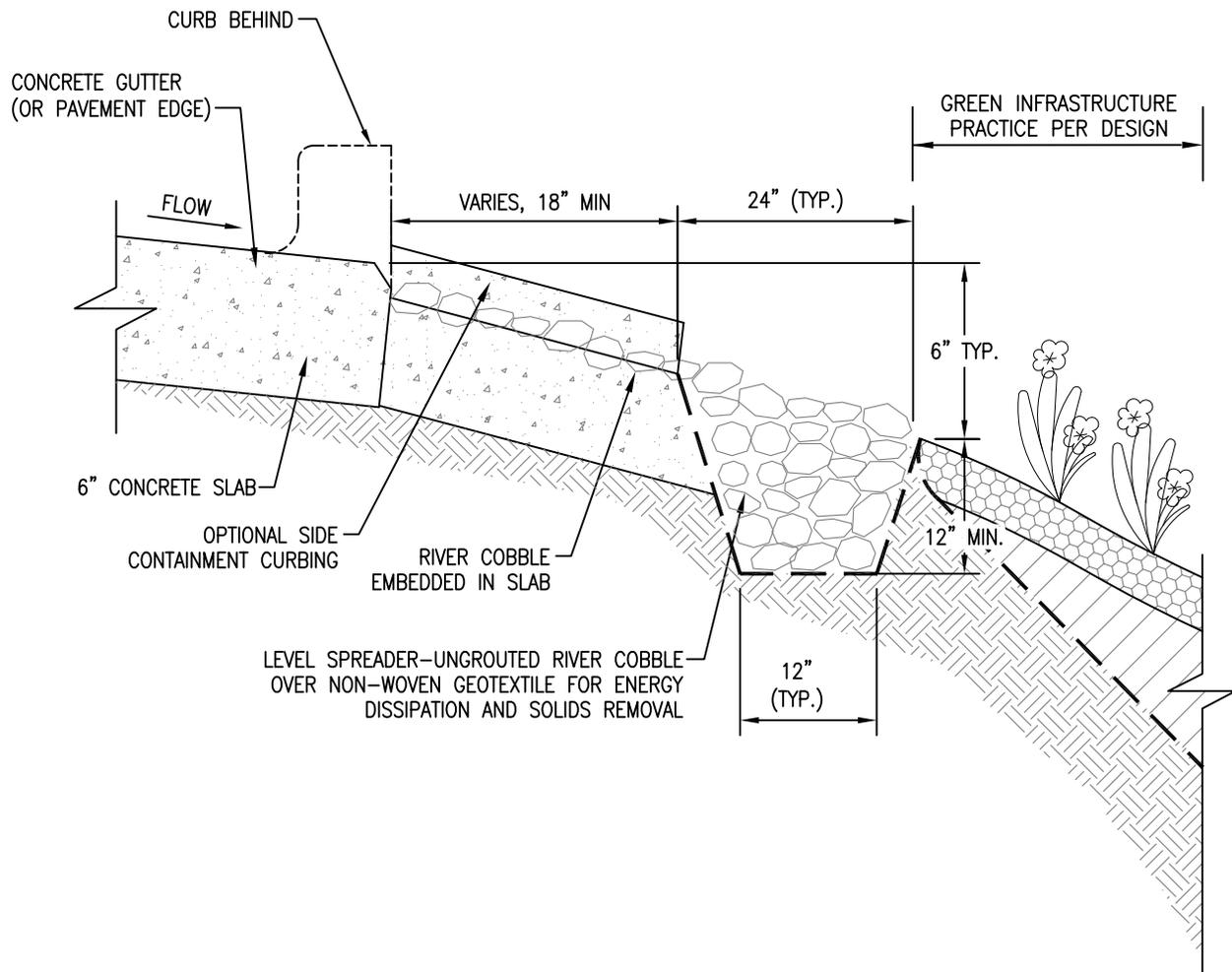
DETAIL NO. SS-3A



SEDIMENT FOREBAY NOTES:

1. THE MAIN GOAL OF PRETREATMENT FILTERING IS TO CAPTURE FLOATABLES, DEBRIS, GREASE, OILS, SILT AND SEDIMENT WHERE THEY CAN BE EASILY CLEANED AT THE SURFACE OF THE GI PRACTICE THROUGH REGULAR MAINTENANCE, AND BEFORE THEY HAVE THE OPPORTUNITY TO CLOG THE PRACTICE.
2. WHEN CONCENTRATED FLOW IS DIRECTED TO A GI PRACTICE THROUGH CURB TURNOUTS OR PIPE OUTLETS, A SEDIMENT FOREBAY SHALL BE USED TO ALLOW MATERIAL TO BE CAPTURED WHERE IT CAN BE EASILY CLEANED.
3. A SEDIMENT FOREBAY SHALL BE DESIGNED SO THAT IS INTEGRATED INTO THE GI PRACTICE AREA.
4. THE FOREBAY SHALL BE SIZED TO CONTAIN 10% OF THE OVERALL VOLUME DIRECTED TO THE GI PRACTICE. DEPTH SHALL BE DETERMINED BY THE DESIGNER.
5. IF HIGH RUNOFF VELOCITY IS A POTENTIAL PROBLEM, SOME TYPE OF ENERGY DISSIPATION DEVICE MUST BE INCORPORATED.
6. DIRECT MAINTENANCE ACCESS TO THE FOREBAY MUST BE PROVIDED.
7. EXIT VELOCITIES FROM THE FOREBAY MUST BE NON-EROSIVE.
8. A FIXED VERTICAL SEDIMENT DEPTH MARKER SHALL BE INSTALLED IN THE FOREBAY TO MEASURE SEDIMENT DEPOSITION OVER TIME.
9. SEDIMENT REMOVAL IN THE FOREBAY SHALL OCCUR WHEN IT IS FILLED TO 50% OF CAPACITY.
10. ALL DISTURBED AREAS MUST BE IMMEDIATELY STABILIZED AFTER CONSTRUCTION TO MINIMIZE EROSION.

<p>CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT</p> 	<h2>TYPICAL DETAILS</h2>	<p>REV. 1 DATE: 2/17/15 ORIG. DATE: 12/19/14 SCALE: N.T.S. DETAIL NO. 10</p>
	<h3>PRETREATMENT: FOREBAY</h3>	



ENERGY DISSIPATION NOTES:

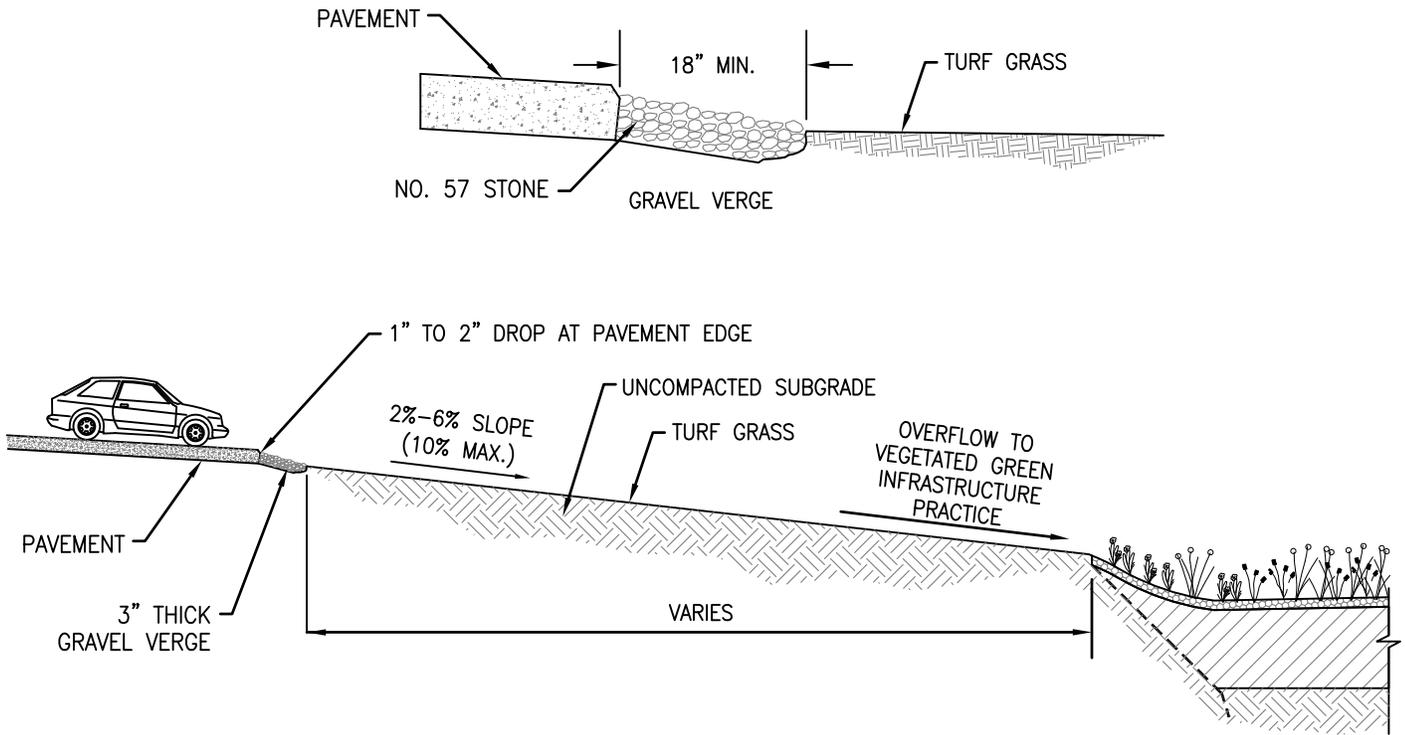
1. CONVEYANCE TO AND FROM GI PRACTICES SHALL ENSURE NON-EROSIVE CONDITIONS. ENERGY DISSIPATION SHALL BE PROVIDED FOR CONCENTRATED DISCHARGES FROM PAVEMENT CURB TURNOUTS, DOWNSPOUTS, SWALES, PIPE OUTLETS, OR OTHER FLOW CONCENTRATING ELEMENT USING A PLUNGE AREA, ROCKS, SPLASH BLOCKS, STONE CHECK DAMS, LEVEL SPREADER, OR OTHER ENERGY DISSIPATION MEASURES.
2. FOR NON-EROSIVE FLOWS, THE RIVER COBBLE CAN BE INSTALLED OVER GEOTEXTILE WITHOUT A CONCRETE SLAB.
3. FOR EROSION OR CONCENTRATED FLOWS, THE CONCRETE SLAB WITH EMBEDDED RIVER COBBLE IS REQUIRED AND THE RIVER COBBLE AT THE DOWNSTREAM END SHOULD BE GROUTED.
4. WIDTH OF RIVER COBBLE FLUME ELEMENTS VARIES; TO BE SPECIFIED BY PROJECT DESIGNER.
5. FOR SLOPED APPLICATIONS, A SERIES OF GI PRACTICES CAN BE TERRACED TO CONVEY WATER NON-EROSIVELY.
6. CONSTRUCT LEVEL SPREADER WITH HORIZONTAL BOTTOM ELEVATIONS, BOTH DIRECTIONS.



TYPICAL DETAILS

**PRETREATMENT:
RIVER COBBLE FLUME**

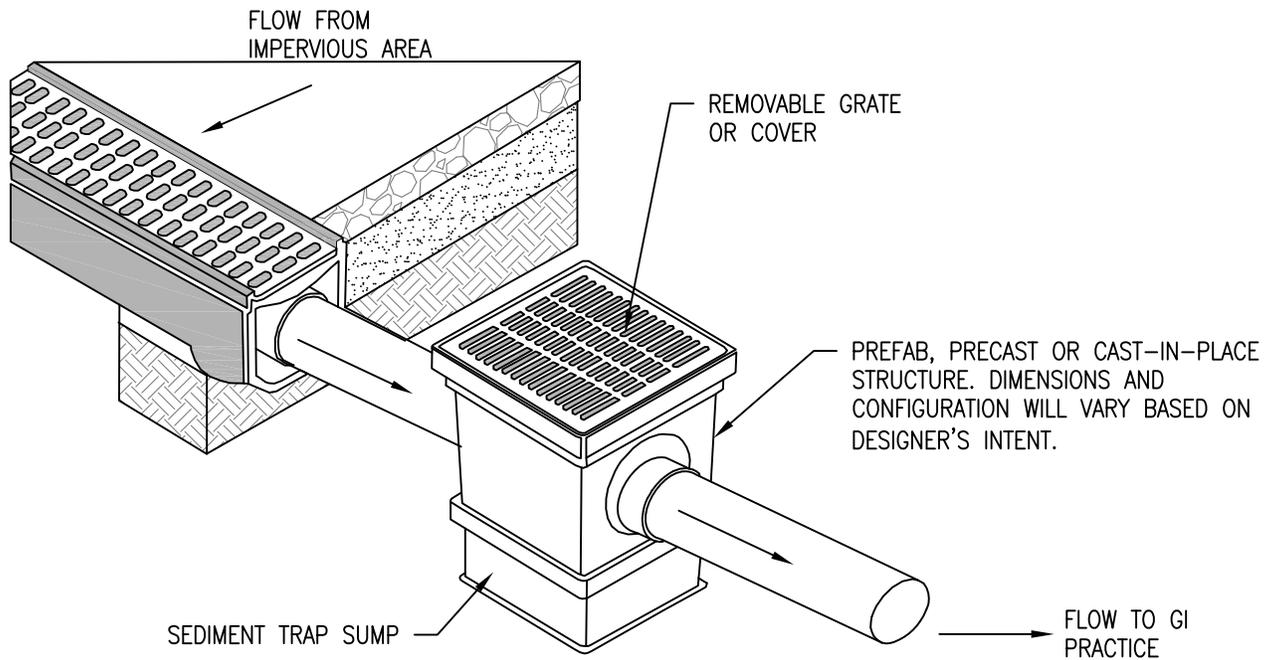
REV. 1
 DATE: 2/17/15
 ORIG. DATE: 12/19/14
 SCALE: N.T.S.
 DETAIL NO. **11**



FILTER STRIP NOTES:

1. THE MAIN GOAL OF PRETREATMENT FILTERING IS TO CAPTURE FLOATABLES, DEBRIS, GREASE, OILS, SILT AND SEDIMENT WHERE THEY CAN BE EASILY CLEANED AT THE SURFACE OF THE GI PRACTICE THROUGH REGULAR MAINTENANCE, AND BEFORE THEY HAVE THE OPPORTUNITY TO CLOG THE PRACTICE.
2. FILTER STRIPS CAN BE USED EFFECTIVELY AS PRETREATMENT MEASURES AND CAN PROVIDE ENERGY DISSIPATION WITH THE ADDITION OF A LEVEL SPREADER, CHECK DAMS OR A GRAVEL VERGE.
3. ENSURE THAT FLOWS IN EXCESS OF THE DESIGN FLOW CAN MOVE ACROSS AND AROUND THE FILTER STRIP WITHOUT DAMAGE.
4. THE SLOPE OF THE FILTER STRIP SHOULD BE BETWEEN 2% AND 6% FOR OPTIMUM PERFORMANCE.
5. THE SLOPE OF FILTER STRIP SHALL NOT EXCEED 10%.
6. THE WIDTH OF THE FILTER STRIP SHALL BE 10 FEET MINIMUM OR EQUAL TO THE WIDTH OF THE RECEIVING GI PRACTICE, WHICHEVER IS GREATER.
7. ALL DISTURBED AREAS SHALL BE IMMEDIATELY STABILIZED AFTER CONSTRUCTION TO MINIMIZE EROSION.
8. WIDTH OF GRASS FILTER STRIP VARIES; TO BE SPECIFIED BY PROJECT DESIGNER.
9. GRAVEL VERGE SHALL CONSIST OF NO. 57 STONE. WIDTH OF VERGE SHALL BE 18" MINIMUM AND DEPTH SHALL BE 3".

<p>CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT</p> 	<p>TYPICAL DETAILS</p>	<p>REV. 1 DATE: 2/17/15 ORIG. DATE: 12/19/14 SCALE: N.T.S. DETAIL NO. 12</p>
	<p>PRETREATMENT: GRASS FILTER STRIP</p>	



SUMP INLET IN-LINE PIPE TREATMENT

DESIGN NOTES:

1. USE PRETREATMENT SEDIMENT TRAP WHEN INFILTRATING FLOWS WITH HIGH SEDIMENT LOADS.
2. DESIGN SUMP RECOMMENDED TO HAVE ONE CUBIC FOOT OF STORAGE FOR EVERY 100 SQUARE FEET OF IMPERVIOUS AREA DRAINING TO SEDIMENT TRAP.
3. SUMP SHALL BE CONSTRUCTED OF PRECAST CONCRETE, THERMOPLASTIC MATERIALS OR COMPOSITE MATERIALS AS SPECIFIED AND SHOWN ON THE PLANS.

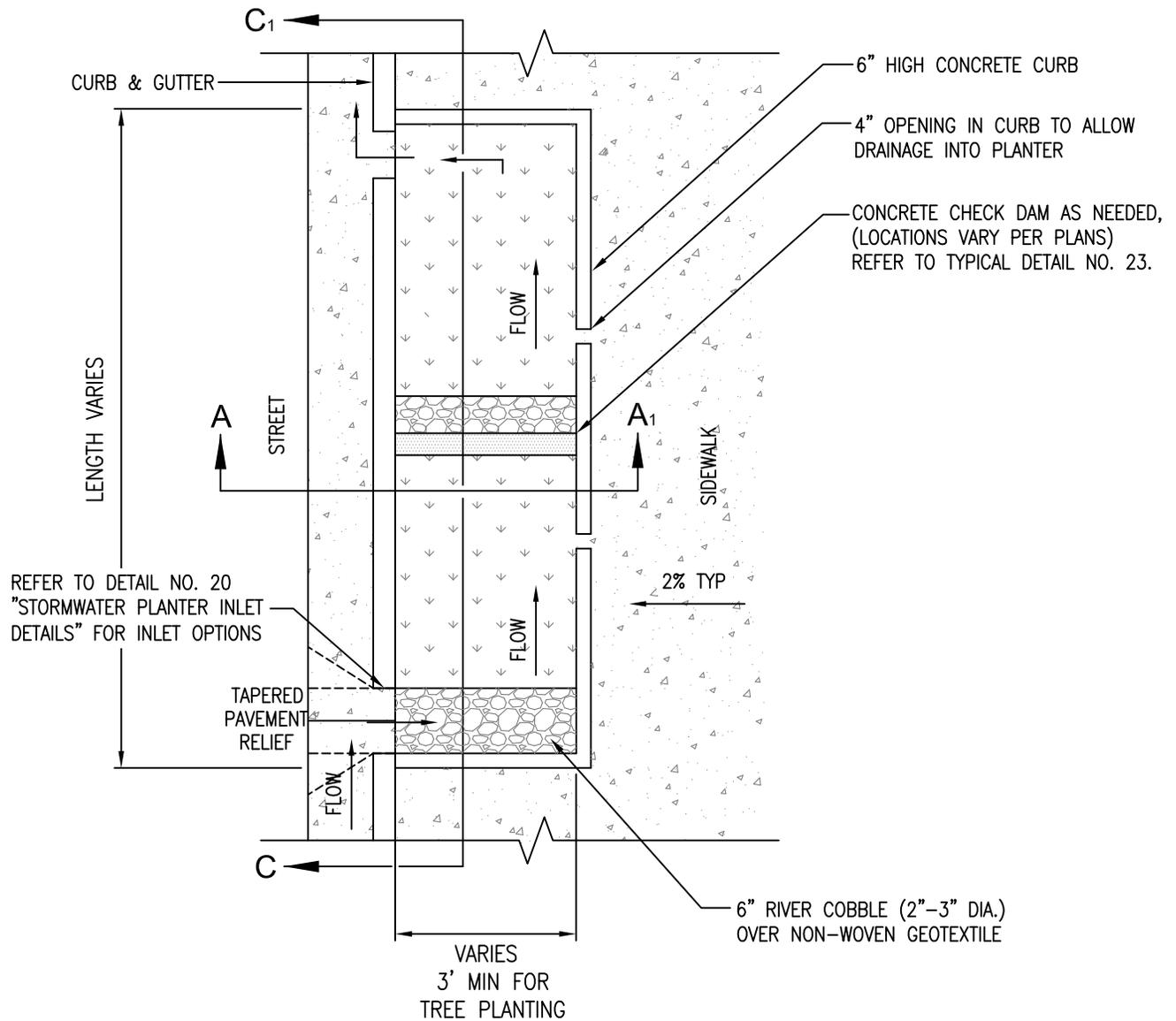
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

PRETREATMENT:
SEDIMENT TRAP SUMP

REV. 1
DATE: 2/17/15
ORIG. DATE: 12/19/14
SCALE: N.T.S.
DETAIL NO. 13



NOTES:

1. REFER TO TYPICAL DETAIL NO. 17 "STORMWATER PLANTER SECTIONS 1 OF 2" AND TYPICAL DETAIL NO. 19 "LONGITUDINAL SECTIONS" FOR SECTIONS A-A₁ AND C-C₁.
2. REFER TO TYPICAL DETAIL NO. 22 "STORMWATER PLANTER NOTES" FOR STORMWATER PLANTER DESIGN AND CONSTRUCTION REQUIREMENTS.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

**STORMWATER PLANTER WITH
NO ON-STREET PARKING**

REV. 1

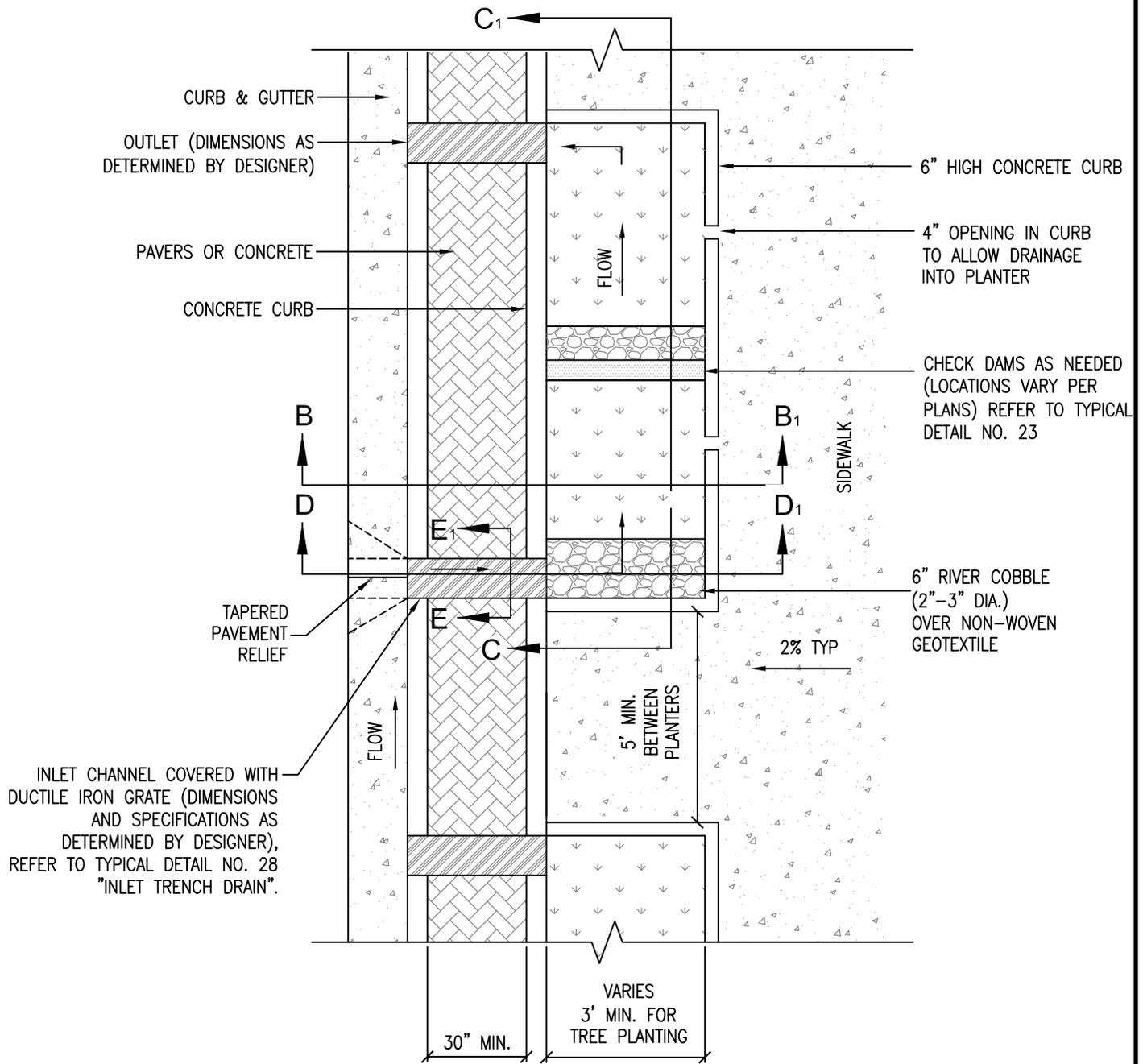
DATE: 2/17/15

ORIG. DATE: 12/19/14

SCALE: N.T.S.

DETAIL NO.

14



NOTES:

1. REFER TO TYPICAL DETAILS NO. 17 AND NO. 18 "STORMWATER PLANTER SECTIONS" AND TYPICAL DETAIL NO. 19 "STORMWATER PLANTER LONGITUDINAL SECTIONS" FOR SECTIONS B-B₁ AND C-C₁.
2. REFER TO TYPICAL DETAIL NO. 28 "INLET TRENCH DRAIN" FOR SECTIONS D-D₁ AND E-E₁.
3. REFER TO TYPICAL DETAIL NO. 22 "STORMWATER PLANTER NOTES" FOR STORMWATER PLANTER DESIGN AND CONSTRUCTION REQUIREMENTS.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

**STORMWATER PLANTER
WITH ON-STREET PARKING**

REV. 1

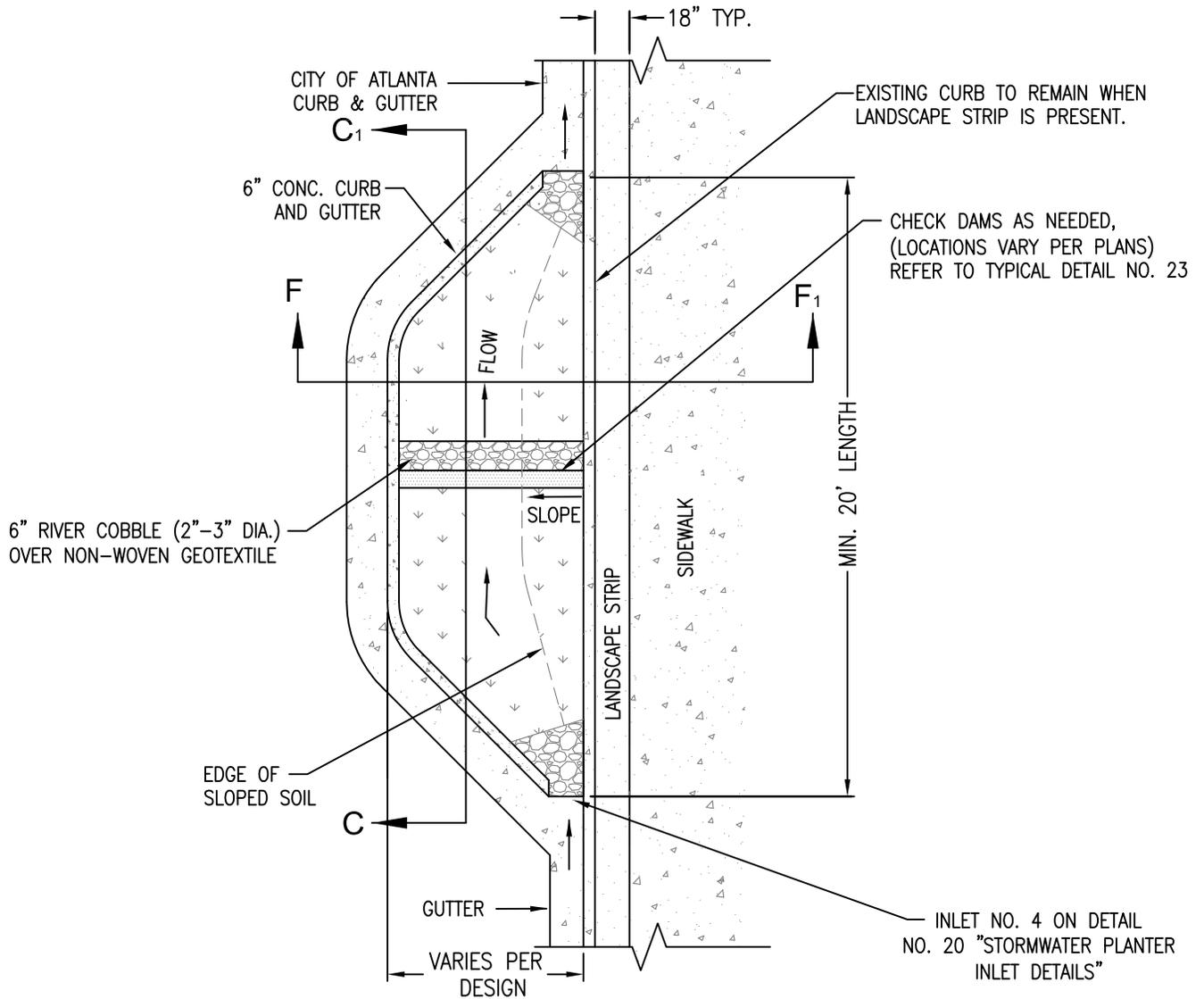
DATE: 2/17/15

ORIG. DATE: 12/19/14

SCALE: N.T.S.

DETAIL NO.

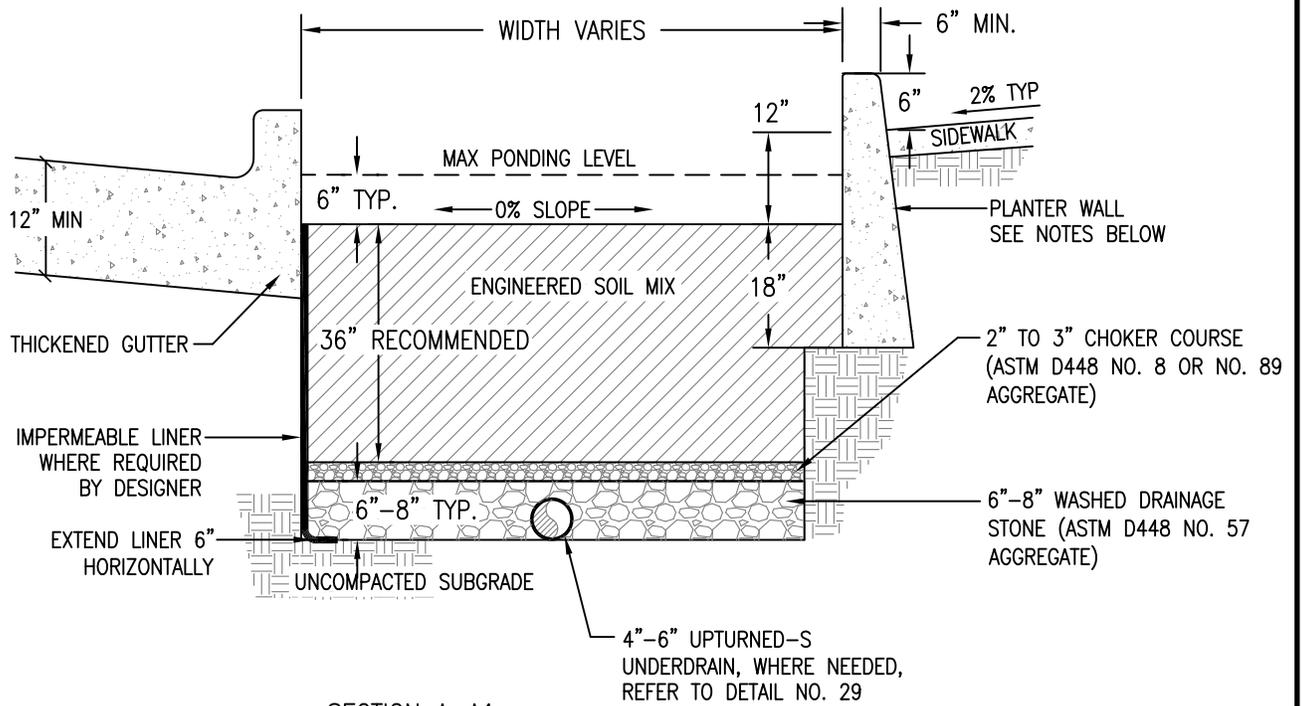
15



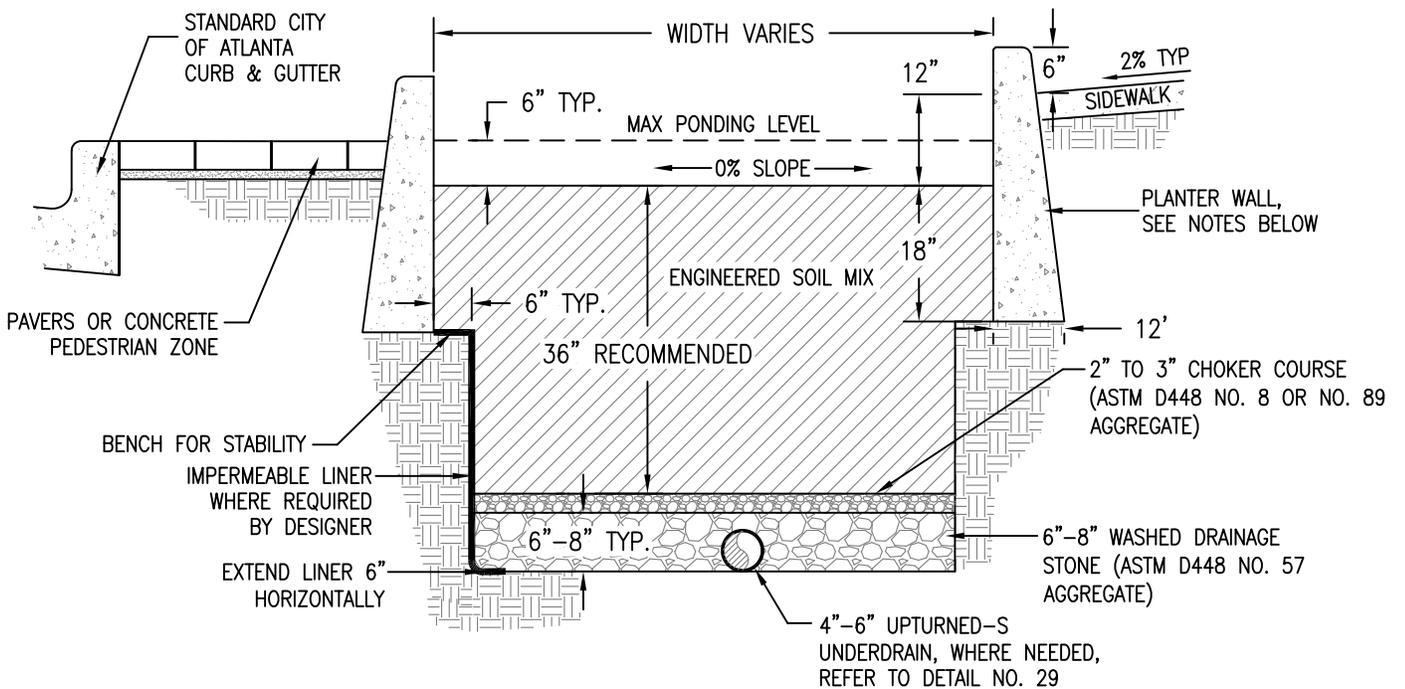
NOTES:

1. REFER TO TYPICAL DETAIL NO. 18 "STORMWATER PLANTER SECTIONS 2 OF 2" AND TYPICAL DETAIL NO. 19 "STORMWATER PLANTER LONGITUDINAL SECTIONS" FOR SECTIONS F-F₁ AND C-C₁.
2. REFER TO TYPICAL DETAIL NO. 22 "STORMWATER PLANTER NOTES" FOR STORMWATER PLANTER DESIGN AND CONSTRUCTION REQUIREMENTS.

<p>CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT</p> 	<p>TYPICAL DETAILS</p>	<p>REV. 1 DATE: 2/17/15</p>
	<p>STORMWATER PLANTER 'BULB-OUTS' / CURB EXTENSIONS</p>	<p>ORIG. DATE: 12/19/14 SCALE: N.T.S. DETAIL NO. 16</p>



SECTION A-A1
(PLANTER WITHOUT ON-STREET PARKING)



SECTION B-B1
(PLANTER WITH ON-STREET PARKING)

NOTES:

1. PLANTER WALL SHALL BE 3' MINIMUM HEIGHT FOR PLANTERS AGAINST SIDEWALKS.
2. SPECIAL DESIGN CONSIDERATIONS OR STRUCTURAL REVIEW MAY BE REQUIRED FOR LONGER PLANTER WALL SPANS. STEEL REINFORCEMENT OR ADDITIONAL CONCRETE CHECK DAMS MAY BE NEEDED FOR STABILITY. REFER TO DETAIL NO. 23 "CONCRETE CHECK DAM".
3. MAINTAIN 1:6 BATTER FOR CURB AND 4" MINIMUM TO TOP OF CURB. WIDTH OF BOTTOM OF CURB WILL VARY WITH HEIGHT.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

STORMWATER PLANTER
SECTIONS 1 OF 2

REV. 1

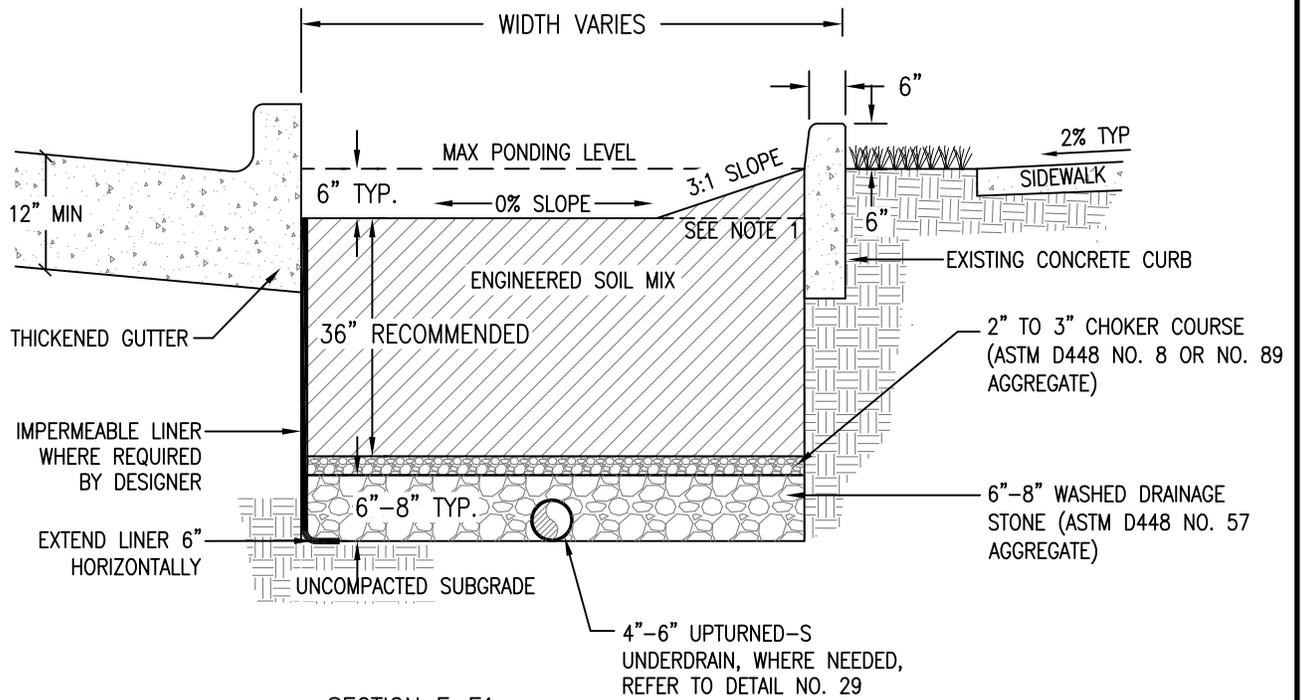
DATE: 2/17/15

ORIG. DATE: 12/19/14

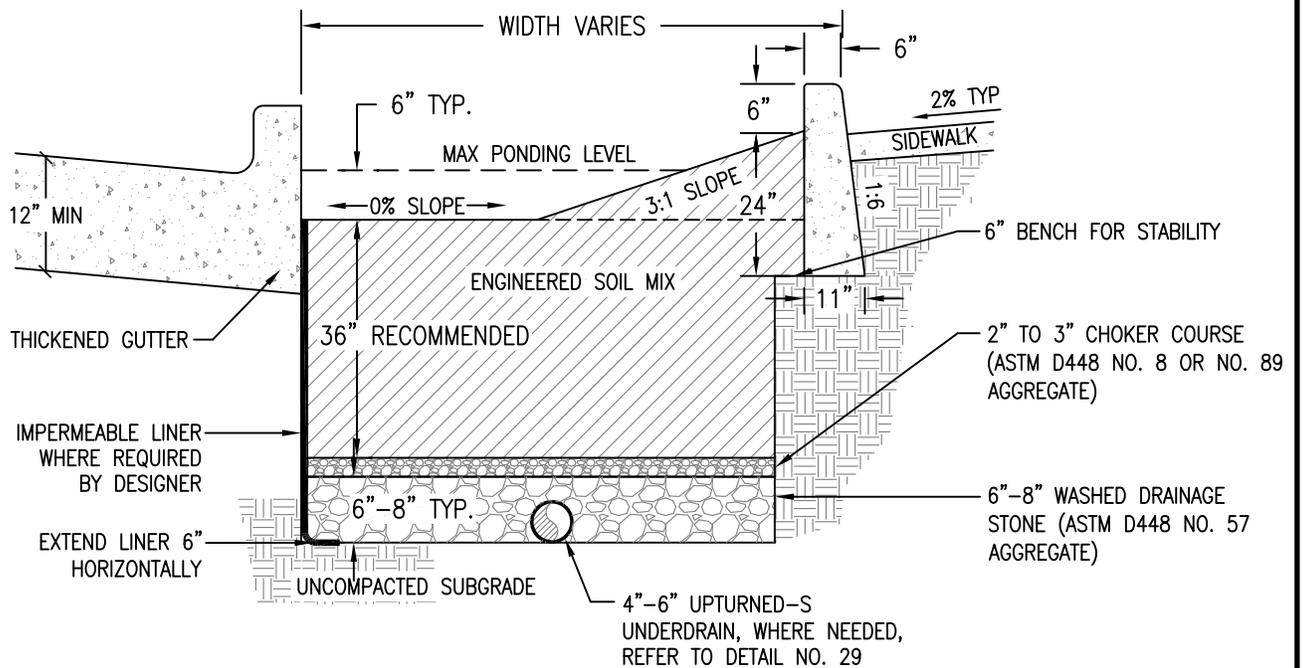
SCALE: N.T.S.

DETAIL NO.

17



SECTION F-F1
(BULB-OUT PLANTER WITH OPTIONAL LANDSCAPE STRIP)



SECTION F-F1
(BULB-OUT PLANTER WITHOUT OPTIONAL LANDSCAPE STRIP)

NOTE:

1. PROJECT DESIGNER TO SPECIFY WHETHER SOIL IS LEVEL OR SLOPED.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

STORMWATER PLANTER SECTIONS 2 OF 2

REV. 1

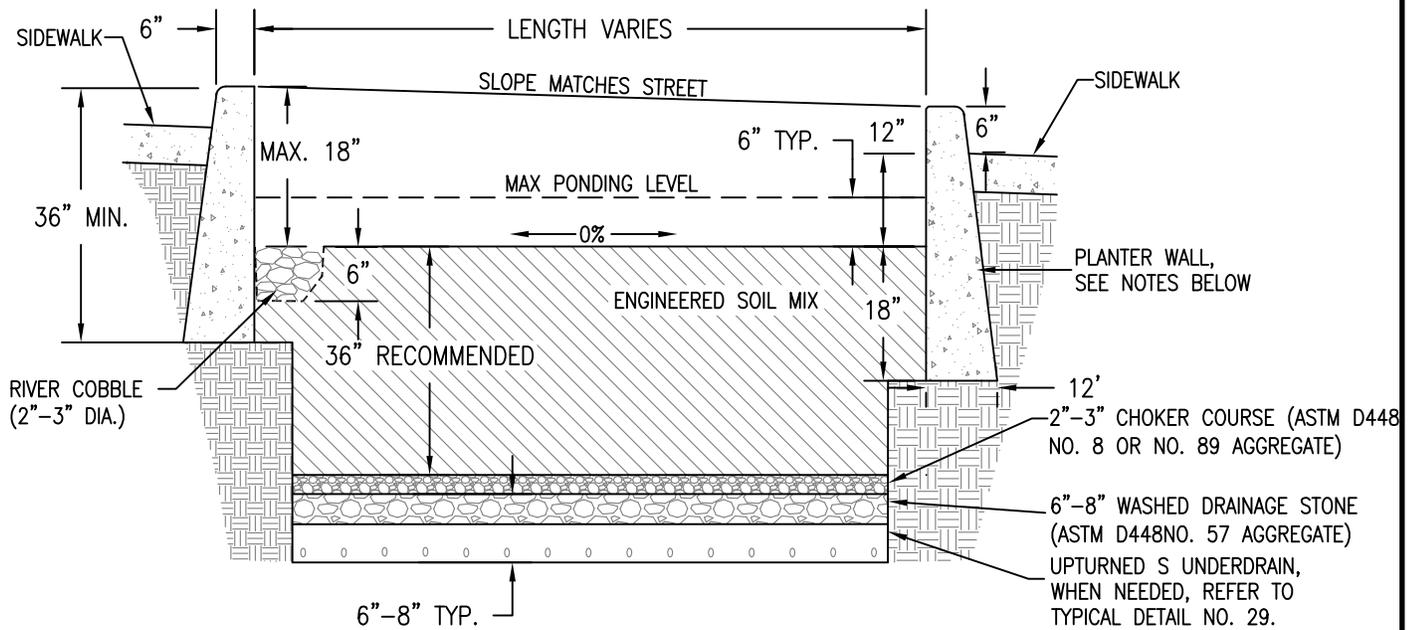
DATE: 2/17/15

ORIG. DATE: 12/19/14

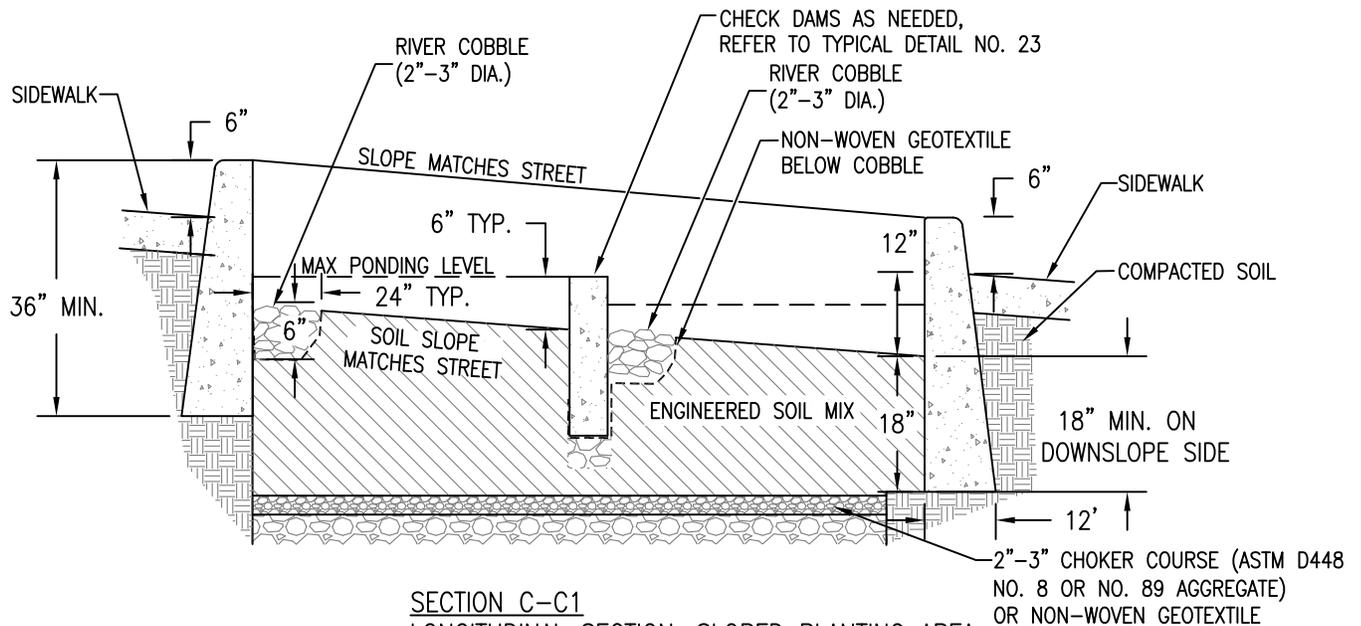
SCALE: N.T.S.

DETAIL NO.

18



SECTION C-C1
LONGITUDINAL SECTION, LEVEL PLANTING AREA



SECTION C-C1
LONGITUDINAL SECTION, SLOPED PLANTING AREA

NOTES:

1. IF SLOPES OF STREET AND SIDEWALK ALLOW, PLANTERS SHALL BE BUILT WITH LEVEL PLANTING AREAS.
2. PLANTER WALL SHALL BE 3' MINIMUM FOR PLANTERS AGAINST SIDEWALKS.
3. SPECIAL DESIGN CONSIDERATIONS OR STRUCTURAL REVIEW MAY BE REQUIRED FOR LONGER PLANTER WALL SPANS. STEEL REINFORCEMENT OR ADDITIONAL CONCRETE CHECK DAMS MAY BE NEEDED FOR STABILITY. REFER TO TYPICAL DETAIL NO. 23 "CONCRETE CHECK DAM".
4. MAINTAIN 1:6 BATTER FOR CURB AND 4" MINIMUM TO TOP OF CURB. WIDTH OF BOTTOM OF CURB WILL VARY WITH HEIGHT.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

STORMWATER PLANTER
LONGITUDINAL SECTIONS

REV. 1

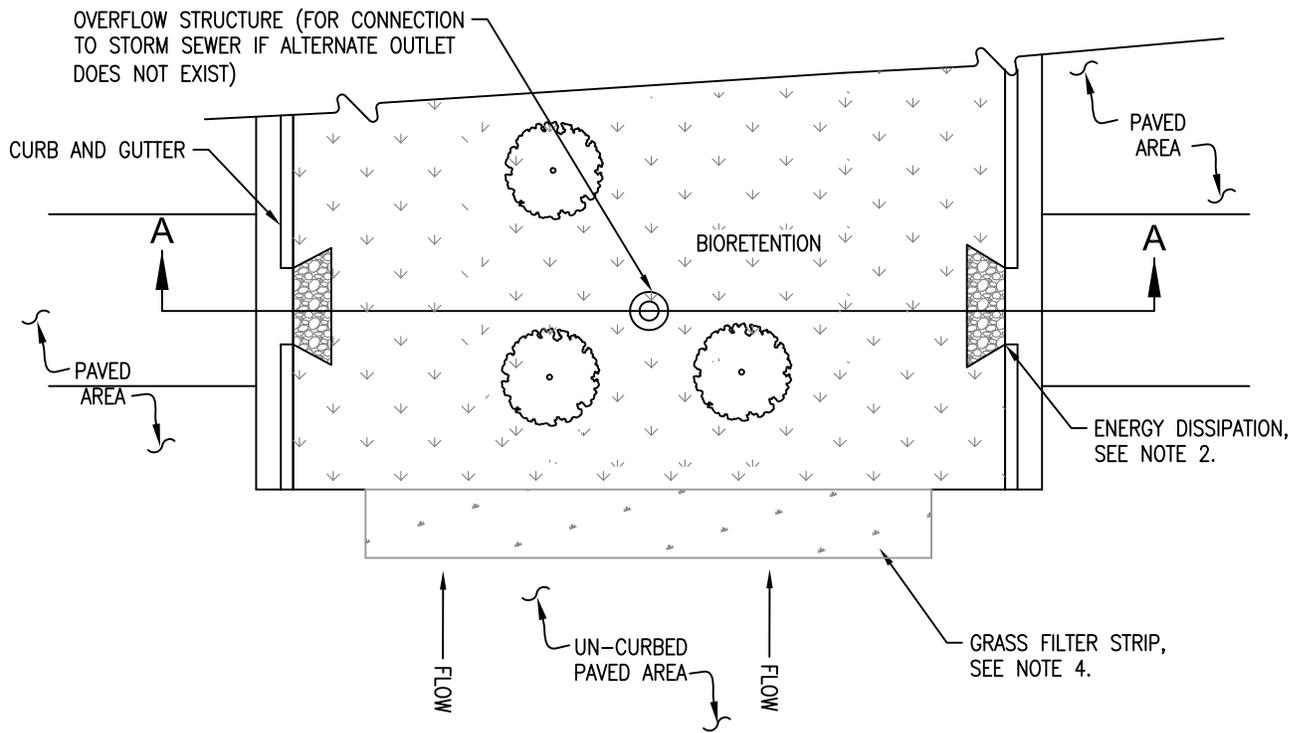
DATE: 2/17/15

ORIG. DATE: 12/19/14

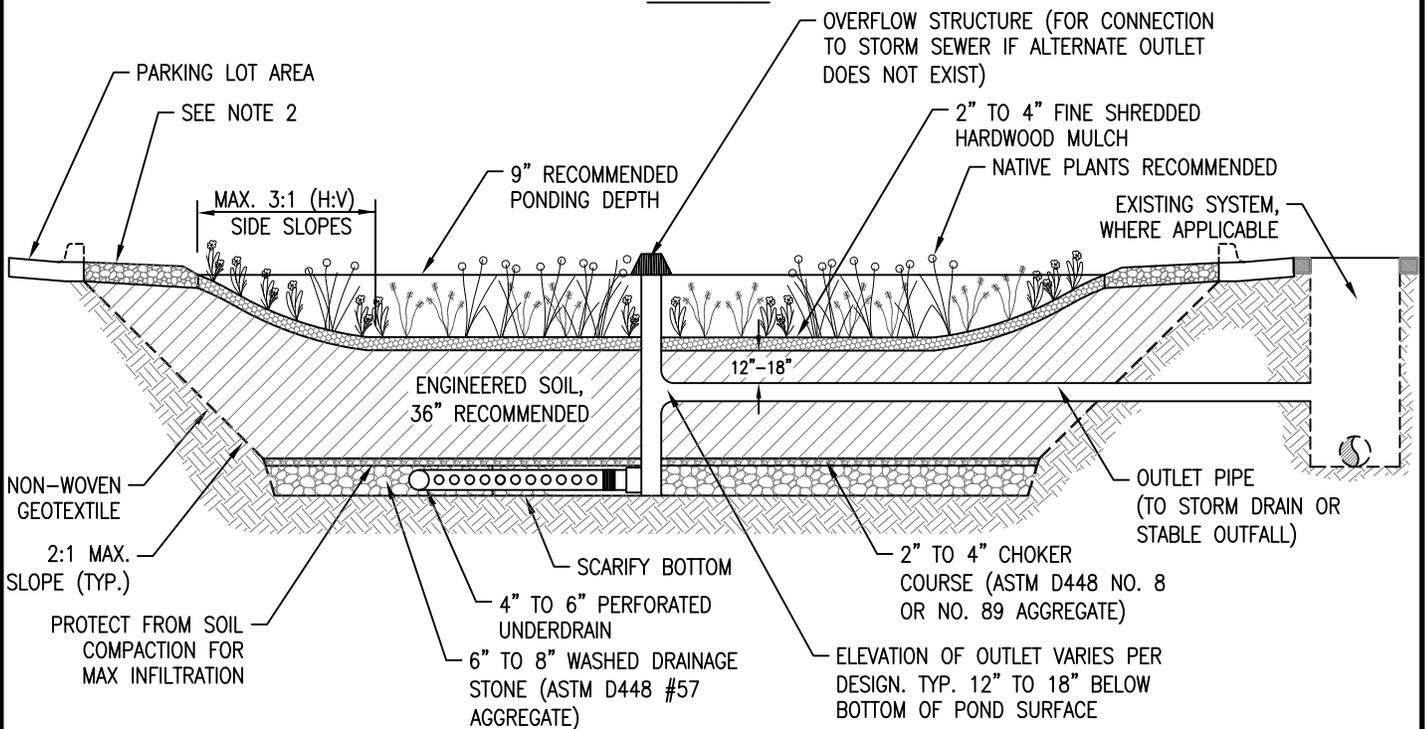
SCALE: N.T.S.

DETAIL NO.

19



PLAN VIEW



SECTION A-A

NOTES:

1. REFER TO TYPICAL DETAIL NO. 2 "BIORETENTION NOTES" FOR BIORETENTION CONSTRUCTION REQUIREMENTS.
2. REFER TO TYPICAL DETAIL NO. 11 "PRETREATMENT: RIVER COBBLE FLUME" FOR ENERGY DISSIPATION AT CURB INLET.
3. DETAILS OF PIPE CONNECTIONS TO PROPOSED/EXISTING STORM SYSTEM SHALL BE AS DESIGNED BY THE PROJECT DESIGNER.
4. WHEN THERE IS NOT A CURB PRESENT, INCLUDE GRASS FILTER STRIP PRIOR TO BIORETENTION AREA FOR SHEET FLOW, SEE TYPICAL DETAIL NO. 12 "PRETREATMENT: GRASS FILTER STRIP."

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

BIORETENTION

REV. 1

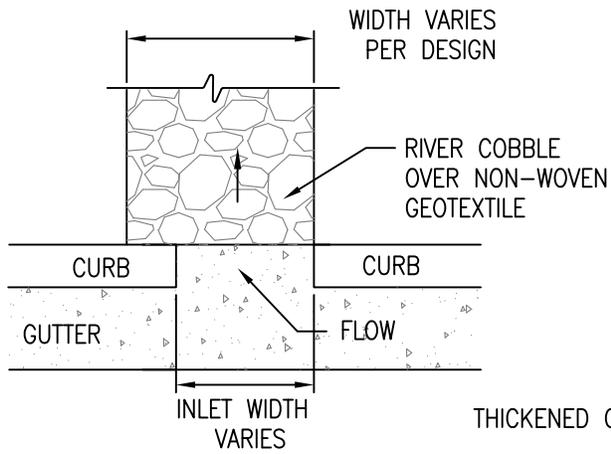
DATE: 2/17/15

ORIG. DATE: 12/19/14

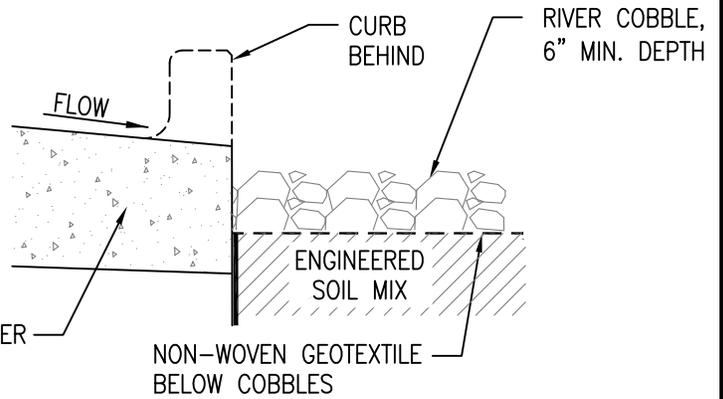
SCALE: N.T.S.

DETAIL NO.

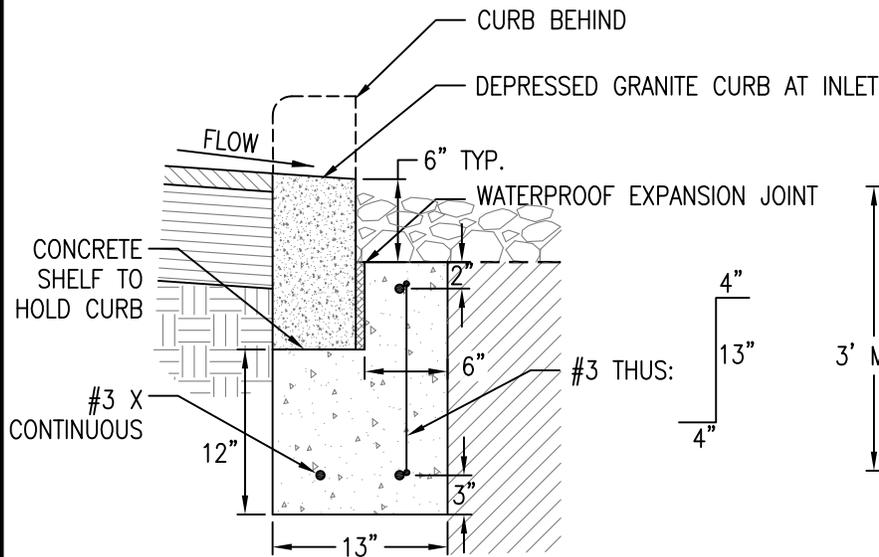
1



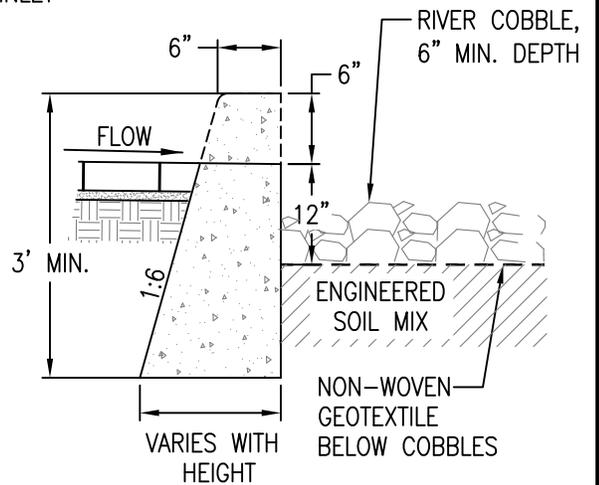
PLANTER INLET 1- CURB & GUTTER



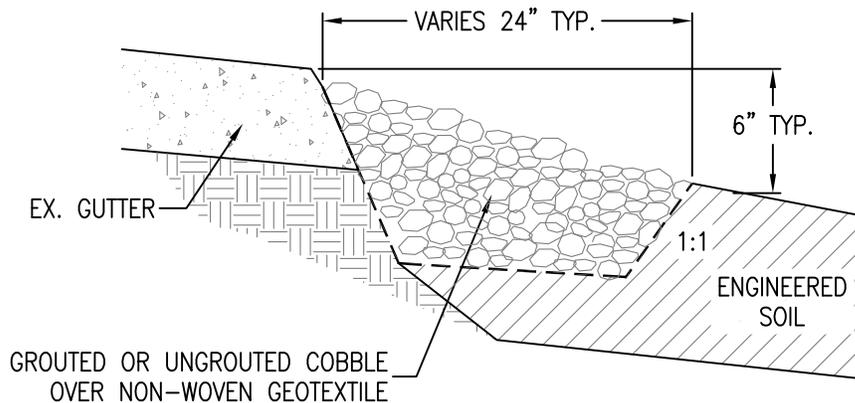
PLANTER INLET 1- SECTION



PLANTER INLET 2- AT GRANITE CURB



PLANTER INLET 3- AT PLANTER WALL



PLANTER INLET 4-'BULB OUTS'/CURB EXTENSIONS

NOTES:

1. SIZE INLETS TO ACCOMMODATE DESIRED FLOWS.
2. INLETS & GUTTER MAY BE MODIFIED TO ADJUST FLOW INTO PLANTER.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

STORMWATER PLANTER
INLET DETAILS

REV. 1

DATE: 2/17/15

ORIG. DATE: 12/19/14

SCALE: N.T.S.

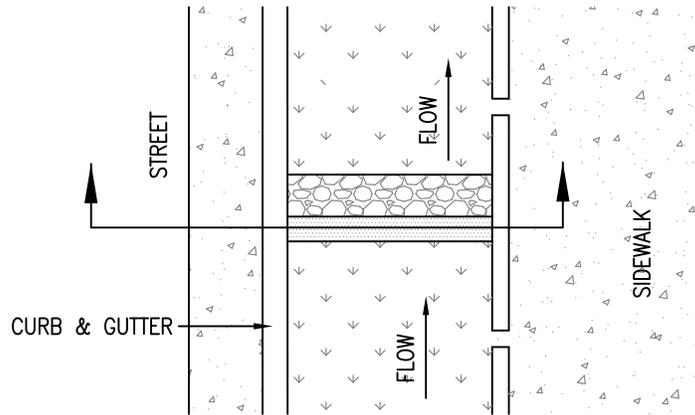
DETAIL NO.

20

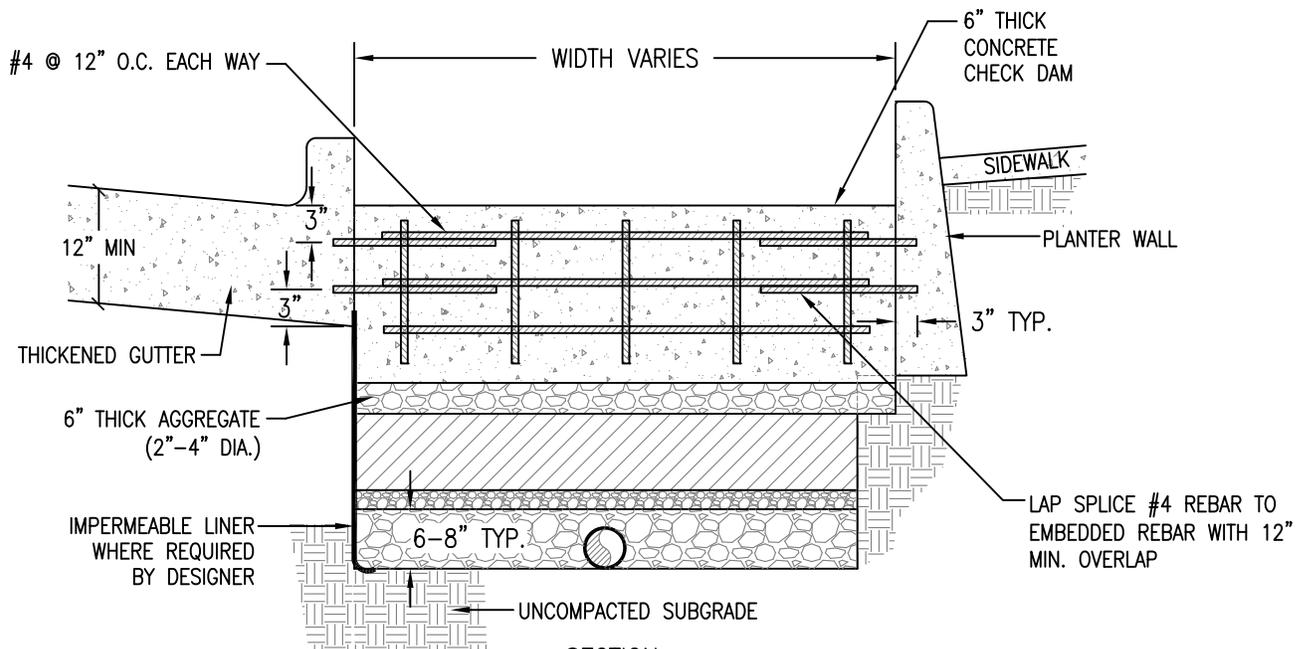
NOTES FOR STORMWATER PLANTERS:

1. WIDTH AND LENGTH OF EACH PLANTER SHALL BE BASED ON SITE CONDITIONS AND STORMWATER TREATMENT VOLUME.
2. LOCATE ALL UTILITIES PRIOR TO DESIGN. SITE CONDITIONS WILL VARY AND SIGNIFICANT DESIGN ADAPTATIONS MAY BE NEEDED TO ADDRESS UTILITY CONFLICTS, STEEP SLOPES, AND OTHER CONSTRAINTS.
3. IF SLOPE OF ROAD AND SIDEWALK ALLOW, PLANTERS SHOULD BE BUILT WITH LEVEL PLANTING AREAS (0% SLOPE LONGITUDINALLY) FOR MAXIMUM STORMWATER TREATMENT VOLUME.
4. LONGITUDINAL SLOPES OF CURBS SURROUNDING PLANTER SHALL MATCH ROADWAY. TOP SURFACE OF PLANTERS SHALL BE A MAXIMUM DEPTH OF 18" BELOW SURROUNDING CURB AT DEEPEST POINT.
5. CROSS SLOPES SHOULD ALWAYS BE AS CLOSE TO LEVEL (0% SLOPE) AS POSSIBLE.
6. CURBS, GUTTERS, STREETS, AND SIDEWALKS SHALL CONFORM TO CITY OF ATLANTA STANDARDS.
7. PROVIDE ELEVATIONS AT ALL INLETS AND OUTLETS, AS WELL AS ALL GRADES ON STREET AND BOTTOM OF PLANTER.
8. SIDEWALK ELEVATION MUST BE HIGHER THAN MAXIMUM FLOW OR POOL ELEVATION.
9. PLANTERS MUST BE ABLE TO WITHSTAND STORMWATER FLOWS WITHOUT EROSION OR OTHER DAMAGE. INLETS SHOULD BE SIZED AND CHECK DAMS USED TO ENSURE APPROPRIATE VELOCITIES.
10. ALL PLANTERS SHALL BE FULLY VEGETATED. SUGGESTED SPECIES CAN BE FOUND IN THE GEORGIA STORMWATER MANAGEMENT MANUAL, VOL. 2, APPENDIX F.
11. ALL VEGETATED AREAS MUST BE MULCHED WITH EITHER 2" TO 4" OF NON-FLOATABLE ORGANIC MULCH (SUCH AS SHREDDED HARDWOOD OR LEAF MULCH) OR STONE. STONE MULCH MAY BE NEEDED IN AREAS OF STRONG FLOWS TO PREVENT EROSION. ALL PONDING ELEVATIONS SHOWN IN DETAILS ARE ASSUMED TO BE MEASURED FROM TOP OF MULCH LAYER.
12. ENGINEERED SOIL MIX SHALL CONFORM TO PERFORMANCE STANDARDS DETAILED IN SPECIFICATIONS.
13. ENGINEERED SOIL MIX SHALL BE A MIN. OF 18" DEEP AT SHALLOWEST POINT. 36" DEPTH IS REQUIRED FOR PLANTING TREES.
14. UNDERDRAINS MAY BE REQUIRED UNLESS INFILTRATION TESTS IN SOILS AT BOTTOM OF PLANTER SHOW SATURATED INFILTRATION RATES OF GREATER THAN 1/2" PER HOUR (1 FOOT/DAY).

<p>CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT</p> 	<p>TYPICAL DETAILS</p>	<p>REV. 1 DATE: 2/17/15 ORIG. DATE: 12/19/14 SCALE: N.T.S.</p>
	<p>STORMWATER PLANTER NOTES</p>	



PLAN



SECTION

NOTES:

1. CONCRETE CHECK DAMS CAN BE USED IN LOCATIONS OTHER THAN STORMWATER PLANTERS WITH SUFFICIENT ANCHORING DEFINED BY THE DESIGNER.
2. REFER TO TYPICAL DETAIL NO. 17 "STORMWATER PLANTER SECTIONS 1 OF 2" AND TYPICAL DETAIL NO. 18 "STORMWATER PLANTER SECTIONS 2 OF 2" FOR DESIGN OF PLANTER SECTION.
3. MASONRY MAY BE USED IN PLACE OF CONCRETE FOR CHECK DAM CONSTRUCTION.
4. ENSURE THAT CHECK DAM ELEVATIONS DO NOT CAUSE STORMWATER TO OVERFLOW INTO SIDEWALK.
5. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 4,000 PSI AND AIR ENTRAINMENT OF 7%.
6. EMBED REBAR 3" INTO CURB AND PLANTER WALL.
7. SPECIFY REBAR OVERLAP LENGTH FOR CHECK DAMS THAT SPAN LONGER THAN 12'. INSTALL REBAR PER ACI 318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE, LATEST EDITION.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

CONCRETE CHECK DAM
(SHOWN IN STORMWATER PLANTER)

REV. 1

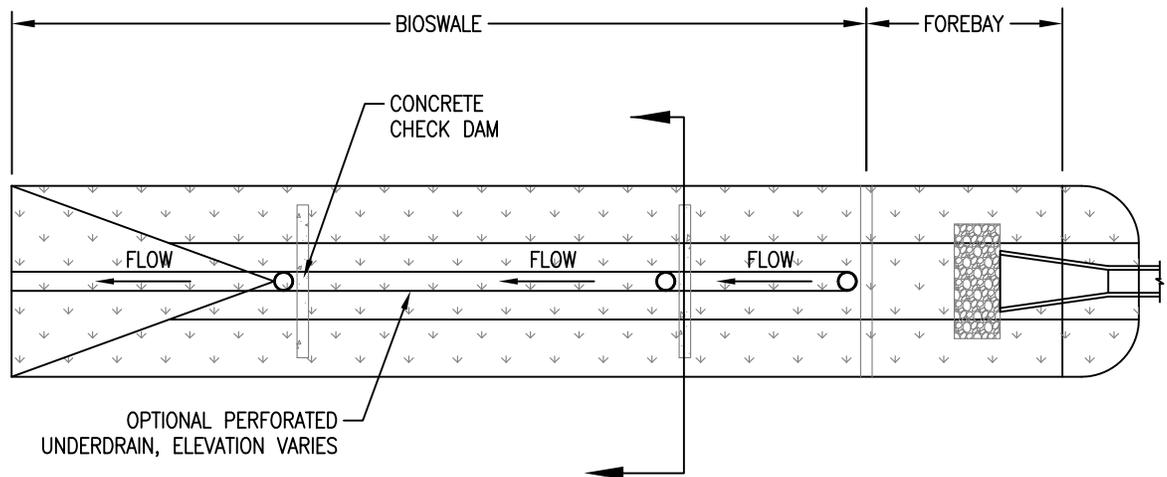
DATE: 2/17/15

ORIG. DATE: 12/19/14

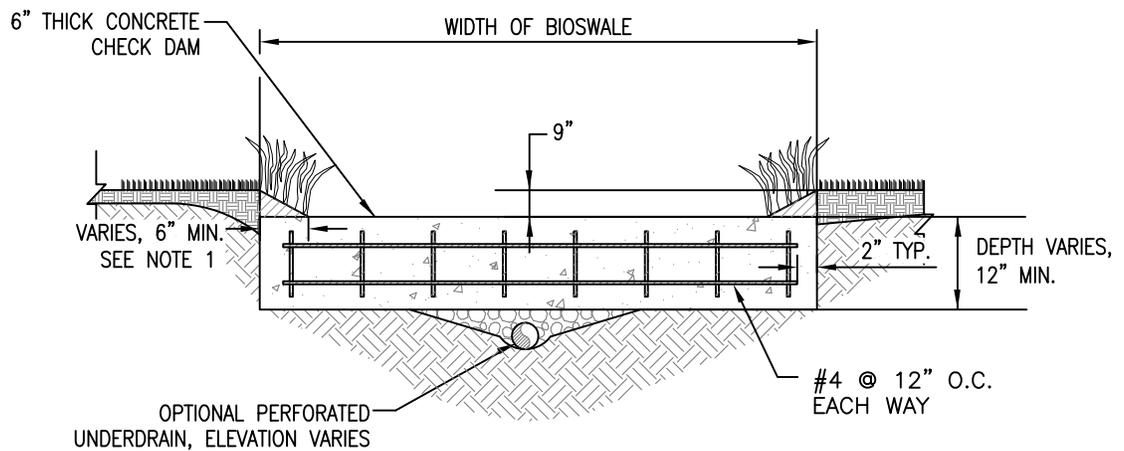
SCALE: N.T.S.

DETAIL NO.

23



PLAN



SECTION

NOTES:

1. CHECK DAM EMBEDMENT WIDTH TO BE DETERMINED BY THE DESIGNER BASED ON SOIL AND FLOW CONDITIONS.
2. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 4,000 PSI AND AIR ENTRAINMENT OF 7%.
3. INSTALL REBAR PER ACI 318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE, LATEST EDITION.
4. REFER TO TYPICAL DETAIL NO. 3 "BIOSWALE".

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

CONCRETE CHECK DAM
(SHOWN IN BIOSWALE)

REV. 1

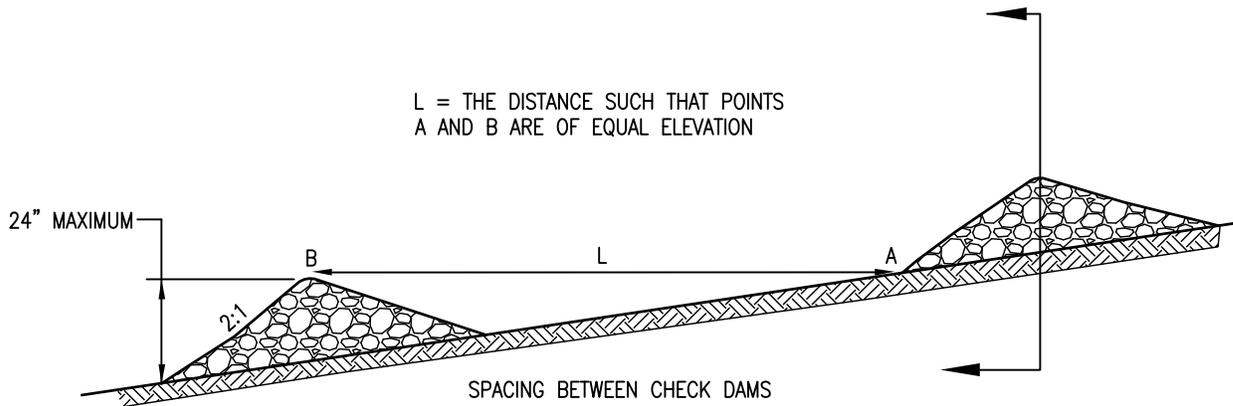
DATE: 2/17/15

ORIG. DATE: 12/19/14

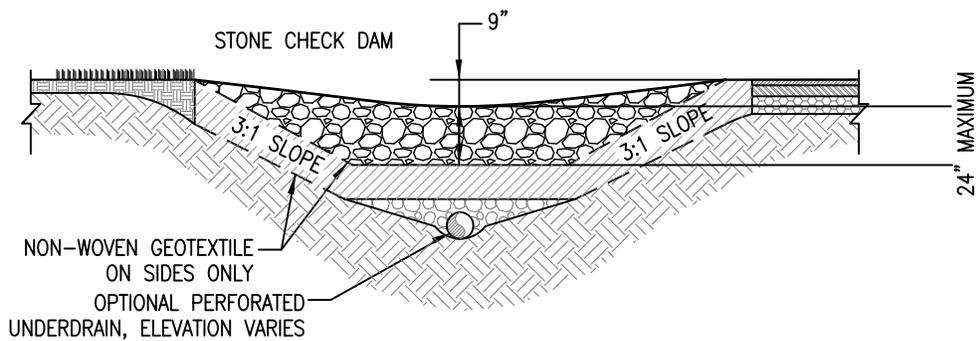
SCALE: N.T.S.

DETAIL NO.

24



PROFILE ALONG BIOSWALE CENTERLINE



SECTION

NOTE:

1. STONE CHECK DAMS CAN BE USED IN LOCATIONS OTHER THAN BIOSWALES WITH HEIGHT AND SPACING DEFINED BY THE DESIGNER.
2. REFER TO TYPICAL DETAIL NO. 3 "BIOSWALE".

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

STONE CHECK DAM
(SHOWN IN BIOSWALE)

REV. 1

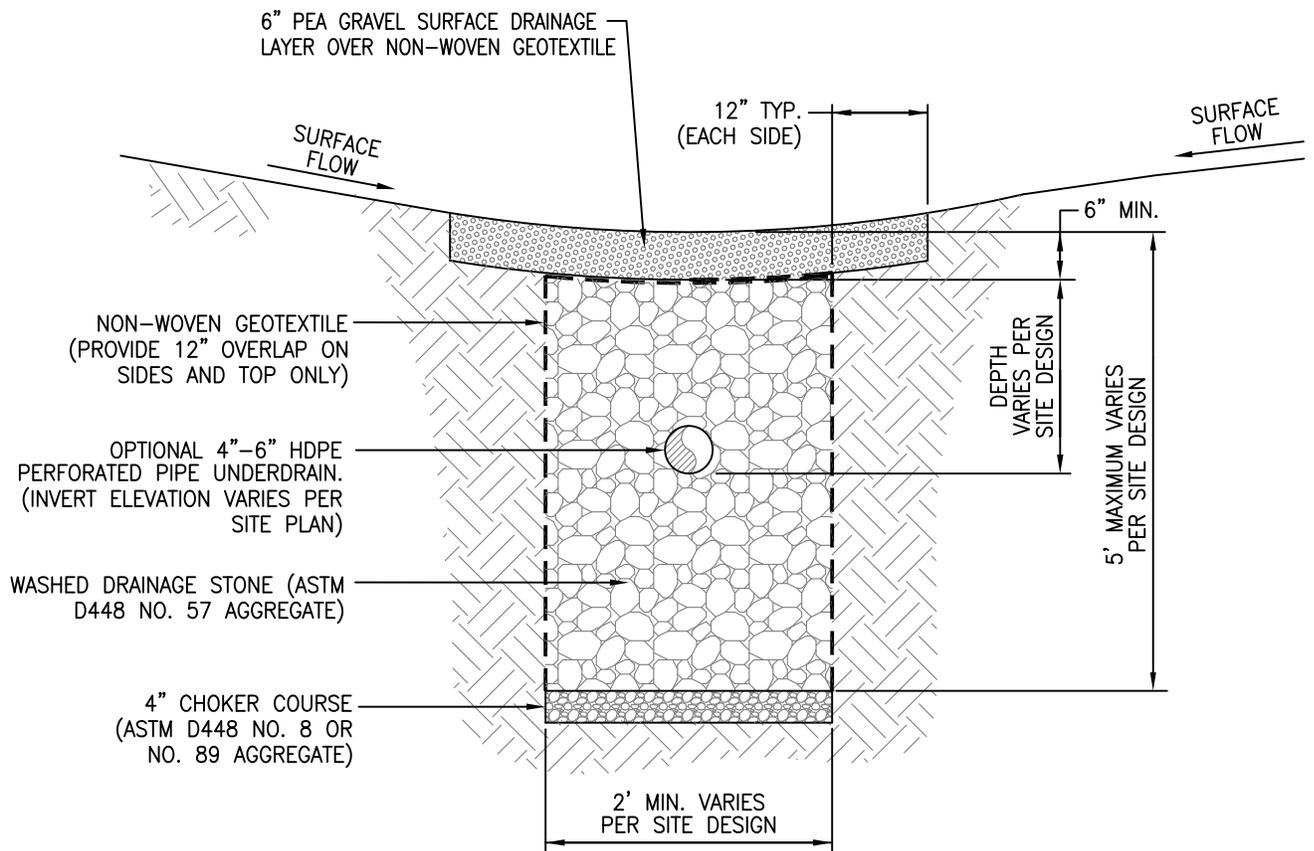
DATE: 2/17/15

ORIG. DATE: 12/19/14

SCALE: N.T.S.

DETAIL NO.

25



NOTES:

1. PROVIDE 4" TO 6" DIAMETER PVC OBSERVATION WELL TO BOTTOM OF TRENCH AT LOCATIONS AS DETERMINED BY DESIGNER.
2. DURING EXCAVATION, HEAVY MACHINERY SHALL NOT DRIVE OVER EXPOSED UNDERLYING SOILS.
3. EXCAVATE IN DRY CONDITIONS AS MUCH AS PRACTICABLE.
4. USE TRACKED OR LOW GROUND PRESSURE VEHICLES.
5. EXCAVATE FINAL 9" TO 12" WITH TEETH OF BUCKET (DO NOT SMEAR).
6. SUBSOILS SHALL BE SCARIFIED (NOT COMPACTED) PRIOR TO PLACEMENT OF CLEAN, WASHED DRAINAGE STONE.
7. ENSURE THAT LENGTH OF INFILTRATION TRENCH EXCEEDS DEPTH.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

INFILTRATION TRENCH

REV. 1

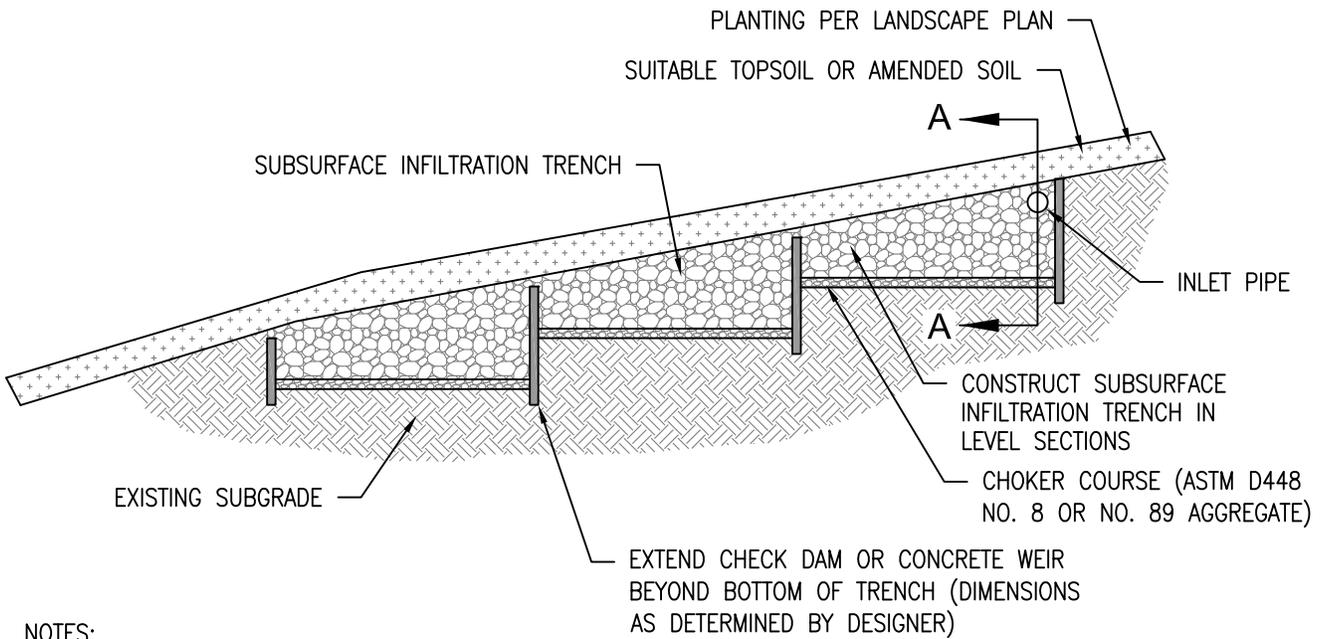
DATE: 2/17/15

ORIG. DATE: 12/19/14

SCALE: N.T.S.

DETAIL NO.

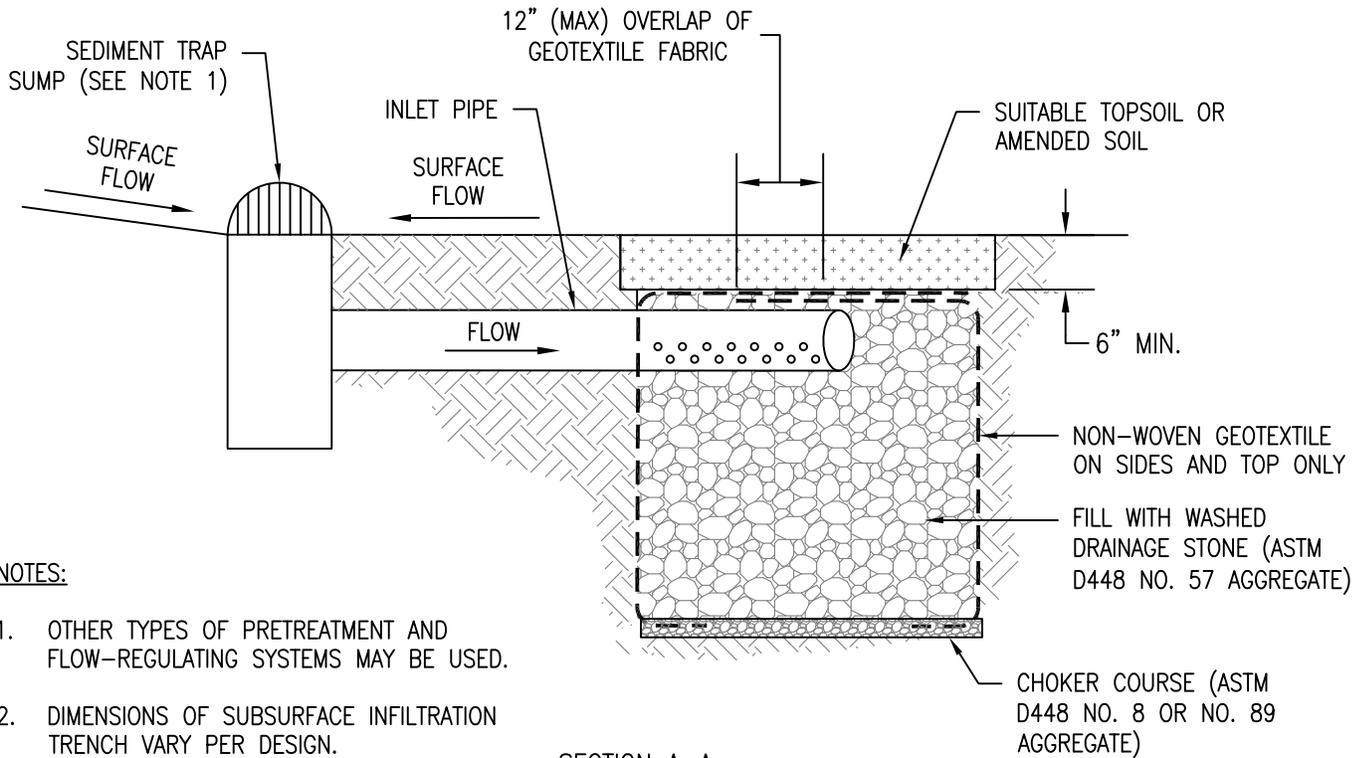
26



NOTES:

1. STEP SUBSURFACE INFILTRATION TRENCH DOWNHILL (ON EXISTING SLOPES OF 5% OR GREATER) AS SHOWN.
2. CHECK DAMS ARE PRESENT TO MAXIMIZE STORAGE VOLUME IN THE TRENCH. WATER CAN RISE TO THE SURFACE AND SATURATE THE AMENDED SOIL OR A CONCRETE WEIR WITH NOTCH OR UNDERDRAIN CAN BE DESIGNED. THE WEIR WILL ALLOW CONTROLLED RELEASE FROM THE UPSTREAM CELL.

TYPICAL PROFILE



NOTES:

1. OTHER TYPES OF PRETREATMENT AND FLOW-REGULATING SYSTEMS MAY BE USED.
2. DIMENSIONS OF SUBSURFACE INFILTRATION TRENCH VARY PER DESIGN.

SECTION A-A

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

**STEP SUBSURFACE
INFILTRATION FACILITY**

REV. 1

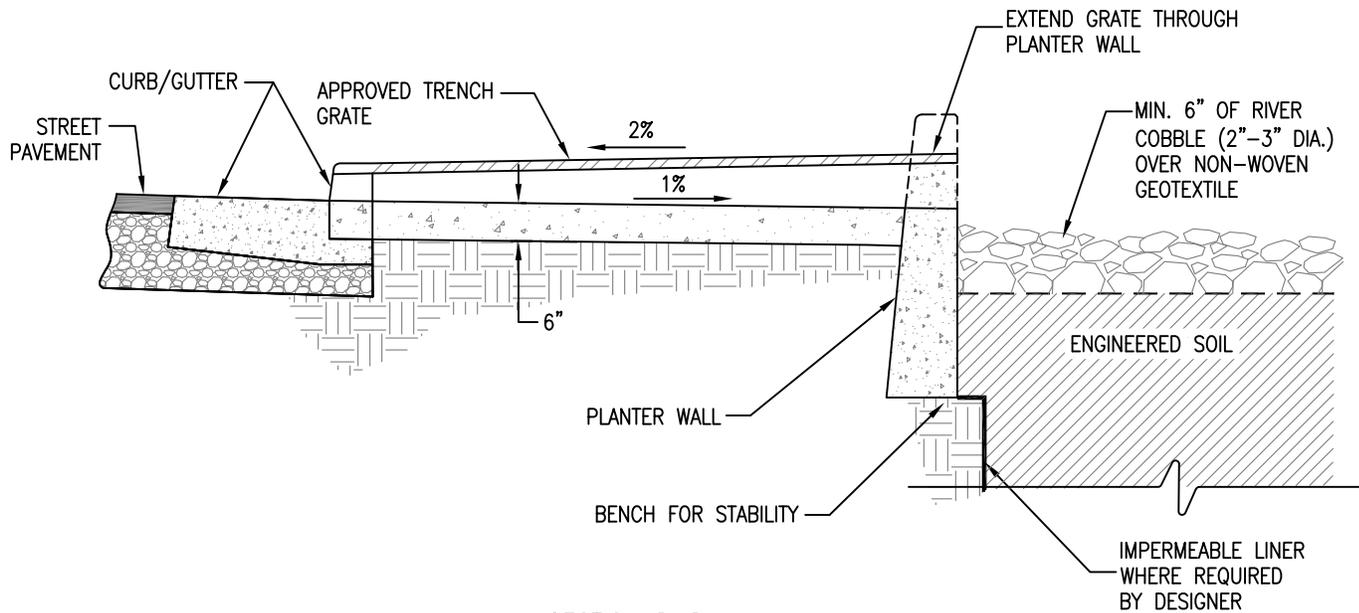
DATE: 2/17/15

ORIG. DATE: 12/19/14

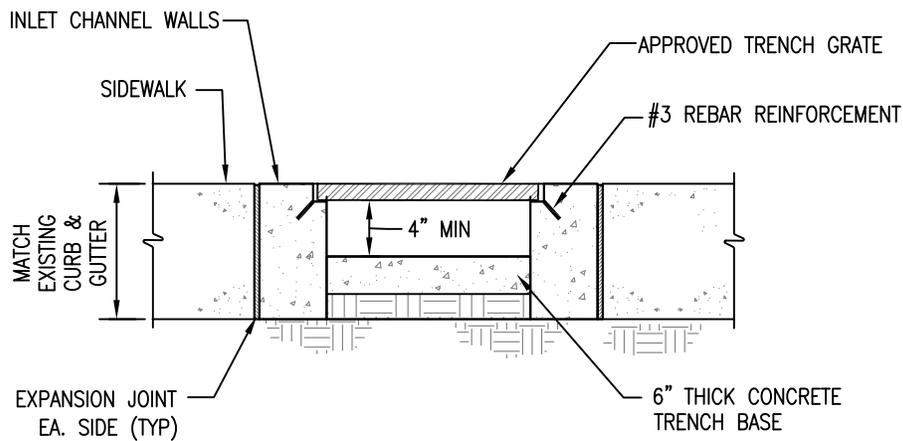
SCALE: N.T.S.

DETAIL NO.

27



SECTION D-D1



SECTION E-E1

NOTE:

REFER TO TYPICAL DETAIL NO. 15 "STORMWATER PLANTER WITH ON-STREET PARKING" FOR SECTION CUTS.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

INLET TRENCH DRAIN

REV. 1

DATE: 2/17/15

ORIG. DATE: 12/19/14

SCALE: N.T.S.

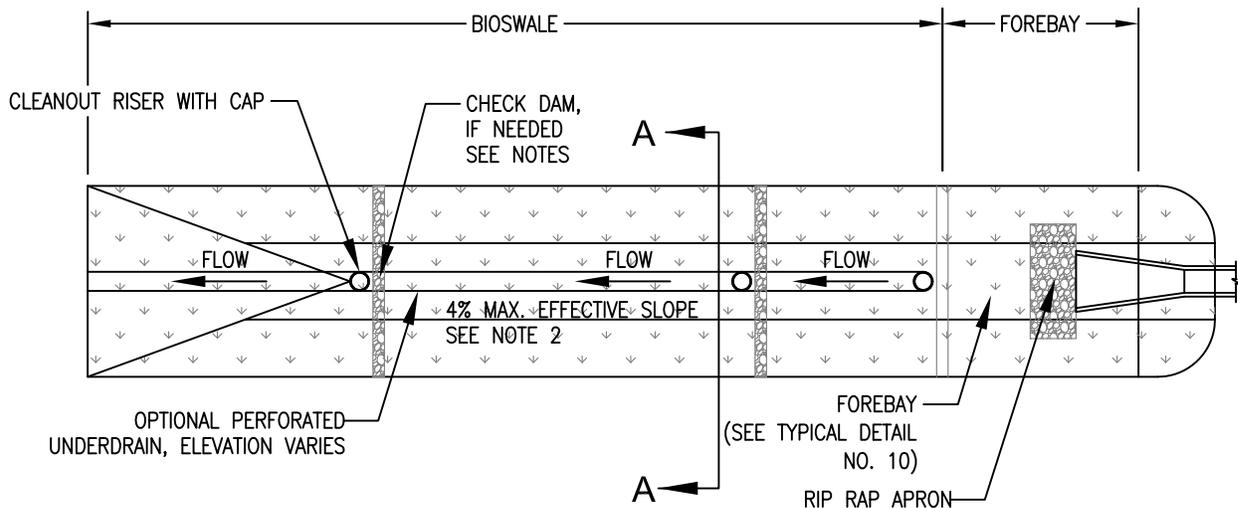
DETAIL NO.

28

NOTES:

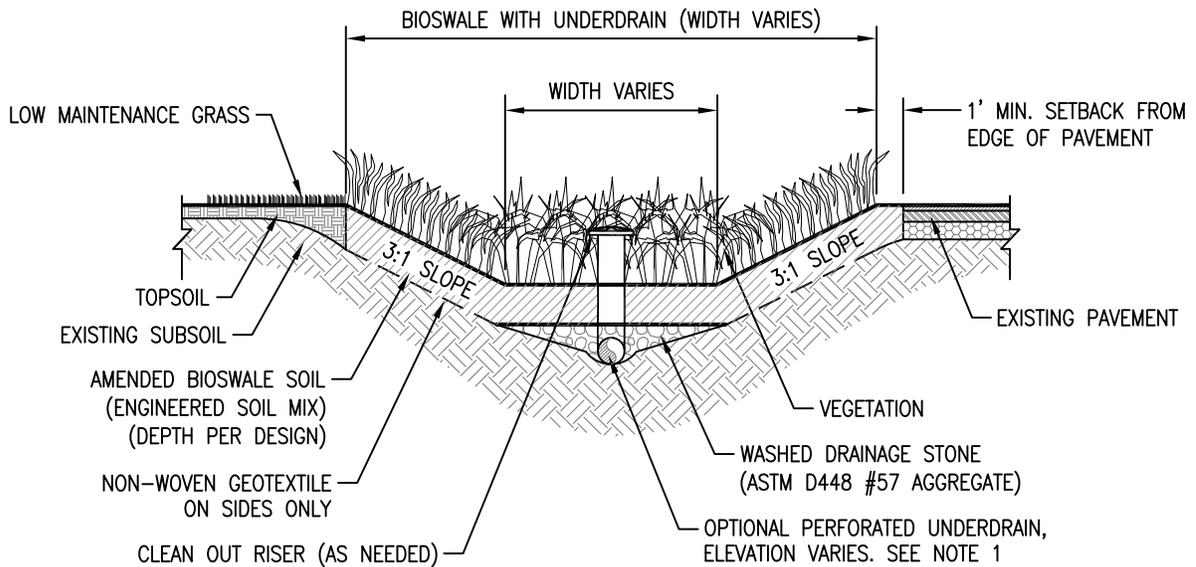
1. BIORETENTION AREA SIZE AND LAYOUT SHALL BE AS INDICATED ON THE PLANS.
2. APPROPRIATE NATIVE PLANTS AND PLANTING SCHEDULE SHALL BE PROVIDED.
 - a. WOODY VEGETATION SHALL NOT BE PLANTED WITHIN TWO FEET OF INFLOW OR OUTFLOW STRUCTURES.
3. APPROPRIATE MULCH LAYER SHALL BE PROVIDED (2" TO 4" OF FINE SHREDDED HARDWOOD).
4. ENGINEERED SOIL MIX SHALL BE MINIMUM OF 18" DEEP, 36" RECOMMENDED. REFER TO SPECIFICATIONS FOR REQUIREMENTS OF ENGINEERED SOIL MIX. GREATER DEPTH OF ENGINEERED SOIL MAY BE NEEDED DEPENDING ON PLANT TYPE AND SPECIFICATIONS.
5. GRAVEL AND PERFORATED PIPE UNDERDRAIN SYSTEM
 - a. DRAINAGE STONE: 6"--8" LAYER ASTM D448 SIZE NO. 57 WASHED STONE AND SHOULD BE SEPARATED BY A THIN 2" TO 4" LAYER OF CHOKER STONE (ASTM D448 SIZE NO. 8, 3/8" TO 1/8" OR ASTM D 448 SIZE NO. 89. 3/8" TO 1/16").
 - b. PERFORATED PIPE: 4" TO 6" PERFORATED HDPE (AASHTO M 252), 3/8" PERFORATION SPACED 6 FEET ON CENTER. NO SOCK PIPES SHALL BE PERMITTED.
 - c. NON-WOVEN SEPARATION GEOTEXTILE MAY BE UTILIZED ON THE SIDE SURFACE INTERFACES ONLY.
6. INSTALLATION SHALL OCCUR AFTER THE CONTRIBUTING DRAINAGE AREAS TO THE BIORETENTION AREA HAVE BEEN STABILIZED. IF THIS IS NOT FEASIBLE, STORMWATER FLOW SHALL BE DIVERTED AROUND THE BIORETENTION AREA. PROTECT AREA WITH TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES. IF SEDIMENT ACCUMULATES IT MUST BE REMOVED.
7. INSTALLATION OF ENGINEERED SOIL MIX MUST BE COMPLETED IN A MANNER THAT WILL ENSURE PRESERVATION OF THE INFILTRATIVE CAPACITY OF THE UNDERLYING SOILS. THE MOISTURE CONTENT OF THE SOIL SHALL BE LOW ENOUGH TO PREVENT CLUMPING AND COMPACTION DURING PLACEMENT.
8. TO PREVENT COMPACTION WITHIN THE LIMITS OF THE BASINS, ONLY HAND LABORERS, SMALL EXCAVATION HOES WITH WIDE TRACKS, LIGHT EQUIPMENT WITH TURF TIES, MARSH EQUIPMENT OR WIDE-TRACK LOADERS MAY BE USED. NO HEAVY EQUIPMENT SHALL BE USED WITHIN 10 FEET OF THE PERIMETER OF THE BIORETENTION FACILITY BEFORE, DURING, OR AFTER THE PLACEMENT OF THE BIORETENTION SOIL MIX.
9. SOIL SURFACES SHALL BE SCARIFIED TO AERATE AND REDUCE SOIL COMPACTION. SOIL SHALL BE PLACED IN 6" LOOSE DEPTH LIFTS AND LIGHTLY HAND-TAMPED OR COMPACTED WITH A WATER-FILLED LANDSCAPE ROLLER, TO REDUCE POTENTIAL FOR EXCESSIVE SETTLING. NO OTHER MECHANICAL EQUIPMENT SHALL BE USED TO COMPACT THE ENGINEERED SOIL MIX OR UNDERLYING SOILS.
10. LOOSEN SUBGRADE SOILS THAT HAVE BEEN COMPACTED OR SMEARED BY RAKING, DISKING OR TILLING TO A MINIMUM DEPTH OF 6". SUBSOILS SHALL BE SCARIFIED (NOT COMPACTED) PRIOR TO PLACEMENT OF CLEAN, WASHED DRAINAGE STONE.
11. UNIFORMLY GRADE BIORETENTION SOIL MIX TO ACHIEVE A SMOOTH SURFACE. DO NOT OVER-WORK OR EXCESSIVELY COMPACT BIORETENTION SOIL MIX. GRADE TO CROSS SECTIONS, THICKNESS AND ELEVATIONS INDICATED ON PLANS. SETTLING OF SOIL BY WALKING ON SURFACE, WORKING WITH HAND OR LOW GROUND PRESSURE EQUIPMENT IS ACCEPTABLE.
12. DURING EXCAVATION, HEAVY MACHINERY SHALL NOT DRIVE OVER EXPOSED UNDERLYING SOILS.
13. EXCAVATE IN DRY CONDITIONS AS MUCH AS PRACTICABLE.
14. EXCAVATE FINAL 9" TO 12" WITH TEETH OF BUCKET (DO NOT SMEAR).

<p style="text-align: center;">CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT</p> 	<p>TYPICAL DETAILS</p>	<p>REV. 1 DATE: 2/17/15 ORIG. DATE: 12/19/14 SCALE: N.T.S.</p>
	<p>BIORETENTION NOTES</p>	



NOTES:

1. REFER TO TYPICAL DETAIL NO. 24 "CONCRETE CHECK DAM" AND TYPICAL DETAIL NO. 25 "STONE CHECK DAM" FOR CHECK DAM OPTIONS.
2. CHECK DAMS ARE REQUIRED IF SLOPE EXCEEDS 5% OR DEPTH OF IMPOUNDED WATER ON UPGRADIENT END OF BIOSWALE IS LESS THAN 50% OF THE MEDIA HEIGHT.



SECTION A-A

NOTES:

1. IF AN UNDERDRAIN IS UTILIZED, IT SHALL TIE INTO AN UPTURNED "S" UNDERDRAIN OR IT SHALL BE INSTALLED ON THE BOTTOM. REFER TO TYPICAL DETAIL NO. 29 "UPTURNED S UNDERDRAIN".
2. BIOSWALE DIMENSIONS VARY TO MEET PROJECT REQUIREMENTS; THICKNESS, WIDTHS AND SLOPES TO BE SPECIFIED BY PROJECT DESIGNER.
3. REFER TO TYPICAL DETAIL NO. 4: "BIOSWALE NOTES" FOR BIOSWALE CONSTRUCTION REQUIREMENTS.
4. INLETS TO BIOSWALE MAY INCLUDE SHEET FLOW ACROSS A GRASS FILTER STRIP (TYPICAL DETAIL NO. 12), DISCHARGE FROM A PIPE, CURB CUT WITH RIVER COBBLE FLUME (TYPICAL DETAIL NO. 11), FOREBAY, OR OTHER ENERGY DISSIPATION DEVICE.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

BIOSWALE WITH OPTIONAL UNDERDRAIN

REV. 1

DATE: 2/17/15

ORIG. DATE: 12/19/14

SCALE: N.T.S.

DETAIL NO.

3

NOTES:

1. INFILTRATION RATE SHALL BE FIELD VERIFIED BY A CERTIFIED PROFESSIONAL.
2. BIOSWALE SIZE AND LAYOUT SHALL BE AS INDICATED ON THE PLANS. SIZE SHALL BE BASED ON VOLUME NEEDED FOR STORAGE OF RRv.
3. TYPICAL STORAGE DEPTH FOR BIOSWALE SHALL BE 9". PLANTINGS SHOULD BE LOCATED ACCORDING TO THEIR WATER TOLERANCE AND ANTICIPATED FLOW DEPTH. WATER SHOULD NOT REMAIN IN BIOSWALE LONGER THAN 48 HOURS.
4. GRAVEL AND PERFORATED PIPE UNDERDRAIN SYSTEM:
 - a. DRAINAGE STONE: 8" LAYER ASTM D448 SIZE NO. 57 WASHED STONE SEPARATED BY A THIN 2" TO 4" LAYER OF CHOKER STONE (ASTM D448 SIZE NO. 8, 3/8" TO 1/8" OR ASTM D448 SIZE NO. 89, 3/8" TO 1/16").
 - b. PERFORATED PIPE: 4" TO 6" PERFORATED HDPE (AASHTO M 252), 3/8" PERFORATION SPACED 6" ON CENTER, MINIMUM SLOPE OF 0.5% (NO SOCK PIPES SHALL BE PERMITTED). CONNECT UNDERDRAIN PIPES (IF USED) TO STORM SEWER SYSTEM PER PLANS. UNDERDRAIN PIPES SHALL BE PERFORATED OR SLOTTED AND SIZED BASED ON FLOW RATE. (4" MIN. DIA.).
 - c. NON-WOVEN SEPARATION GEOTEXTILE SHALL BE UTILIZED ON THE SIDE SURFACE INTERFACES ONLY TO PREVENT SOIL MOVEMENT INTO THE SUBBASE.
5. REFER TO GUIDE SPECIFICATIONS FOR TOPSOIL AND ENGINEERED SOIL MIX REQUIREMENTS.
6. WHERE PERMEABLE PAVEMENTS (SUCH AS ASPHALT) ARE USED NEAR BIOSWALES, PROTECT STONE BASE UNDER PAVEMENT WITH GEOTEXTILE TO PREVENT SOIL MOVEMENT INTO PERMEABLE PAVEMENT BASE. SEE PERMEABLE PAVEMENT DETAIL.
7. WHERE LOW PERMEABILITY PAVEMENTS ARE USED NEAR BIOSWALES, PROTECT PAVEMENT BASE WITH IMPERVIOUS LINER TO MINIMIZE WATER MIGRATION UNDER PAVEMENT.
8. BIOSWALES SHALL NOT BE CONSTRUCTED OVER SEPTIC TANKS.
9. INLETS TO BIOSWALE MAY INCLUDE SHEET FLOW ACROSS A GRASS FILTER STRIP (TYPICAL DETAIL NO. 12), DISCHARGE FROM A PIPE, CURB CUT WITH RIVER COBBLE FLUME (TYPICAL DETAIL NO. 11), FOREBAY, OR OTHER ENERGY DISSIPATION DEVICE.
10. TO PREVENT FAILURE DUE TO SEDIMENT ACCUMULATION, BIOSWALES SHALL BE CONSTRUCTED AFTER THEIR CONTRIBUTING DRAINAGE AREA HAS BEEN COMPLETELY STABILIZED. IF THIS IS NOT FEASIBLE, STORMWATER FLOW SHALL BE DIVERTED AROUND BIOSWALE.
11. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE USED TO PROTECT BIOSWALES. DIVERT POST-CONSTRUCTION STORMWATER RUNOFF AROUND BIOSWALES UNTIL VEGETATIVE COVER HAS BEEN ESTABLISHED.
12. HEAVY VEHICULAR AND FOOT TRAFFIC SHALL BE KEPT OUT OF BIOSWALES DURING AND AFTER CONSTRUCTION TO PREVENT SOIL COMPACTION.
13. NATIVE SOILS ALONG BOTTOM OF THE BIOSWALE SHALL BE TILLED TO MINIMUM DEPTH OF 6" PRIOR TO PLACEMENT OF AN UNDERDRAIN AND/OR ENGINEERED SOIL MIX.
14. DURING EXCAVATION, HEAVY MACHINERY SHALL NOT DRIVE OVER EXPOSED UNDERLYING SOILS.
15. EXCAVATE IN DRY CONDITIONS AS OFTEN AS PRACTICABLE.
16. USE TRACKED VEHICLES.
17. EXCAVATE FINAL 9" TO 12" WITH TEETH OF BUCKET (DO NOT SMEAR).
18. SUBSOILS SHALL BE SCARIFIED (NOT COMPACTED) PRIOR TO PLACEMENT OF CLEAN, WASHED DRAINAGE STONE.
19. IF STORMWATER BIOSWALE IS CONSTRUCTED NEXT TO AN EXISTING SIDEWALK, SOIL ELEVATIONS MUST BE BROUGHT TO TOP OF CURB AND SLOPE AWAY FROM CURB AT A 4:1 SLOPE.
20. STONE CHECK DAMS SHALL BE CONSTRUCTED OF GRADED SIZE 2" TO 10" STONE. MECHANICAL OR HAND PLACEMENT SHALL BE REQUIRED TO ENSURE COMPLETE COVERAGE OF ENTIRE WIDTH OF BIOSWALE, AND THAT CENTER OF DAM IS LOWER THAN EDGES. CHECK DAMS ARE REQUIRED WHEN SLOPE EXCEEDS 5% OR DEPTH OF IMPOUNDED WATER ON UPGRADIENT END OF BIOSWALE IS LESS THAN 50% OF THE MEDIA HEIGHT. SEE TYPICAL DETAILS NO. 24 AND NO. 25 FOR CHECK DAM OPTIONS.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT



TYPICAL DETAILS

BIOSWALE NOTES

REV. 1

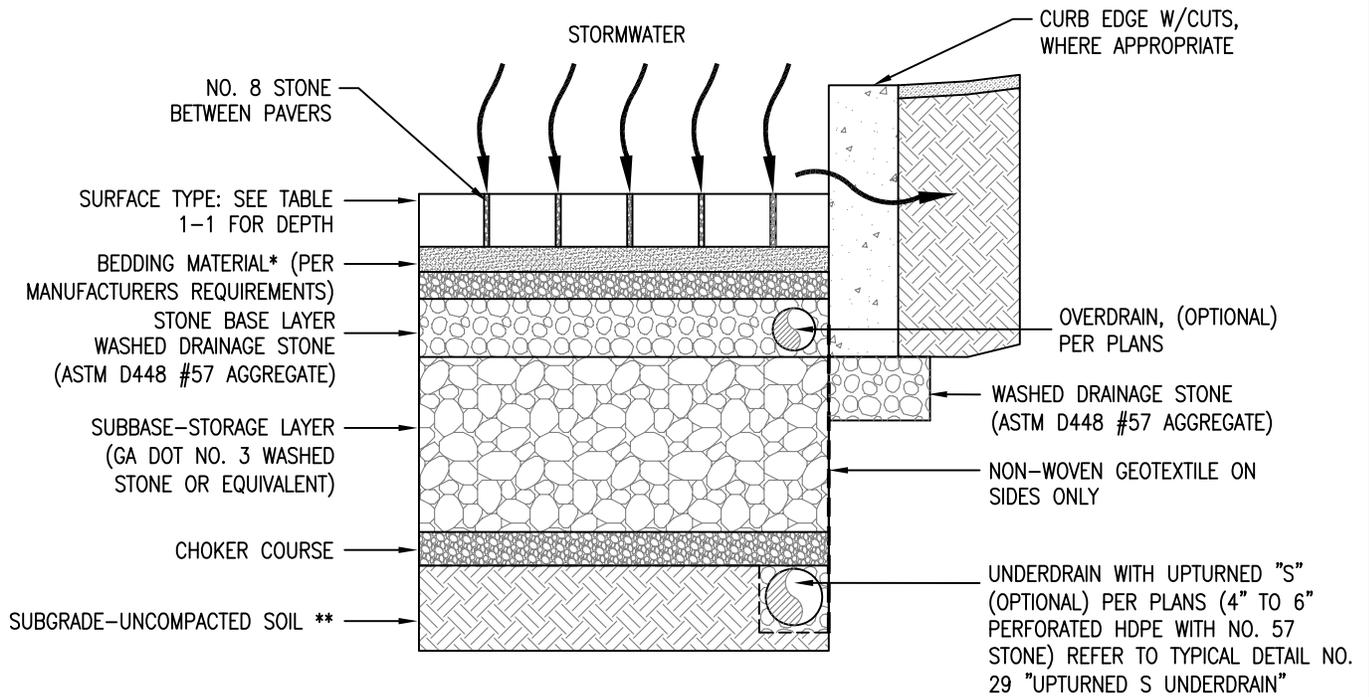
DATE: 2/17/15

ORIG. DATE: 12/19/14

SCALE: N.T.S.

DETAIL NO.

4



NOTE:

WHERE NATIVE SOILS HAVE AN INFILTRATION RATE < 0.25 IN/HR AN UNDERDRAIN IS REQUIRED. UPTURNED "S" UNDERDRAIN SHALL BE USED TO RECEIVE RRv CREDIT FOR RUNOFF CAPTURE AND STORAGE. STONE STORAGE LAYER SHALL BE DESIGNED AND CONSTRUCTED TO DRAIN WITHIN 48 HOURS.

PERMEABLE PAVEMENT SYSTEM

TABLE 1-1
DEPTH REQUIRED FOR EACH LAYER

SURFACE TYPE	SURFACE***	BEDDING MATERIAL	BASE	SUBBASE STORAGE LAYER	CHOKER	UNDERDRAIN
PERVIOUS CONCRETE	4" TO 8"	N/A	4" MIN.	12" MIN.	2" TO 4"	4" TO 6"
INTERLOCKING PAVERS	MIN. 1.5"	2"	6" MIN.	12" MIN.	2" TO 4"	4" TO 6"

NOTES:

- SUBBASE DEPTH MUST EXCEED MANUFACTURER'S MINIMUM FOR TRAFFIC LOADING DESIGN. ADDITIONAL DEPTH FOR STORAGE AS NEEDED.
- TABLE 1-1 IS FOR STANDARD VEHICULAR LOADING.

* POROUS CONCRETE AND ASPHALT SURFACE TYPES DO NOT REQUIRE BEDDING MATERIAL.
 ** MINIMIZE COMPACTION OF SUBGRADE SOILS. SCARIFY OR TILL SUBGRADE TO A DEPTH OF 3" TO 4".
 *** PERMEABLE PAVEMENT SURFACE MUST BE ABLE TO SUPPORT THE MAXIMUM PROJECTED TRAFFIC LOAD.

CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT 	TYPICAL DETAILS	REV. 1 DATE: 2/17/15 ORIG. DATE: 12/19/14 SCALE: N.T.S.
	PERMEABLE PAVEMENT	DETAIL NO. 8

NOTES:

1. DIMENSIONS LISTED ARE MINIMUMS. DESIGNER MUST VERIFY PAVEMENT DEPTH.
2. EXCAVATE AND GRADE SUBGRADE TO THE LINES AND GRADES INDICATED ON THE DRAWINGS. ENGINEER TO SPECIFY REQUIREMENTS BASED ON SITE CONDITIONS AND GEOTECHNICAL REPORT.
3. DURING EXCAVATION, HEAVY MACHINERY SHALL NOT DRIVE OVER EXPOSED UNDERLYING SOILS.
4. EXCAVATE IN DRY CONDITIONS AS MUCH AS PRACTICABLE.
5. USE TRACKED VEHICLES OR LOW GROUND PRESSURE VEHICLES.
6. EXCAVATE FINAL 9"–12" WITH TEETH OF BUCKET (DO NOT SMEAR).
7. SUBGRADE SHALL BE SCARIFIED (NOT COMPACTED) PRIOR TO PLACEMENT CHOKER COURSE AND SUBBASE–STORAGE LAYER.
8. NO. 57 STONE BASE SHALL BE COMPACTED UNTIL THERE IS NO VISIBLE MOVEMENT.
9. MINIMUM STONE BASE DEPTH = 6" WASHED DRAINAGE STONE (ASTM D448 #57 AGGREGATE) OR OTHER APPROVED MATERIAL.
10. UPTURNED "S" UNDERDRAIN SHALL BE USED TO RECEIVE RRv CREDIT FOR RUNOFF CAPTURE AND STORAGE. STONE STORAGE LAYER SHALL DRAIN WITHIN 48 HOURS.
11. INFILTRATION RATE SHALL BE FIELD VERIFIED BY CERTIFIED PROFESSIONAL. REFER TO THE CITY OF ATLANTA STORMWATER MANAGEMENT PRACTICES FOR SMALL COMMERCIAL DEVELOPMENT – APPENDIX C – INFILTRATION TESTING PARAMETERS.
12. USE NON–WOVEN GEOTEXTILE ON SIDES OF STONE SUB–BASE STORAGE LAYER.
13. PERMEABLE PAVEMENT SYSTEM MUST BE CLEARLY MARKED ON DEVELOPMENT PLAN AND A NOTE TO PROTECT WITH TEMPORARY CONSTRUCTION FENCING.
14. EXCAVATION MUST BE CONSTRUCTED TO SPECIFIED WIDTH AND DEPTH OF PERMEABLE PAVEMENT SYSTEM, STOCKPILED MATERIAL SHOULD BE CLEARLY STORED AWAY FROM EXCAVATION.
15. NATIVE SOILS ALONG BOTTOM OF THE PERMEABLE PAVEMENT SYSTEM SHALL BE TILLED OR SCARIFIED TO MINIMUM DEPTH OF 3"–4" PRIOR TO PLACEMENT OF CHOKER COURSE.
16. SIDES OF EXCAVATIONS MUST BE TRIMMED OF LARGE ROOTS THAT WILL HAMPER INSTALLATION OF FILTER FABRIC AROUND THE STONE STORAGE.
17. WHEN USING PORTLAND CEMENT PERVIOUS CONCRETE (PCPC), THE PAVEMENT SHALL REMAIN COVERED FOR 7 DAYS DURING THE CURING PERIOD. NOT REQUIRED FOR PAVERS OR POROUS ASPHALT. DURING THIS TIME IT IS CRITICAL THAT ANY STORMWATER BE DIVERTED AWAY FROM THE PAVEMENT.
18. ADEQUATE EROSION CONTROL MUST BE PROVIDED. SEDIMENT LADEN STORMWATER SHALL NOT BE ALLOWED TO FLOW IN THE PERMEABLE PAVEMENT AREA.
19. NO MULCH OR LANDSCAPING STORAGE SHALL BE ALLOWED ON THE PAVEMENT AREAS.
20. PERMEABLE PAVEMENT MUST BE TESTED AFTER CONSTRUCTION. AFTER PLACEMENT AND APPROPRIATE CURING OF STRUCTURAL PAVEMENT SURFACE (7 DAYS FOR PERVIOUS CONCRETE AND 48 HOURS MINIMUM FOR POROUS ASPHALT HARDENING), TEST INFILTRATION ABILITY BY APPLYING CLEAN WATER AT A RATE OF AT LEAST 5 GPM OVER SURFACE. THE WATER APPLIED TO THE SURFACE SHOULD INFILTRATE WITHOUT CREATING PUDDLES OR RUNOFF.
21. REFER TO SPECIFICATION SECTION 02798 (PERVIOUS CONCRETE PAVING) AND SPECIFICATION SECTION 02796 (PERMEABLE INTERLOCKING CONCRETE PAVERS) FOR ADDITIONAL REQUIREMENTS.

<p style="text-align: center;">CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT</p> 	<h2>TYPICAL DETAILS</h2>	<p>REV. 1 DATE: 2/17/15 ORIG. DATE: 12/19/14 SCALE: N.T.S.</p>
	<h2>PERMEABLE PAVEMENT NOTES</h2>	

EXHIBIT G

ADDITIONAL REQUIRED SUBMITTALS

- **EXHIBIT G.1- EXPERIENCE STATEMENT**
- **EXHIBIT G .2 - LOWER-TIER EXPERIENCE STATEMENT**
- **EXHIBIT G.3 - WORK IN PROGRESS**
- **EXHIBIT G.4 - SAFETY AND HEALTH HISTORY FORM**

Exhibit G.4 - SAFETY AND HEALTH HISTORY FORM

1. EXPERIENCE MODIFICATION RATE			
1A. List your firm's Interstate Experience Modification Rate (EMR) for the three (3) most recent years and total hours worked.			
	20_____	20_____	20_____
a. EMR	_____	_____	_____
b. Hours Worked	_____	_____	_____
1B. If the state where the jobsite is located has an EMR rating system, provide the state EMR for the three (3) most recent years and total hours worked.			
	20_____	20_____	20_____
a. EMR	_____	_____	_____
b. Hours Worked	_____	_____	_____
2. SAFETY PERFORMANCE			
2A. List safety performance incident rates for the three (3) most recent years:			
	20_____	20_____	20_____
a. OSHA Recordable Incident Rate	_____	_____	_____
b. Lost Workday Case Incident Rate	_____	_____	_____
2B. Use your OSHA No. 200 Log to fill in the three (3) most recent years:			
	20_____	20_____	20_____
a. Number of first aid cases	_____	_____	_____
b. Number of lost workday cases.	_____	_____	_____
c. Number of restricted workday cases.	_____	_____	_____
d. Number of cases with medical attention only.	_____	_____	_____
e. Number of fatalities.	_____	_____	_____
3. Check your type of work:			
___ Non-Residential Building		___ Earthwork	
___ Heavy (Non-Highway) Construction		___ Concrete	
___ Mechanical		___ Architectural	
___ Electrical			
___ Other (State Type): _____			

SAFETY AND HEALTH HISTORY (Continued)

4. Are accident reports (OSHA 200) and report summaries sent to the following and how often?

	No	Yes	Monthly	Quarterly	Annually
a. Project Superintendent/Site Mgr.	—	—	—	—	—
b. Vice President/Mgr. of Construction	—	—	—	—	—
c. Safety Director	—	—	—	—	—
d. President of Firm	—	—	—	—	—

5. Do you hold site safety meetings for field employees both Manual and Non-Manual?

Yes ___ No ___

How Often?

Weekly ___ Bi-Weekly ___ Monthly ___ Less Often, As Needed ___

6. Do you conduct project safety inspections?

Yes ___ No ___

If yes, who conducts this inspection?

TITLE

HOW OFTEN?

7. How are accident records and accident summaries kept? How often are they reported?

	No	Yes	Monthly	Annually
a. Accidents totaled for the entire company	—	—	—	—
b. Accidents totaled by project	—	—	—	—
(1) Subtotaled by superintendent	—	—	—	—
(2) Subtotaled by foreman	—	—	—	—

8. How are the costs of individual accidents kept? How often are they reported?

	No	Yes	Monthly	Annually
a. Costs totaled for the entire company	—	—	—	—
b. Costs totaled by project	—	—	—	—
(1) Subtotaled by superintendent	—	—	—	—
(2) Subtotaled by foreman ___	—	—	—	—

SAFETY AND HEALTH HISTORY (Continued)

9. List key Safety and Health personnel planned for this project. Please list name, expected position and safety performance on their last three projects (OSHA Recordable and Lost Workday Case Incident (LWCI) rates). When a project has not been specified, list key company personnel.

NAME	POSITION	PROJECT	OSHA	LWCI

10. Do you have a written safety program?

Yes ___ No ___

If yes, submit a copy for evaluation.

11. Do you have an orientation program for new hires?

Yes ___ No ___

If yes submit a copy for evaluation. Does it include instruction on the following?

	Yes	No		Yes	No
a. Head protection	___	___	i. Fire protection	___	___
b. Eye protection	___	___	j. First aid facilities	___	___
c. Hearing Protection	___	___	k. Emergency procedures	___	___
d. Respiratory protection	___	___	l. Toxic substances	___	___
e. Safety belts and lifeline	___	___	m. Trenching and excavation	___	___
f. Scaffolding	___	___	n. Signs, barricades, flagging	___	___
g. Perimeter guarding	___	___	o. Electrical safety	___	___
h. Housekeeping	___	___	p. Rigging and crane safety	___	___
			q. Road Safety (Driving)	___	___

SAFETY AND HEALTH HISTORY (Continued)

12. Do you have a program for newly hired or promoted foremen?

Yes ___ No ___

If yes submit a copy for evaluation. Does it include the following?

	Yes	No		Yes	No
a. Safe work practices	___	___	e. First aid procedures	___	___
b. Safety supervision	___	___	f. Accident investigation	___	___
c. Toolbox meetings	___	___	g. Fire protection and prevention	___	___
d. Emergency procedures	___	___	h. New worker orientation	___	___

13. Do you hold craft "toolbox" safety meetings?

Yes ___ No ___

How Often?

Weekly ___ Bi-Weekly ___ Monthly ___ Less Often, As Needed ___

14. Do you have a written Hazard Communication program?

Yes ___ No ___

If yes, how is it implemented on each project?

15. Do you have/require Material Safety Data Sheets (M.S.D.'s) for material/chemicals/equipment?

Yes ___ No ___

If yes, explain field procedure for informing craft workers about potential hazards:

SAFETY AND HEALTH HISTORY (Continued)

16. List three (3) client references that could verify the quality and management commitment of your safety program.

Name	Address	Phone No.
a. _____	_____ _____	_____
b. _____	_____ _____	_____
c. _____	_____ _____	_____

APPENDIX A

REQUIREMENTS OF THE OF THE OFFICE OF CONTRACT COMPLIANCE



CITY OF ATLANTA

Kasim Reed
Mayor

SUITE 1700
55 TRINITY AVENUE, SW
ATLANTA, GA 30303
(404) 330-6010 Fax: (404) 658-7359
Internet Home Page: www.atlantaga.gov

OFFICE OF
CONTRACT COMPLIANCE
Larry Scott
Director
Lscott@atlantaga.gov

January 6, 2015

RE: Project No.: FC 7908, Construction of Sidewalks, Driveways, Curbs and Gutters

Dear Prospective City of Atlanta Bidder:

The Office of Contract Compliance information is an integral part of every City of Atlanta bid. All Bidders are required to make efforts to ensure that businesses are not discriminated against on the basis of their race, ethnicity or gender, and to demonstrate compliance with these program requirements at or prior to the time of Bid opening, or upon request by OCC. Bidders are required to ensure that prospective subcontractors, vendors, suppliers and other potential participants are not denied opportunities to compete for work on a City contract on the basis of their race, ethnicity, or gender, and must afford all firms, including those owned by racial or ethnic minorities and women, opportunities to participate in the performance of the business of the City to the extent of their availability, capacity and willingness to compete. Please read all of the information very carefully. Pay close attention to the specific goal of minority and female business enterprises for this project and the EBO program reminders listed on page 6.

If you have any questions about the information included in this section of the solicitation, please contact the City of Atlanta Office of Contract Compliance at (404) 330-6010.

The City of Atlanta looks forward to the opportunity to do business with your company.

Table of Contents

Policy Statement.....	2
Implementation of EBO Policy.....	2
OCC Review of Bidder Submissions.....	3
Equal Business Opportunity Program Bid/RFP Submittals	4
Monitoring Of EBO Policy	4
Implementation of EEO Policy.....	4
Monitoring of EEO Policy.....	4
First Source Jobs Program Policy Statement.....	5
Joint Venture Participation on City of Atlanta EBO Projects	6
Equal Business Opportunity M/FBE Availability for this Project	7
Equal Business Opportunity Program Reminders.....	8
Covenant of Non-Discrimination (EBO1)	9
Subcontractor Contact Form (EBO2).....	10 - 11
Subcontractor Utilization Form (EBO3)	12
First Source Job Information (Form 4)	13
First Source Jobs Agreement (Form 5).....	14

CITY OF ATLANTA

EQUAL BUSINESS OPPORTUNITY EQUAL EMPLOYMENT OPPORTUNITY

POLICY STATEMENT

It is the policy of the City of Atlanta to promote full and equal business opportunity for all persons doing business with the City. The City must ensure that firms seeking to participate in contracting and procurement activities with the City are not prevented from doing so on the basis of the race or gender of their owners. The City is committed to ensuring that it is not a passive participant in any private scheme of discrimination. To ensure that businesses are not discriminated against with regard to prime contracting, subcontracting or other partnering opportunities with the City, the City has developed an Equal Business Opportunity (EBO) Program. It is also the policy of the City of Atlanta to actively promote equal employment opportunities for minority and female workers and prohibit discrimination based upon race, religion, color, sex, national origin, marital status, physical handicap or sexual orientation through the City's Equal Employment Opportunity (EEO) Program. The purpose of the Equal Business Opportunity and Equal Employment Opportunity Programs is to mitigate the present and ongoing effects of the past and present discrimination against women and minority owned businesses and women and minority workers so that opportunity, regardless of race or gender, will become institutionalized in the Atlanta marketplace. It is important to note that all bidders, without exception, including minority and female owned business enterprises, must comply with the City of Atlanta's EBO and EEO Program requirements. Goals for minority and female business enterprises are set for this project on page 6.

Implementation of EBO Policy

The Office of Contract Compliance will review information submitted by Bidders pertaining to efforts to promote opportunities for diverse businesses, including M/FBEs, to compete for business as subcontractors and/or Suppliers. A Bidder is eligible for award of a City contract upon a finding by OCC that the Bidder has engaged in, and provided with its bid submission documentation of, efforts to ensure that its process of soliciting, evaluating and awarding subcontracts, placing orders, and partnering with other companies has been non-discriminatory. To assist prime contractors in this effort, the Office of Contract Compliance has set forth in this solicitation document the M/FBEs goals within the relevant NAICS Codes, for this Project.

For subcontracting, the Subcontractor Project Plan must include all subcontractors to be utilized on the project, detail the services to be performed, the dollar value of the work to be performed by each subcontractor, and the City of Atlanta M/FBE certification number and supplier id number.

For Suppliers, the Subcontractor Project Plan must include all suppliers to be utilized on the project, the supplies to be provided, including the dollar value of the supplies being provided and the City of Atlanta M/FBE certification number and supplier id number.

Determination of Non-discrimination During Bid Process

No Bidder shall be awarded a contract on an Eligible Project unless the Office of Contract Compliance determines that the Bidder has satisfied the non-discrimination requirements of section 2-1448 on such Eligible Project. Accordingly, each Bidder shall submit with each Bid the following

1. Covenant of Non Discrimination. Each Bidder shall submit with her/his Bid a Covenant of Non-Discrimination which is set forth herein as Exhibit EBO1.
2. Outreach efforts documentation. Each bidder shall submit with her/his bid written documentation demonstrating the bidder's outreach efforts to identify, contact, contract with, or utilize businesses, including certified MFBEs and SBEs, as subcontractors or suppliers on the contract. This information shall be set forth on Exhibit EBO2, which is included herein.
3. Subcontractor project plan. Each bidder shall submit with her/his bid a completed and signed subcontractor project plan, in a form approved and provided by the office of contract compliance, which lists the name, address, telephone number and contact person of each subcontractor or other business to be used in the contract, the NAICS Code and the type of work or service each business will perform, the dollar value of the work and the scope of work, the ownership of each business by race and gender, if applicable the AABE, APABE, FBE, or HABE certification number of each business, and any other information requested by the office of contract compliance. In order for the office of contract compliance to officially consider a firm to be an MFBE, the MFBE firm must be certified by or have a certification application pending with the office of contract compliance prior to the bidder's submission of the bid. The subcontractor project plan shall not be changed or altered after approval of the plan and award of the contract without the written approval of the director of the office of contract compliance. A written letter to the director of the office of contract compliance requesting approval to

change the subcontractor project plan must be submitted prior to any change in the plan or termination of an MFBE's contract.

OCC Review of Bidder Submissions

The Office of Contract Compliance shall determine whether a Bidder has satisfied the non-discrimination requirements of section 2-1448 based on its review of the Covenant of Non Discrimination, the Outreach Efforts Documentation, the Subcontractor Project Plan, and its review of other relevant facts and circumstances, including complaints received as part of the bid process. In reviewing the documents submitted by a Bidder to determine whether the Bidder has satisfied the non-discriminatory practices requirement of this section, the Office of Contract Compliance will consider, among other things, the total project dollars subcontracted to or expended for services performed by other businesses, including certified MFBEs, whether such businesses perform Commercially Useful Functions in the work of the contract based upon standard industry trade practices, whether any amounts paid to Supplier businesses are for goods customarily and ordinarily used based upon standard industry trade practices, and the availability of certified MFBEs within the relevant NAICS Codes for such Eligible Project.

(a) Receipt of Complaint of Discrimination in the Bid Process

The Office of Contract Compliance shall accept complaints of alleged discrimination during the bid process regarding any participant in the bid process. Where the complaint of discrimination is specific to the procurement which is under consideration by the city, the office of contract compliance may investigate said complaint, determine its validity, and determine whether the actions complained of impact the bidder's responsiveness on the specific procurement. Allegations of discrimination based on events, incidents or occurrences which are unrelated to the specific procurement will be placed in the bidder's file maintained in the vendor relations database and handled in accordance with the procedure established in the city's vendor relations subdivision, section 2-1465, et seq.

(b) Determination of Violation of EBO Process

Determination of violation of EBO process. Where the office of contract compliance investigates a complaint of discrimination that is related to the specific bid process, the details of that investigation, including findings, shall be recorded and maintained in the vendor relations database, pursuant to section 2-1471.

(c) Office of Contract Compliance Determination of Non-Compliance

Office of contract compliance determination of non-compliance. When, based upon the totality of the circumstances, the office of contract compliance determines that a bidder fails to satisfy the requirements of section 2-1448(a) of a city bid solicitation, the director of the office of contract compliance shall present a written determination of non-compliance to the Chief Procurement Officer which states the determination and lists the

reasons for the determination. A bid that does not comply with the requirements set forth in section 2-1448(a) shall be deemed non-responsive and rejected.

Equal Business Opportunity Program Bid/RFP Submittals

The Office of Contract Compliance will make any determinations of non-responsiveness. The covenant of non-discrimination, the outreach efforts documentation, the subcontractor project plan, and any other information required by OCC in the solicitation document pursuant to section 2-1448(b) must be completed in their entirety by each bidder and submitted with the other required bid documents in order for the bid to be considered as a responsive bid. Failure to timely submit these forms, fully completed, will result in the bid being considered as a non-responsive bid, and therefore, excluded from consideration.

Monitoring Of EBO Policy

Upon execution of a contract with the City of Atlanta, the successful bidder's Subcontractor Project Plan will become a part of the contract between the bidder and the City of Atlanta. The Subcontractor Project Plan will be monitored by the City of Atlanta's Office of Contract Compliance for adherence with the plan. The successful bidder will be required to provide specific EBO information on a monthly basis that demonstrates the use of subcontractors and suppliers as indicated on the Subcontractor Project Plan. The failure of the successful bidder to provide the specific EBO information by the specified date each month shall be sufficient cause for the City to withhold approval of the successful bidder's invoices for progress payments, increase the amount of the successful bidder's retainage, or evoke any other penalties as set forth in the City of Atlanta Code of Ordinances, Section 2-1452.

Implementation of EEO Policy

The City effectuates its EEO policy by adopting racial and gender work force availability for every contractor performing work for the City of Atlanta. These percentages are derived from the work force demographics set forth in the 2000 Census EEO file prepared by the United States Department of Commerce for the applicable labor pool normally utilized for the contract.

Monitoring of EEO Policy

Upon award of a contract with the City of Atlanta, the successful bidder must submit a Contract Employment Report (CER), describing the racial and gender make-up of the firm's work force. If the CER indicates that the firm's demographic composition does not meet the adopted EEO goals, the firm will be required to submit an affirmative action plan setting forth the steps to be taken to reach the adopted goals. The CER and the affirmative action plan, if necessary, will become a part of the contract between the successful bidder and the City of Atlanta. Compliance with the EEO requirements will be monitored by the Office of Contract Compliance.

First Source Jobs Program Policy Statement

It is the policy of the City of Atlanta to provide job opportunities to the residents of the City of Atlanta, whenever possible. Every contract with the City of Atlanta creates a potential pool of new employment opportunities. The prime contractor is expected to work with the First Source Jobs Program to fill at least 50% of all new entry-level jobs, which arise from this project, with residents of the City of Atlanta. For more specific information about the First Source Jobs Program contact:

**Michael Sterling
Interim Executive Director
First Source Jobs Program
Atlanta Workforce Development Agency
818 Pollard Boulevard
Atlanta, GA 30315
(404) 546-3001**

Joint Venture Participation on City of Atlanta EBO Projects

The City of Atlanta encourages, where economically feasible, the establishment of joint ventures to ensure prime contracting opportunities for all businesses, including non-discriminatory outreach efforts to utilize certified minority and female business enterprises on Eligible Projects. On selected projects valued at five million dollars and over, the Office of Contract Compliance shall determine on a project-by-project basis whether non-discriminatory outreach efforts to enter into a joint venture shall be required. On such Eligible Projects, joint venture member businesses must have different race ownership, different gender ownership or both. The minority and female business enterprise members of the joint venture on projects on which a Joint Venture is required must be certified as such by the Office of Contract Compliance, and the joint venture team shall include in its bid submittal the M/FBE certification number of each M/FBE joint venture member.

A joint venture may submit its agreement to the Office of Contract Compliance for pre-approval no later than fourteen (14) calendar days prior to the date set for receipt of bids on an Eligible Project. Otherwise, agreements must be submitted on or before the date set for receipt of bids on an Eligible Project.

Components of a Joint Venture Agreement

The Joint Venture agreement should include at a minimum:

- The initial capital investment of each venture partner.
- The proportional allocation of profits and losses to each venture partner.
- The sharing of the right to control the ownership and management of the joint venture.
- A detailed description of the discrete portion of work or tasks that will be performed by each of the venture partners.
- The method of, and responsibility for, accounting.
- The methods by which disputes are resolved.
- All other pertinent factors of the joint venture.

Equal Business Opportunity M/FBE Goals for this Project

Project No.: FC 7908, Construction of Sidewalks, Driveways, Curbs and Gutters

Part 1: All proponents must ensure that non-discriminatory practices are utilized to enter into a Joint Venture Agreement in accordance with the City of Atlanta's EBO Ordinance. The Joint Venture Agreement, at the very least, should reflect details of the member company's/companies' involvement in the Construction of Sidewalks, Driveways, Curbs and Gutters project throughout the life of the contract (See Page 6).

Part 2: All proponents must ensure that non-discriminatory practices are utilized during efforts to engage minority and female subcontractors and suppliers throughout the life of the contract. All outreach efforts must be documented and included with this bid submittal.

The availability of certified minority and female firms for the procurement categories listed in this project are:

17.5% AABE and 13% FBE

Please be reminded that no Bidder shall be awarded a contract on an Eligible Project unless the Office of Contract Compliance determines that the Bidder has satisfied the non-discrimination requirements of section 2-1448 on such Eligible Project. Details of the O.C.C. review process for determination of non-discrimination are outlined on page 2 of this document.

Equal Business Opportunity Program Reminders

1. Joint Venture Agreements. The Joint Venture member businesses must have different race ownership, different gender ownership, or both. MFBE members of the Joint Venture must be certified as such by the Office of Contract Compliance. The Joint Venture team shall include in its submittal the MFBE certification number of each MFBE Joint Venture member.
2. Subcontractor Certification. It is the prime contractor's responsibility to verify that MFBEs included on the Subcontractor Project Plan are certified by the City of Atlanta's Office of Contract Compliance, or have a certification application pending with the City of Atlanta's Office of Contract Compliance at the time that the bid is submitted.
3. Reporting. The successful bidder must submit monthly EBO participation reports to the Office of Contract Compliance.
4. Subcontractor Contact Form. It is required that bidders list and submit information on **all subcontractors** they solicit for quotes, all subcontractors who contact them with regard to the project, and all subcontractors they have discussions with regarding the project. Failure to provide complete information on this form will result in your bid being declared non-responsive.
5. EBO Ordinance. The EBO Program is governed by the provisions of the EBO Ordinance set forth in the City of Atlanta Code Division 12, section 2 - 1441 through 2 -1464. The ordinance can be obtained from the City of Atlanta Clerk's Office at (404) 330-6032.
6. Supplier Participation. In order to receive full M/FBE credit, suppliers must manufacture or warehouse the materials, supplies, or equipment being supplied for use on the Eligible Project.

COVENANT OF NON-DISCRIMINATION

The undersigned understands that it is the policy of the City of Atlanta to promote full and equal business opportunity for all persons doing business with the City of Atlanta. The undersigned covenants that we have not discriminated, on the basis of race, gender or ethnicity, with regard to prime contracting, subcontracting or partnering opportunities. The undersigned further covenants that we have completed truthfully and fully the required forms EBO-2 and EBO-3. Set forth below is the signature of an officer of the bidding entity with the authority to bind the entity.

Signature of Attesting Party

Title of Attesting Party

On this ____ day of _____, 20____, before me appeared _____, the person who signed the above covenant in my presence.

Notary Public

Seal

First Source Job Information

Company Name: _____

FC No.: _____

Project Name: _____

The following entry level positions will become available as a result of the above referenced contract with the City of Atlanta.

- 1.
- 2.
- 3.
- 4.
- 5.

Include a job description and all required qualifications for each position listed above.

Identify a company representative and contact phone number who will be responsible for coordinating with the First Source Jobs Program.

Company Representative: _____

Phone Number: _____

First Source Jobs Agreement

THIS AGREEMENT REGARDING THE USE OF THE FIRST SOURCE JOBS PROGRAM BY CONTRACTORS WITH THE CITY OF ATLANTA TO FILL ENTRY LEVEL JOBS is made and entered into by _____

This _____ day of _____, 201__.

The City of Atlanta requires the immediate beneficiary or primary contractor for every eligible project to enter into a First Source Jobs employment agreement. The contractor agrees to the following terms and conditions:

- The first source for finding employees to fill all entry level jobs Created by the eligible project will be the First Source Program.
- The contractor will make every effort to fill 50% of the entry level jobs created by this eligible project with applicants from the First Source Program.
- The contractor shall make good faith effort to reach the goal of this employment agreement.
- Details as to the number and description of each entry level job must me provided with the bid.
- The contractor shall comply with the spirit of the First Source Jobs Policy beyond the duration of this agreement and continue to make good faith attempts to hire employees of similar backgrounds to those participating in the First Source Program.
- The contractor as a condition of transfer, assignment or otherwise shall require the transferee to agree in writing to the terms of the employment Agreement.

Upon a determination that a beneficiary or contractor has failed to comply with the terms of this Agreement, the City may impose the following penalties based on the severity of the non-compliance:

- The City of Atlanta may withhold payment from the contractor.
- The City of Atlanta may withhold 10 percent of all future payments on the contract until the contractor is in compliance
- The City of Atlanta may refuse all future bids on city projects or applications for financials assistance in any form from the City until the contractor demonstrated that the First Source requirements have been met, or cancellation of the eligible project.
- The City of Atlanta may cancel the eligible project.

All terms stated herein can be found in the City of Atlanta Code of Ordinances Sections 5-8002 through 5-8005.

The undersigned hereby agrees to the terms and conditions set forth in this agreement.

Contractor

FORM 5

APPENDIX B

Insurance and Bonding Requirements

APPENDIX B INSURANCE & BONDING REQUIREMENTS

FC-7909, Annual Contract for the Maintenance and Repair of Sidewalks, Curbs,
Driveway Aprons & Associated Infrastructure

A. Preamble

The following requirements apply to all work under the agreement. Compliance is required by all Contractors/Consultants. **To the extent permitted by applicable law, the City of Atlanta (“City”) reserves the right to adjust or waive any insurance or bonding requirements contained in this Appendix B and applicable to the agreement.**

1. Evidence of Insurance Required Before Work Begins

No work under the agreement may be commenced until all insurance and bonding requirements contained in this Appendix B, or required by applicable law, have been complied with and evidence of such compliance satisfactory to City as to form and content has been filed with City. Contractor/Consultant must provide City with a Certificate of Insurance that clearly and unconditionally indicates that Contractor/Consultant has complied with all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement. If the Contractor/Consultant is a joint venture, the insurance certificate should name the joint venture, rather than the joint venture partners individually, as the primary insured. In accordance with the solicitation documents applicable to the agreement at the time Contractor/Consultant submits to City its executed agreement, Contractor/Consultant must satisfy all insurance and bonding requirements required by this Appendix B and applicable by law, and provide the required written documentation to City evidencing such compliance. In the event that Contractor/Consultant does not comply with such submittal requirements within the time period established by the solicitation documents applicable to the agreement, City may, in addition to any other rights City may have under the solicitation documents applicable to the agreement or under applicable law, make a claim against any bid security provided by Contractor/Consultant.

2. Minimum Financial Security Requirements

All companies providing insurance required by this Appendix B must meet certain minimum financial security requirements. These requirements must conform to the ratings published by A.M. Best & Co. in the current Best's Key Rating Guide - Property-Casualty. The ratings for each company must be indicated on the documentation provided by Contractor/Consultant to City certifying that all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement have been unconditionally satisfied.

For all agreements, regardless of size, companies providing insurance or bonds under the agreement must meet the following requirements:

- i) Best's Rating not less than A-,

- ii) Best's Financial Size Category not less than Class VII, and
- iii) Companies must be authorized to conduct and transact insurance contracts by the Insurance Commissioner, State of Georgia.
- iv) All bid, performance and payment bonds must be underwritten by a U.S. Treasury Circular 570 listed company.

If the issuing company does not meet these minimum requirements, or for any other reason is or becomes unsatisfactory to City, City will notify Contractor/Consultant in writing. Contractor/Consultant must promptly obtain a new policy or bond issued by an insurer acceptable to City and submit to City evidence of its compliance with these conditions.

Contractor/Consultant's failure to comply with all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement will not relieve Contractor/Consultant from any liability under the agreement. Contractor/Consultant's obligations to comply with all insurance and bonding requirements set forth in Appendix B and applicable to the agreement will not be construed to conflict with or limit Contractor/Consultant's/Consultant's indemnification obligations under the agreement.

3. Insurance Required for Duration of Contract

All insurance and bonds required by this Appendix B must be maintained during the entire term of the agreement, including any renewal or extension terms, and until all work has been completed to the satisfaction of City.

4. Notices of Cancellation & Renewal

Contractor/Consultant must, notify the City of Atlanta in writing at the address listed below by mail, hand-delivery or facsimile transmission, within 2 days of any notices received from any insurance carriers providing insurance coverage under this Agreement and Appendix B that concern the proposed cancellation, or termination of coverage.

Enterprise Risk Management
68 Mitchell St. Suite 9100
Atlanta, GA 30303
Facsimile No. (404) 658-7450

Confirmation of any mailed notices must be evidenced by return receipts of registered or certified mail.

Contractor/Consultant shall provide the City with evidence of required insurance prior to the commencement of this agreement, and, thereafter, with a certificate evidencing renewals or changes to required policies of insurance at least fifteen (15) days prior to the expiration of previously provided certificates.

5. Agent Acting as Authorized Representative

Each and every agent acting as Authorized Representative on behalf of a company affording coverage under this contract shall warrant when signing the

Acord Certificate of Insurance that specific authorization has been granted by the Companies for the Agent to bind coverage as required and to execute the Acord Certificates of Insurance as evidence of such coverage. City of Atlanta coverage requirements may be broader than the original policies; these requirements have been conveyed to the Companies for these terms and conditions.

In addition, each and every agent shall warrant when signing the Acord Certificate of Insurance that the Agent is licensed to do business in the State of Georgia and that the Company or Companies are currently in good standing in the State of Georgia.

6. Certificate Holder

The **City of Atlanta** must be named as certificate holder. All notices must be mailed to the attention of **Enterprise Risk Management** at **68 Mitchell Street, Suite, 9100, Atlanta, Georgia 30303**.

7. Project Number & Name

The project number and name must be referenced in the description section of the insurance certificate.

8. Additional Insured Endorsements Form CG 20 26 07 04 or equivalent

The City must be covered as Additional Insured under all insurance (except worker's compensation and professional liability) required by this Appendix B and such insurance must be primary with respect to the Additional Insured. **Contractor/Consultant must submit to City an Additional Insured Endorsement evidencing City's rights as an Additional Insured for each policy of insurance under which it is required to be an additional insured pursuant to this Appendix B. Endorsement must not exclude the Additional Insured from Products - Completed Operations coverage. The City shall not have liability for any premiums charged for such coverage.**

9. Mandatory Sub-Contractor/Consultant Compliance

Contractor/Consultant must require and ensure that all subContractor/Consultants/subconsultants at all tiers to be sufficiently insured/bonded based on the scope of work performed under this agreement.

10. Self Insured Retentions, Deductibles or Similar Obligations

Any self insured retention, deductible or similar obligation will be the sole responsibility of the contractor.

11. Task Order

Evidence of compliance with insurance requirements must be provided on a Task Order basis prior to the issuance of any Notice to Proceed.

B. Workers' Compensation and Employer's Liability Insurance

Contractor/Consultant must procure and maintain Workers' Compensation and Employer's Liability Insurance in the following limits to cover each employee who is or may be engaged in work under the agreement. :

Workers' Compensation. **Statutory**

Employer's Liability:

Bodily Injury by Accident/Disease **\$1,000,000 each accident**
Bodily Injury by Accident/Disease **\$1,000,000 each employee**
Bodily Injury by Accident/Disease **\$1,000,000 policy limit**

C. Commercial General Liability Insurance

Contractor/Consultant must procure and maintain Commercial General Liability Insurance on form (CG 00 00 01 or equivalent) in an amount not less than **\$1,000,000 per occurrence subject to a \$2,000,000 aggregate.** The following indicated extensions of coverage must be provided:

- Contractual Liability
- Broad Form Property Damage
- Premises Operations
- Fire Legal Liability
- Medical Expense
- Independent Contractor/Consultants/SubContractor/Consultants
- Products – Completed Operations
- Additional Insured Endorsement* (primary & non-contributing in favor of the City of Atlanta)
- Waiver of Subrogation in favor of the City of Atlanta

D. Commercial Automobile Liability Insurance

Contractor/Consultant must procure and maintain Automobile Liability Insurance in an amount not less than **\$1,000,000** Bodily Injury and Property Damage combined single limit. The following indicated extensions of coverage must be provided:

- Owned, Non-owned & Hired Vehicles
- Waiver of Subrogation in favor of the City of Atlanta

If Contractor/Consultant does not own any automobiles in the corporate name, non-owned vehicle coverage will apply and must be endorsed on either Contractor/Consultant's personal automobile policy or the Commercial General Liability coverage required under this Appendix B.

E. Property Coverage/Inland Marine

Contractor/Consultant shall procure and maintain all risk property coverage in an amount equal to replacement value for all equipment, furniture, fixtures, machinery and/or personal property.

F. Performance Bond and Payment Bond

Contractor/Consultant shall furnish a Payment Bond and a Performance Bond to the City in an amount equal to **100 percent of the total contract value** and for the duration of the entire term.

The person executing the Bonds on behalf of the surety shall file with the Bonds a general power of attorney unlimited as to amount and type of bonds covered by such power of attorney, and certified by an official of said surety.

Payment Bond

INSTRUCTIONS

1. This form is required for use in connection with the Agreement identified on its face. There shall be no deviation from this form without approval by the City.
2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of the form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an office of the corporation involved, evidence of this authority must be furnished.
3. Corporation executing the bond as surety must be among those appearing on the U.S. Treasury Department's most current list of approved sureties and must be acting within the amounts and limitations set forth therein.
4. Corporate surety shall be duly authorized by the Commissioner of Insurance of the State of Georgia to transact surety business in the State of Georgia.
5. Do not date this bond. The City will date this bond the same date or later than the date of the Agreement.
6. The Surety shall attach a duly authorized power-of-attorney authorizing signature on its behalf of any attorney-in-fact.
7. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Seal."
8. The name of each person signing this bond shall be typed or printed in the space provided.

Payment Bond

"City" City of Atlanta

"Project" Annual Contract for the Construction of Sidewalks, Driveways, Curbs & Gutters

"FC No." FC-7908

"Principal" (Legal Name and Business Address), _____

Type of Organization ("X" one):
 Individual
 Partnership
 Joint Venture
 Corporation

"Surety:" (Name and Business Address) _____

duly authorized by the Commissioner of Insurance of the State of Georgia to transact surety business in the State of Georgia.

"Agreement:" Agreement between Principal and City, dated ____ day of _____, 20____, regarding performance of Work relative to the Project.

"Penal Sum:" _____ Dollars (\$ _____).

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal and Surety hereto, as named above, are held and firmly bound to the City in the above Penal Sum for the payment of which well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, jointly and severally.

WHEREAS, the Principal and the City entered into the Agreement identified above;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal shall make payment of all Subcontractors and all persons supplying labor, Materials, machinery and Equipment for the performance of said work, this obligation shall be void; otherwise of full force and effect.

And the Surety to this bond, for value received, agrees that no modification, change, extension of time, alteration or addition to the terms of the Agreement or to the Work to be performed thereunder shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such modification, change, extension of time, alteration or addition to the terms of the Agreement or the Work.

It is agreed that this bond is executed pursuant to and in accordance with the provisions of O.C.G.A. Section 36-91-1 *et seq.* and is intended to be and shall be construed to be a bond in compliance with the requirements thereof, though not restricted thereto.

IN WITNESS WHEREOF, the Principal and the Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20____.

PRINCIPAL: _____

President/Vice President (Sign)

President/Vice President (Type or Print)

Attested to by:

Secretary/Assistant Secretary (Seal)

SURETY: _____

By: _____
Attorney-in-Fact (Sign)

Attorney-in-Fact (Type or Print)

APPROVED AS TO FORM

Associate/Assistant City Attorney

APPROVED

City's Chief Financial Officer

Performance Bond

INSTRUCTIONS

1. This form is required for use in connection with the Agreement identified on its face. There shall be no deviation from this form without approval by the City.
2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of the form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an office of the corporation involved, evidence of this authority must be furnished.
3. Corporation executing the bond as surety must be among those appearing on the U.S. Treasury Department's most current list of approved sureties and must be acting within the amounts and limitations set forth therein.
4. Corporate surety shall be duly authorized by the Commissioner of Insurance of the State of Georgia to transact surety business in the State of Georgia.
5. Do not date this bond. The City will date this bond the same date or later than the date of the Agreement.
6. The Surety shall attach a duly authorized power-of-attorney authorizing signature on its behalf of any attorney-in-fact.
7. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Seal."
8. The name of each person signing this bond shall be typed or printed in the space provided.

Performance Bond

"City" City of Atlanta

"Project" Annual Contract for the Construction of Sidewalks, Driveways, Curbs & Gutters

"FC No." FC-7908

"Principal" (Legal Name and Business Address)

Type of Organization ("X" one):
 Individual
 Partnership
 Joint Venture
 Corporation

"Surety:" (Name and Business Address)

duly authorized by the Commissioner of Insurance of the State of Georgia to transact surety business in the State of Georgia.

"Agreement:" Agreement between Principal and City, dated ____ day of _____, 20____, regarding performance of Work relative to the Project.

"Penal Sum:" _____.

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal and Surety hereto, as named above, are held and firmly bound to the City in the above Penal Sum for the payment of which well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, jointly and severally.

WHEREAS, the Principal and the City entered into the Agreement identified above;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal shall faithfully and fully comply with, perform and fulfill all of the undertakings, covenants, conditions and all other of the terms and conditions of said Agreement, including any and all duly authorized modifications of such Agreement, within the original term of such Agreement and any extensions thereof, which shall include, but not be limited to any obligations created by way of warranties and/or guarantees for workmanship and materials which warranty and/or guarantee may extend for a period of time of one year beyond completion of said Agreement, this obligation shall be void; otherwise, of full force and effect.

And the Surety to this bond, for value received, agrees that no modification, change, extension of time, alteration or addition to the terms of the Agreement or to the Work to be performed thereunder shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such modification, change, extension of time, alteration or addition to the terms of the Agreement or the Work.

It is agreed that this bond is executed pursuant to and in accordance with the provision of O.C.G.A. Section 13-10-1 and 36-91-1, *et seq.* and is intended to be and shall be construed to be a bond in compliance with the requirements thereof, though not restricted thereto.

IN WITNESS WHEREOF, the Principal and the Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20__.

PRINCIPAL: _____

President/Vice President (Sign)

President/Vice President (Type or Print)

Attested to by:

Secretary/Assistant Secretary (Seal)

SURETY: _____

By: _____
Attorney-in-Fact (Sign)

Attorney-in-Fact (Type or Print)

APPROVED AS TO FORM

Associate/Assistant City Attorney

APPROVED

City's Chief Financial Officer

APPENDIX C

LOCAL BIDDER PREFERENCE PROGRAM

APPENDIX C; Local Bidder Preference Program

TABLE OF CONTENTS

Statement of Policy.....2

Certification as a Local Bidder.....3

Criteria to be Certified as a Local Bidder.....4

Term of Certification.....5

Local Bidder Certification Application.....6

APPENDIX C; Local Bidder Preference Program

STATEMENT OF POLICY

The City of Atlanta (the “City”) has a significant interest in encouraging the creation of employment opportunities for its residents and for businesses located within the City. As a purchaser of goods and services, the City will benefit from expanded job and business opportunities for its residents and businesses through additional revenues generated by its activities. It is in the interest of the City and its residents to give preference on Local Projects to those Contractors who have direct physical and economic relationships with the City.

APPENDIX C; Local Bidder Preference Program

CERTIFICATION AS A LOCAL BIDDER

In order to be certified as a Local Bidder, a Contractor must submit a completed application to the Department of Procurement (“**DOP**”), and the applicant must be approved by the DOP.

A Contractor must submit a completed and signed application to become a Local Bidder before it will be allowed to receive a bid preference on a Local Project. In order to be approved as a Local Bidder and receive a bid preference on a Local Project, the application for approval as a Local Bidder and all supporting documents must be received by the DOP **no later than thirty (30) calendar days prior to the date the bids are received** on such Local Project. A Contractor who fails to submit an application for approval as a Local Bidder within thirty (30) calendar days prior to the date bids are received on an Local Project, and who otherwise meets the requirements for approval as a Local Bidder, shall be approved as a Local Bidder and receive a bid preference on such future Local Projects for which the date bids are received is at least thirty (30) calendar days after the date such application is received.

APPENDIX C; Local Bidder Preference Program

CRITERIA TO BE CERTIFIED AS A LOCAL BIDDER

To be certified as a Local Bidder, the Contractor **must** satisfy two (2) of the following criteria:

1. Verify that the Contractor's principal place of business is located in the City or that the Contractor has held a valid City business license for at least one (1) year prior to the date of the application.
2. Verify that a majority of the full time employees, chief officers, and managers of the Contractor have regularly conducted work and business in the City for at least one (1) year prior to the date of application.
3. Verify that a majority of the employees based at the Contractor's location(s) in the City have been residents of the City for at least one (1) year prior to the date of application.
4. Provide references or other means of verification acceptable to the DOP that the services the Contractor offers to the City have been provided by the Contractor in the City for at least one (1) year prior to the date of application. If the applicant is a Joint Venture or Mentor-Protégé team, each participant in the Joint Venture or Mentor-Protégé team must be approved independently as a Local Bidder in order for the Joint Venture or Mentor-Protégé team to receive the bid preference on Local Projects.

The application **must be typed, signed in blue ink** and provides instructions for required supporting documentation that Contractor must submit with the application for the criteria listed above.

APPENDIX C; Local Bidder Preference Program

TERM OF CERTIFICATION

The certification as a Local Bidder shall expire two (2) years from the date of the approval of the application. Following the expiration date, a business is no longer a Local Bidder. A Contractor must submit a new application for certification as a Local Bidder to the DOP and establish that it continues to meet the requirements contained in § 2-1188.1(d) in order to receive the bid preference on Local Projects.

Contractors certified as Local Bidders shall be under a continuing duty to immediately inform the DOP in writing of any changes in the Contractor's business if, as a result of such changes, the Contractor no longer satisfies the requirements contained in § 2-1188.1(d).

REQUIRED SUBMITALS WHEN PROJECT IS DESIGNATED AS LOCAL BIDDER PREFERENCE

Where bidders desire to receive a bid preference on this project, responses must include a copy of the City-issued Local Bidder Certificate or some other information which would confirm its local bidder preference certification status.

LOCAL BIDDER CERTIFICATION APPLICATION
 CITY OF ATLANTA, DEPARTMENT OF PROCUREMENT
 55 TRINITY AVE., SW, SUITE 1900, ATLANTA, GEORGIA 30303

PLEASE TYPE.

(ONLY APPROVED ELIGIBLE BIDDERS MAY BE CERTIFIED AS A LOCAL BIDDER. PLEASE PROVIDE A COPY OF YOUR NOTICE OF ELIGIBLE APPROVAL.)

I. BUSINESS NAME / DBA _____ STREET ADDRESS _____ CITY, STATE, ZIP CODE _____ TELEPHONE _____

CHECK ONE: PARTNERSHIP CORPORATION, GA SOLE PROPRIETORSHIP OTHER

PRINCIPAL OR CORPORATE OFFICE NAME _____ STREET ADDRESS _____ CITY, STATE, ZIP CODE _____ TELEPHONE _____

NAME OF OWNER (S) _____ TITLE _____ RESIDENCE ADDRESS _____ CITY, STATE, ZIP CODE _____ TELEPHONE _____

1. _____

2. _____

NAME OF OFFICERS OR PARTNERS: _____ TITLE _____ RESIDENCE ADDRESS _____ CITY, STATE, ZIP CODE _____ TELEPHONE _____

1. _____

2. _____

II. TO BE CERTIFIED AS A LOCAL BIDDER, AN ELIGIBLE BIDDER MUST SATISFY NO LESS THAN TWO (2) OF THE FOLLOWING CRITERIA LISTED BELOW. PLEASE SELECT TWO OF THE FOLLOWING CRITERIA WHICH YOU SATISFY TO APPLY FOR CERTIFICATION AS A LOCAL BIDDER. A COPY OF YOUR BUSINESS LICENSE, A COPY OF YOUR ELIGIBLE BIDDER'S CERTIFICATE AND ANY ADDITIONAL DOCUMENTATION MUST BE SUBMITTED WITH THIS APPLICATION TO VERIFY THAT YOU SATISFY THE SELECTED CRITERIA. INSTRUCTIONS FOR SUBMITTING DOCUMENTATION TO SATISFY EACH OF THE CRITERIA ARE LOCATED ON THE BACK OF THIS APPLICATION.

- _____ 1. Verify that the Eligible Bidder's principal place of business is located in the City of Atlanta or that the Eligible Bidder has held a valid City of Atlanta business license for at least one (1) year prior to the date of application.
- _____ 2. Verify that a majority of the full time employees, chief officers, and managers of the Eligible Bidder have regularly conducted work and business in the City of Atlanta for at least one (1) year prior to the date of application.
- _____ 3. Verify that a majority of the employees based at the Eligible Bidder's location(s) in the City of Atlanta have been residents of the City of Atlanta for a least one (1) year prior to the date of application.
- _____ 4. Provide references or other means of verification acceptable to the Department of Procurement that the services the Eligible Bidder offers to the City of Atlanta have been provided by the Eligible Bidder in the City of Atlanta for at least one (1) year prior to the date of application.

IF THE APPLICANT IS A JOINT VENTURE OR MENTOR-PROTÉGÉ TEAM, EACH PARTICIPANT IN THE JOINT VENTURE OR MENTOR-PROTÉGÉ TEAM MUST BE APPROVED INDEPENDENTLY AS A LOCAL BIDDER IN ORDER FOR THE JOINT VENTURE OR MENTOR- PROTÉGÉ TEAM TO RECEIVE THE BID PREFERENCE ON ELIGIBLE LOCAL PROJECTS.

III. CERTIFICATION: THIS INFORMATION HEREIN IS REQUIRED BY § 2-1188.1 CODE OF ORDINANCES OF THE CITY OF ATLANTA, GEORGIA.

I (NAME) _____ BEING THE (TITLE) _____

OF THE BUSINESS FIRM NAMED, DO HEREBY APPLY FOR LOCAL BIDDER CERTIFICATION. IN ACCORDANCE WITH LOCAL PREFERENCE ORDINANCE, CITY OF ATLANTA, GEORGIA: THE UNDERSIGNED CERTIFIES THAT HE/SHE IS THE PERSON DULY AUTHORIZED BY THE BUSINESS HEREIN NAMED TO FILE THIS APPLICATION FOR LOCAL BIDDER CERTIFICATION, INCLUDING THE ACCOMPANYING DOCUMENTATION AND STATEMENTS, AND THAT SAME ARE TRUE CORRECT AND COMPLETE.

APPLICANT SIGNATURE _____ THE _____ DAY OF _____ 20_____.

SIGNATURE MUST BE IN **BLUE** INK!

GENERAL INFORMATION FOR APPLICANTS

- (A) *Applicability: This local preference program shall apply to any City contract as described in Code § 2-1188, excluding competitive sealed proposals under Code § 2-1189, small purchases not exceeding \$20,000 under Code § 2-1190, sole source procurement under Code § 2-1191, emergency procurement under Code § 2-1192, competitive selection procedures for professional and consultant services under Code § 2-1193, and federally-funded projects (referred to herein as "Eligible Local Projects").*
- (B) *An Eligible Bidder must submit a completed and signed written application to become a Local Bidder **before** it will be allowed to receive a bid preference on an Eligible Local Project.*
- (C) *In order to be approved as a Local Bidder and receive a bid preference on an Eligible Local Project, the application for approval as a Local Bidder and **all supporting documents** must be received by the Department of Procurement no later than thirty (30) calendar days prior to the date bids are received on such Eligible Local Project.*
- (D) *Term: The certification as a Local Bidder shall expire two (2) years from the date of the approval of the application. Following the expiration date, a business is no longer a Local Bidder. An Eligible Bidder must submit a new application for certification as a Local Bidder to the Department of Procurement and establish that it continues to meet the requirements of § 2-1188.1 in order to continue receiving the bid preference on Eligible Local Projects.*
- (E) *Eligible Bidders certified as Local Bidders shall be under a continuing duty to immediately inform the Department of Procurement in writing of any changes in the Eligible Bidder's business, if as a result of such changes, the Eligible Bidder no longer satisfies the requirements.*

ADDITIONAL INSTRUCTIONS FOR COMPLETING SECTION II

For each of the criteria you selected in Section II, the Department of Procurement requires that you submit the following supporting documentation with this application:

Line 1

If you have a City of Atlanta business license, please provide a copy. If you do not have a City of Atlanta business license, please provide a copy of Articles of Incorporation or Organization, or a copy of the Eligible Bidder's most recent federal income tax return, or if the Eligible Bidder is a partnership, provide a copy of the Partnership Agreement.

Line 2

Provide a list of all full time employees, chief officers, and managers at the Eligible Bidder's locations. For those employees, chief officers, and managers who regularly conducted work and business in the City of Atlanta for a least one (1) year prior to the date of application, please provide employee's name, business address, business phone number, a brief description of the work or business performed in the City of Atlanta, and the number of years such work or business has been performed in the City of Atlanta.

Line 3

Provide a list of all employees based at Eligible Bidder's locations. For those employees who have been residents of the City of Atlanta for at least one year prior to the date of application, provide employee's name, address, phone number and number of years at residence.

Line 4

Provide a notarized letter from at least three (3) customers of the Eligible Bidder, which letters shall include the following information: (a) a description of services provided by the Eligible Bidder to the customer that were performed at least one (1) year prior to the date of application; (b) the total dollar value of the services provided at least one (1) year prior to the date of application; and (c) a statement that the services the Eligible Bidder offers to the City of Atlanta have been provided by the Eligible Bidder in the City of Atlanta for at least one (1) year prior to the date of application.