COLUMBUS CONSOLIDATED GOVERNMENT

Georgia's First Consolidated Government

FINANCE DEPARTMENT
PURCHASING DIVISION

1111 1st AVENUE - 1st FLOOR, COLUMBUS, GEORGIA 31901
P. O. BOX 1340, COLUMBUS, GEORGIA 31902-1340
706-225-4087 | ColumbusGA.gov

November 10, 2026

REQUEST FOR BIDS: **RFB No. 27-0017**	Qualified contractors are requested to submit bids, subject to conditions and instructions as specified, for the following: **CARVER LAKE PARK – PHASE 1**
GENERAL SCOPE	The project's Base Bid consists of improvements to Carver Lake Park, including demolition and removal of existing site improvements; clearing and grubbing; earthwork and grading; construction and reconstruction of access drives and parking areas; asphalt pavement, permeable pavers, concrete sidewalks, curb and gutter; pedestrian trails; playground and pavilion areas; fencing; site signage and pavement markings; landscaping and site restoration; and associated storm drainage and utility improvements. The Work also includes construction of a 10-foot-wide multi-use trail, parking and accessible parking improvements, pedestrian crossings, park benches, landscape islands, and supporting infrastructure associated with the redevelopment of the park. Recreational improvements include playground and pavilion areas and improvements surrounding the existing splash pad.
MANDATORY SITE VISIT	**A Mandatory Site Visit** is scheduled for **11:00 AM (Eastern) on Monday, November 30, 2026.** Contractors shall convene and sign in at Carver Park Recreation Center, which is located at 6665 Hunter Road, Columbus, Georgia 31907. **Refer to page 6 for additional information.**
INSTRUCTIONS TO OBTAIN SPECIFICATIONS	**This RFB document is considered a part of the Contract Documents (Plan Book).** Copies of Bidding Documents may be purchased from Memphis Reprographics for a fee of $50.00. Details for ordering are available at https://bidding.bargedesign.com or via phone at 901-381-9811. No part of the purchase price will be refunded.
DUE DATE	**DECEMBER 16, 2026 - 2:30 PM (Eastern)** **Responses must be submitted via OpenBids (formerly DemandStar) on or before the due date. A virtual opening will be held during the 3:00 PM hour of the due date.** *Responding vendors are not required but are invited to attend the opening.* If you wish to attend the virtual opening, use one of the Microsoft Teams meeting options**:** Click here to join the meeting **or call in (audio only)** +1 478-239-0725,,855808406# United States, Macon Phone Conference ID: 855 808 406# Find a local number | Reset PIN. ***Note: Columbus Consolidated Government is not responsible for technical issues that may arise during the virtual opening.***
SUBMISSION REQUIREMENTS	**DemandStar is now OpenBids: See *Appendix A* for Submission Requirements, Submission Requirements Checklist, and OpenBids Registration and Submission instructions.**
ADDENDA	Any and all addenda will be posted on the Bid Opportunities page of the Finance Department/Purchasing Division, https://www.columbusga.gov/finance/Bid-Opportunities. Vendors are responsible for periodically visiting the web page for addenda, both before the due date and prior to submitting a bid.
NO BID RESPONSE	If you are not interested in this solicitation, refer to page 3.

Andrea J. McCorvey,
Purchasing Manager

IMPORTANT INFORMATION
e-Notification

The City uses the Georgia Procurement Registry e-notification system. You must register with GA@WORK (formerly Team Georgia Marketplace) to receive future procurement notifications via: **https://doas.ga.gov/state-purchasing/getting-started-supplier**.

If you have any questions or encounter any problems while registering, please contact the State Purchasing Division:

Telephone: **404-657-6000**

Email: **procurementhelp@doas.ga.gov**

STATEMENT OF "NO BID SUBMISSION"

NOTIFY THE PURCHASING DIVISION IF YOU DO NOT INTEND TO SUBMIT A BID:

TO: Heather Biddle, Buyer
Email BidOpportunities@columbusga.org

We, the undersigned decline to submit a bid for **RFB No. 27-0017**, for **Carver Lake Park – Phase 1**, for the following reason(s):

_____Specifications are too "tight", i.e. geared towards one brand or manufacturer (explain below).
_____There is insufficient time to respond.
_____We do not offer this product and/or service.
_____We are unable to meet specifications.
_____We are unable to meet bond requirements.
_____Specifications are unclear (explain below).
_____We are unable to meet insurance requirements.
_____Other (specify below)

Comments_____

_____

_____

_____

_____

COMPANY NAME:_____

AGENT:_____

DATE:_____

EMAIL:_____

TELEPHONE NUMBER:_____

GENERAL PROVISIONS

THE GENERAL PROVISIONS SHALL BE DEEMED AS PART OF THE BID SPECIFICATIONS. The provisions of the Procurement Ordinance for the Consolidated Government of Columbus, Georgia, as adopted and amended by Council, shall apply to all invitations for bids and award of all contracts and is specifically incorporated herein by reference.

NOTICE TO VENDORS

Per Sec. 2-3.05 of the Procurement Ordinance, neither the mayor nor any member of the Columbus Council shall submit any bid to the Consolidated Government, nor shall the mayor or any member of the Columbus Council own or have a substantial pecuniary interest in any business that submits a bid to the Consolidated Government.

Per Sect. 2-3.06 of the Procurement Ordinance, no member of any board or authority or commission or other independent or subordinate entity of the Consolidated Government shall submit any bid to the Consolidated Government or have a substantial pecuniary interest in any business that submits a bid to the Consolidated Government if such bid pertains to the board or authority or commission on which such person holds such membership.

BID BOND SUBMISSION

Provide a bid surety in the form of a Cashier's Check, Certified Check, or Bid Bond payable to the Consolidated Government of Columbus, Georgia in the amount of five percent (5%) of the sum of the bid submittal. **If submitting a check, responding vendors must include a copy of the instrument in their OpenBids submission and mail the physical check**. The exterior of the mailed package must display the bid number and bid name and be addressed to 'Attention: Heather Biddle, Buyer', Columbus Consolidated Government, PO Box 1340, Columbus, GA 31902. **The bid security will be forfeited to the City if successful bidder fails to complete the firearms transfer within ten (10) calendar days following completion of the required publication dates.**

PERFORMANCE AND PAYMENT BONDS

The successful Bidder shall, without any additional cost to the City, furnish Performance and Payment Bonds, both in the amount of one hundred percent (100%) of the total contract amount, within ten (10) calendar days after notification of award. Such bond shall be issued from a reliable surety company, licensed to do business in the state of Georgia and acceptable to the City.

BUSINESS LICENSE

The successful contractor shall submit a copy of the Business License (Occupation License) that is required to conduct business at their location. If awarded the contract, the successful contractor must obtain a business license from the City of Columbus. However, if the business is located in Georgia and has proof of being properly licensed by a municipality in Georgia, and paid applicable occupation taxes in that city, the contractor will not be required to pay occupation taxes in Columbus, GA. If you have questions regarding this requirement, please contact the Revenue Division at 706-225-3780.

ADDENDA

Each Bidder must include the Addenda Acknowledgment form with their submittal; failure to do so may render the Bidder's submittal non-responsive and ineligible for further consideration. The Purchasing Division will post any and all addenda on the Bid Opportunities web page of Columbus Consolidated Government, at https://www.columbusga.gov/finance/Bid-Opportunities. Bidders are responsible for periodically visiting the web page, to check for addenda, prior to the bid due date and before submitting a bid.

EQUAL OPPORTUNITY

Columbus Consolidated Government in accordance with Title VI of the Civil Rights Act of 1964 and 78 Stat. 252, 42 USC 2000d—42 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, part 21, Nondiscrimination in federally assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into

pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, sex, or national origin in consideration for an award.

REJECTION OF BIDS

The Columbus Consolidated Government reserves the right to reject any and all bids.

MANDATORY SITE VISIT

ATTENDANCE CONFIRMATION FORM

Date: _____

To: Heather Biddle, Buyer
Email: BidOpportunities@ColumbusGA.org

Re: Caver Lake Park – Phase 1; RFB No. 27-0017

A Mandatory Site Visit is scheduled for 11:00 AM (Eastern) on Monday, November 30, 2026. Contractors shall convene and sign in at Carver Park Recreation Center, which is located at 6665 Hunter Road, Columbus, Georgia, 31907.

The purpose of the site visit is to allow contractors to view and measure the work area. The City will not be bound by any oral representations, clarifications or changes made at the site visit. If you have questions or requests for clarification resulting from the site visit, submit said inquires in the manner prescribed on pages 7 and 8 of these specifications.

Contractors shall sign an attendance sheet at the Mandatory Site Visit/Pre-Bid Conference. Only contractors who sign the attendance sheets will receive future addenda and will be allowed to submit a bid for this project. The Purchasing Division will deem non-responsive any and all bids received from contractors who were not represented at the site visits.

Complete and return this form to confirm attendance:

_____
Company Name # of Attendees

_____
Contact Person Email Address

_____
Mailing Address City State Zip

_____
Telephone Number Fax Number

DO YOU HAVE QUESTIONS, CONCERNS OR NEED CLARIFICATION ABOUT THIS SOLICITATION?

COMMUNICATION CONCERNING ANY SOLICITATION CURRENTLY ADVERTISED MUST TAKE PLACE IN WRITTEN FORM AND ADDRESSED TO THE PURCHASING DIVISION.

ANY INQUIRY RECEIVED BY NOON (12:00 PM) EASTERN TIME, ON THE FIFTH CALENDAR DAY PRIOR TO THE DATE FIXED FOR THE OPENING OF BIDS, WILL BE GIVEN CONSIDERATION.

ALL QUESTIONS OR CLARIFICATIONS CONCERNING THIS SOLICITATION SHALL BE SUBMITTED IN WRITING. THE CITY WILL NOT ORALLY OR TELEPHONICALLY ADDRESS ANY QUESTION OR CLARIFICATION REGARDING BID/PROPOSAL SPECIFICATIONS. IF A VENDOR VISITS OR CALLS THE PURCHASING DIVISION WITH SUCH QUESTIONS, HE OR SHE WILL BE INSTRUCTED TO SUBMIT THE QUESTIONS IN WRITING.

ALL CONTACT CONCERNING THIS SOLICITATION SHALL BE MADE THROUGH THE PURCHASING DIVISION. BIDDERS SHALL NOT CONTACT CITY EMPLOYEES, DEPARTMENT HEADS, USING AGENCIES, EVALUATION COMMITTEE MEMBERS OR ELECTED OFFICIALS WITH QUESTIONS OR ANY OTHER CONCERNS ABOUT THE SOLICITATION. QUESTIONS, CLARIFICATIONS, OR CONCERNS SHALL BE SUBMITTED TO THE PURCHASING DIVISION IN WRITING. IF IT IS NECESSARY THAT A TECHNICAL QUESTION NEEDS ADDRESSING, THE PURCHASING DIVISION WILL FORWARD SUCH TO THE USING AGENCY, WHO WILL SUBMIT A WRITTEN RESPONSE.

THE PURCHASING DIVISION WILL FORWARD WRITTEN RESPONSES TO THE RESPECTIVE BIDDER OR IF IT BECOMES NECESSARY TO REVISE ANY PART OF THIS SOLICITATION, A WRITTEN ADDENDUM WILL BE ISSUED TO ALL BIDDERS.

THE CITY IS NOT BOUND BY ANY ORAL REPRESENTATIONS, CLARIFICATIONS, OR CHANGES MADE TO THE WRITTEN SPECIFICATIONS BY CITY EMPLOYEES, UNLESS SUCH CLARIFICATION OR CHANGE IS PROVIDED TO THE BIDDERS IN A WRITTEN ADDENDUM FROM THE PURCHASING MANAGER.

BIDDERS ARE INSTRUCTED TO USE THE ENCLOSED "QUESTION/CLARIFICATION FORM" TO FAX OR EMAIL QUESTION.

ANY REQUEST, AFTER A SOLICITATION HAS CLOSED AND PENDING AWARD, MUST ALSO BE SUBMITTED IN WRITING TO THE PURCHASING DIVISION.

QUESTION/CLARIFICATION FORM

DATE: _____

TO: Heather Biddle, Buyer
Email BidOpportunities@ColumbusGA.org

RE: Carver Lake Park – Phase 1; RFB No. 27-0017

Questions and requests for clarification must be submitted by noon (12:00 PM) Eastern on the fifth calendar day prior to the date fixed for the opening of bids.

From: _____
Company Name Website

_____
Representative Email Address

_____
Complete Address City State Zip

_____
Telephone Number Fax Number

E-VERIFY AFFIDAVIT

Pursuant to O.C.G.A. § 13-10-91, a public employer shall not enter into a contract for the performance of services unless the contractor registers and participates in the federal work authorization program. If a supplier is providing services under a contract with a total compensation amount of $2,500 or greater, (even if such services will be performed outside of the State of Georgia), DOAS requires a notarized affidavit from the supplier attesting to the following:

(A) The affiant has registered with, is authorized to use, and uses the federal work authorization program;

(B) The user identification number and date of authorization for the affiant;

(C) The affiant will continue to use the federal work authorization program throughout the contract period; and

(D) The affiant will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the same information required by subparagraphs (A), (B), and (C) of this paragraph.

Additional information regarding the State's E-Verify requirements can be found at: https://www.audits2.ga.gov/wp-content/uploads/2021/10/13-10-91.pdf.

A completed, notarized/stamped E-Verify Affidavit must be included with sealed proposal; failure to do so will render the firm's or individual's proposal non-responsive and ineligible for award consideration.

CONTRACTOR E-VERIFY AFFIDAVIT

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 ***Columbus Consolidated Government*** 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 the 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:

_____

Company ID Number ***(numerical, 4-7 digits)*** Date of Authorization

****See www.everify.gov to access your E-Verify Company Identification Number.**

_____

Name and Address of Contractor

Carver Lake Park – Phase 1; RFB No. 27-0017

Name of Project

Columbus Consolidated Government

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing 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:

_____

A properly completed, stamped/notarized E-Verify Affidavit must be included with sealed proposal; failure to do so will render the firm's proposal non-responsive and ineligible for further consideration.

GEORGIA SECURITY AND IMMIGRATION COMPLIANCE"
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 ***Columbus Consolidated Government*** 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 that a sub-subcontractor has received an affidavit from any other contracted sub-subcontractor, the undersigned subcontractor must forward, within five business days of receipt, a copy of the notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____ _____
Company ID Number ***(numerical, 4-7 digits)*** Date of Authorization

Columbus Consolidated Government _____
Name of Public Employer Name of Contractor

Carver Lake Park – Phase 1; RFB No. 27-0017
Name of Project

I hereby declare under penalty of perjury that the foregoing 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:

_____

"GEORGIA SECURITY AND IMMIGRATION COMPLIANCE"
Sub-subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(4)

By executing this affidavit, the undersigned sub-subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation that is engaged in the physical performance of services under a contract for

_____

(Name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract)

and

_____

(Name of Contractor)

on behalf of ***Columbus Consolidated Government*** 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 sub-subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned sub-subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the sub-subcontractor with the information required by O.C.G.A. § 13-10-91(b). The undersigned sub-subcontractor shall submit, at the time of such contract, this affidavit to

_____

(Name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract)

Additionally, the undersigned sub-subcontractor will forward notice of the receipt of any affidavit from a sub-subcontractor to

_____

(Name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract)

Sub-subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____

Company ID Number ***(numerical, 4-7 digits)*** Date of Authorization

Columbus Consolidated Government _____

Name of Public Employer Name of Contractor

Carver Lake Park – Phase 1; RFB No. 27-0017

Name of Project

I hereby declare under penalty of perjury that the foregoing 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: _____

COMMUNICATION CONCERNING THIS SOLICITATION

THIS PAGE MUST BE SIGNED AND RETURNED WITH THE VENDOR'S BID/PROPOSAL. FAILURE TO INCLUDE THIS FORM WILL AUTOMATICALLY RENDER VENDOR'S RESPONSE NON-RESPONSIVE.

ALL QUESTIONS OR CLARIFICATIONS CONCERNING THIS SOLICITATION SHALL BE SUBMITTED IN WRITING. THE CITY WILL NOT ORALLY OR TELEPHONICALLY ADDRESS ANY QUESTION OR CLARIFICATION REGARDING BID/PROPOSAL SPECIFICATIONS. IF A VENDOR VISITS OR CALLS THE PURCHASING DIVISION WITH SUCH QUESTIONS, HE OR SHE WILL BE INSTRUCTED TO SUBMIT THE QUESTIONS IN WRITING.

ALL CONTACT CONCERNING THIS SOLICITATION SHALL BE MADE THROUGH THE PURCHASING DIVISION. BIDDERS SHALL NOT CONTACT CITY EMPLOYEES, DEPARTMENT HEADS, USING AGENCIES, EVALUATION COMMITTEE MEMBERS, INCLUDING NON-CCG EMPLOYEES, CONTRACTED PERSONNEL ASSOCIATED WITH THIS PARTICULAR PROJECT (I.E. ARCHITECTS, ENGINEERS, CONSULTANTS), OR ELECTED OFFICIALS WITH QUESTIONS OR ANY OTHER CONCERNS ABOUT THE SOLICITATION. QUESTIONS, CLARIFICATIONS, OR CONCERNS SHALL BE SUBMITTED TO THE PURCHASING DIVISION IN WRITING. IF IT IS NECESSARY THAT A TECHNICAL QUESTION NEEDS ADDRESSING, THE PURCHASING DIVISION WILL FORWARD SUCH TO THE USING AGENCY, WHO WILL SUBMIT A WRITTEN RESPONSE.

THE PURCHASING DIVISION WILL FORWARD WRITTEN RESPONSES TO THE RESPECTIVE BIDDER. IF IT BECOMES NECESSARY TO REVISE ANY PART OF THIS SOLICITATION, A WRITTEN ADDENDUM WILL BE ISSUED TO ALL BIDDERS.

THE CITY IS NOT BOUND BY ANY ORAL REPRESENTATIONS, CLARIFICATIONS, OR CHANGES MADE TO THE WRITTEN SPECIFICATIONS BY CITY EMPLOYEES, UNLESS SUCH CLARIFICATION OR CHANGE IS PROVIDED TO THE BIDDERS IN A WRITTEN ADDENDUM FROM THE PURCHASING MANAGER.

BIDDERS ARE INSTRUCTED TO USE THE ENCLOSED "QUESTION/CLARIFICATION FORM" TO FAX OR EMAIL QUESTION. **QUESTIONS AND REQUESTS FOR CLARIFICATION MUST BE SUBMITTED BY THE DEADLINE LISTED ON "QUESTION/CLARIFICATION FORM".**

ANY REQUEST/CONCERN/PROTEST, AFTER A SOLICITATION HAS CLOSED AND PENDING AWARD, MUST ALSO BE SUBMITTED IN WRITING TO THE PURCHASING DIVISION.

I agree to forward all communication about this solicitation, in writing, to the Purchasing Division. I understand that communication with other persons, other than the Purchasing Division, will render my Bid/Proposal response non-responsive and I will no longer be considered in the solicitation process.

Vendor Name: _____

Print Name of Authorized Agent: _____

Signature of Authorized Agent: _____

DBE PARTICIPATION

CONSISTENT WITH THE PROCUREMENT ORDINANCE FOR THE CONSOLIDATED GOVERNMENT OF COLUMBUS, GEORGIA; THE CITY IS COMMITTED TO USING DISADVANTAGED BUSINESS ENTERPRISES (DBES) TO THE FULLEST EXTENT POSSIBLE IN ALL FTA ASSISTED PROCUREMENT CONTRACTS, CONSTRUCTION PROJECTS, AS WELL AS THE DAY-TO-DAY PROCUREMENT NEEDS OF THE CITY.

EACH BIDDER IS RESPONSIBLE FOR MAKING A GOOD FAITH EFFORT TO MEET OR EXCEED THE 10% WOMEN/MINORITY (DBE) PARTICIPATION GOAL IDENTIFIED BY THE CITY. THEREFORE, BIDDERS SHOULD UTILIZE THE SERVICES OF WOMEN/MINORITY (DBE) SUBCONTRACTORS IN ANY AREA POSSIBLE IN ORDER TO REACH THE CITY'S GOAL.

THE CITY RESERVES THE RIGHT TO REQUEST BIDDER SEEK ADDITIONAL DBE PARTICIPATION IF THE BIDDER'S DBE PARTICIPATION IS LESS THAN THE CITY'S 10% GOAL.

IN THE EVENT A DBE SUBCONTRACTOR IS NOT AVAILABLE OR UNABLE TO PERFORM ANY PORTION OF THIS PROJECT; THE PRIME CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING ENOUGH INFORMATION TO ENABLE THE CITY TO DETERMINE WHETHER EFFORTS MADE TO CONTACT DBE SUBCONTRACTORS WERE GOOD-FAITH EFFORTS. FAILURE TO PROVIDE THE INFORMATION WILL RENDER THE VENDOR'S BID INCOMPLETE.

DBE ATTACHMENT I IS A BINDING PART OF THE BID RESPONSE. THE CITY EXPECTS THE SUCCESSFUL BIDDER TO UTILIZE THE DBE SUBCONTRACTORS LISTED ON DBE ATTACHMENT I. CONSEQUENTLY, THE SUCCESSFUL BIDDER MUST FORWARD ANY CHANGES IN DBE UTILIZATION TO THE PURCHASING DIVISION.

THE PRIME CONTRACTOR SHALL HAVE A VALID STATE OF GEORGIA BUSINESS LICENSE. IT IS THE RESPONSIBILITY OF THE PRIME CONTRACTOR TO ENSURE THAT ALL SUBCONTRACTORS HAVE VALID GEORGIA BUSINESS LICENSES.

DBE PARTICIPATION
ATTACHMENT I

(CONTRACTORS ARE REQUIRED TO COMPLETE AND RETURN THIS SHEET WITH SEALED BID. THE CITY RESERVES THE RIGHT TO REQUEST THE FORM OF ANY BIDDER, IF NOT INCLUDED WITH BID.)

Consistent with the Procurement Ordinance for the Consolidated Government of Columbus, Georgia; the City is committed to using Disadvantaged Business Enterprises (DBEs) to the fullest extent possible in all FTA assisted procurement contracts, construction projects, as well as the day to day procurement needs of the City. Therefore, prime contractors who bid on this project shall seek the services of DBE sub-contractors to perform portions of the work, where feasible.

List below all DBE subcontractors, suppliers, service firms, etc. expected to work on this project. Show complete name, address, phone number, owner and total dollars committed for all subcontract work by DBEs. **IF THE PRIME CONTRACTOR IS A CERTIFIED DBE, PLEASE STATE BELOW. IF VENDOR IS NOT UTILIZING ANY SUBCONTRACTORS, PLEASE STATE BELOW.**

PARTICIPATING DBE SUBCONTRACTORS

NAME OF DBE COMPANY ADDRESS, PHONE NUMBER, OWNER	PROJECT WORK ASSIGNED	DBE CERTIFICATION
Name: _____ **Owner:** _____ **Address:** _____ _____ **Telephone:** _____	**Work:** _____ _____ _____ **Amount: $**_____	**Certifying Agency:** _____ _____ _____
Name: _____ **Owner:** _____ **Address:** _____ _____ **Telephone:** _____	**Work:** _____ _____ _____ **Amount: $**_____	**Certifying Agency:** _____ _____ _____
Name: _____ **Owner:** _____ **Address:** _____ _____ **Telephone:** _____	**Work:** _____ _____ _____ **Amount: $**_____	**Certifying Agency:** _____ _____ _____

Columbus Consolidated Government is a member of the Georgia Unified Certification Program (UCP), in which Georgia Department of Transportation is the certifying agency for Disadvantaged Business Enterprises (DBEs). The following is a link to the UCP Directory: https://www.dot.ga.gov/GDOT/pages/business.aspx**.**

I UNDERSTAND THAT THIS PAGE IS CONSIDERED A BINDING PART OF MY BID RESPONSE. The City expects the above listed DBE subcontractor(s) to be utilized on this project. Consequently, any changes in DBE utilization shall be forwarded to the Purchasing Division, in the event I am awarded the contract.

COMPANY NAME **AUTHORIZED SIGNATURE** **DATE**

DBE PARTICIPATION
ATTACHMENT II

(BIDDERS ARE REQUIRED TO COMPLETE AND RETURN THIS SHEET WITH BID PACKAGE. THE CITY RESERVES THE RIGHT TO REQUEST THE FORM OF ANY BIDDER, IF NOT INCLUDED WITH BID PACKAGE.)

Important: In the event a DBE subcontractor is not available or unable to perform any portion of this project; the Prime contractor shall provide enough information to enable the City to determine whether good-faith efforts were made to contact DBE subcontractors. **(IF THE PRIME CONTRACTOR IS A CERTIFIED DBE, PLEASE STATE BELOW)**

List the name, address, and phone number of DBE subcontractors contacted for participation in this project:

NAME OF DBE SUBCONTRACTOR CONTACTED:	DATE CONTACTED	ADDRESS	PHONE NUMBER

COMPANY NAME **AUTHORIZED SIGNATURE** **DATE**

CONFLICT OF INTEREST AFFIDAVIT:

THIS PAGE MUST BE SIGNED, NOTARIZED/STAMPED AND RETURNED WITH THE VENDOR'S BID. FAILURE TO INCLUDE THIS FORM WILL AUTOMATICALLY RENDER VENDOR'S BID NON-RESPONSIVE.

Pursuant to Columbus Georgia Code Part I – Charter, Appendix Two Code of Ethics and Prohibited Practices:

I hereby declare that any person(s) employed by the City of Columbus, who has direct or indirect personal or financial interest in this solicitation, has been identified and the interest disclosed below. (Please include in your disclosure any interest which you know of).

An example of a direct interest would be a City of Columbus employee, City of Columbus City Council Member, who would be paid to perform services if awarded the contract.

An example of indirect interest would be a City of Columbus employee who is related to any officers, employees, principal, or shareholders of your firm or to you. (If in doubt as to status or interest, please disclose to the extent known).

CONFLICT OF INTEREST: ☐ YES ☐ NO

Disclosed Conflict of Interests:

_____

_____

_____

I hereby certify that the information on this form is complete and accurate. If necessary, I will provide the information required to verify this data (e.g., pay stubs, bank account statements, etc.). I, therefore, authorize such verification, and I will provide the supporting documentation, if necessary.

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

Executed on _____, _____, 20 ___ in _____ (city), _____ (state).

_____

Vendor Name

_____

Signature of Authorized Officer or Agent **Printed Name and Title**

Subscribed and sworn before me on this the _____ day of _____, 20___.

_____

NOTARY PUBLIC SIGNATURE

_____

PRINT NAME OF NOTARY PUBLIC

My Commission Expires: _____

FEDERAL COMPLIANCE

In the event a procurement under this contract is federally funded, the Contractor agrees to comply with all federal statutes relating to nondiscrimination, labor standards, and environmental compliance. The Contractor will be notified if the procurement is federally funded.

With regards to **"Rights to Inventions Made Under a Contract or Agreement,"** If the Federal award meets the definition of "funding agreement" under 37 CFR § 401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

Contractor agrees to be wholly compliant with the provisions of **2 CFR 200, Appendix II**. Additionally, for work to be performed under the Agreement or subcontract thereof, including procurement of materials or leases of equipment.

Contractor shall comply and shall notify each potential subcontractor or supplier of the Contractor's federal compliance obligations. These may include, but are not limited to:

(a) **Title VII of the Civil Rights Act of 1964 (P.L. 88-352)** which prohibits discrimination on the basis of race, color or national origin;
(b) **Title IX of the Education Amendments of 1972**, as amended (20 U.S.C. §§ 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex;
(c) the **Fair Labor Standards Act of 1938 (29 USC 676 et. seq.**),
(d) **Section 504 of the Rehabilitation Act of 1973, as implemented by Executive Orders 11914 and 11250)**, which prohibits discrimination on the basis of handicaps and the Americans with Disabilities Act of 1990;
(e) the **Age Discrimination in Employment Act of 1967 (29 USC 621 et. seq.)** and the Age Discrimination Act of 1974, as amended (42 U.S.C. §§ 6101-6107), which prohibits discrimination on the basis of age;
(f) the **Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255)**, as amended, relating to nondiscrimination on the basis of drug abuse;
(g) the **Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616)**, as amended, relating to the nondiscrimination on the basis of alcohol abuse or alcoholism;
(h) **§§ 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. 290 dd-3 and 290 ee-3)**, as amended, relating to confidentiality of alcohol and drug abuse patient records;
(i) **Title VIII of the Civil Rights Act of 1968 (42 U.S.C. § 3601 et seq.)**, as amended, relating to nondiscrimination in the sale, rental or financing of housing;
(j) any other nondiscrimination provisions in any specific statute(s) applicable to any Federal funding for this Agreement;
(k) the requirements of any other nondiscrimination statute(s) which may apply to this Agreement;
(l) applicable provisions of the **Clean Air Act (42 U.S.C. §7401 et seq.)**, the **Federal Water Pollution Control Act, as amended (33 U.S.C. §1251 et seq.)**, **Section 508 of the Clean Water Act (33 U.S.C. 1368),** Permits required by **Section 404 of the Clean Water Act**, **Executive Order 11738**, **Endangered Species Act (P.L. 93-205)**, and the **Environmental Protection Agency regulations at 40 CPR Part 15**;
(m) **DBE requirements** found at **40 CFR Part 33**, **Executive Order 11246**, and **Equal Employment Opportunity** regulations at **41 CFR § 60-4**;
(n) applicable provisions of the **Davis-Bacon Act (40 U.S.C. 276a - 276a-7**) as it relates to cleanup activities, the **Copeland Act (40 U.S.C. 276c)**, the **Anti-Kickback Act (40 USC § 3145)**, the **OSHA Worker Health & Safety Standard (29 CFR § 1910.120)**, and the **Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333)**, as set forth in Department of Labor Regulations at 20 CPR 5.5a;
(o) applicable provisions of **Uniform Relocation Act (40 USC § 61)** and the **National Historic Preservation Act (16 USC § 470)**;
(p) the mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the **Energy Policy and Conservation Act (P.L. 94-163).**
(q) the Buy America sourcing requirements in the **Build America, Buy America Act (41 U.S.C. § 8301-8305);**
(r) the general provisions of **Section 3** offering economic opportunities for low-income persons **(12 U.S.C. 1701u).**

To demonstrate acknowledgement and understanding of the above listed Federal Requirements, vendor is required to sign below and return with bid response:

Vendor Name:_____

Signature of Authorized Agent: _____

Print Name and Title of above Agent: _____

APPENDIX A

OPENBIDS
SUBMISSION INFORMATION
(Formerly DemandStar)

Responses must be submitted via OpenBids. See following pages for Submission Requirements Checklist, Registering for OpenBids and Responding to an Electronic Bid in OpenBids.

There is no cost to submit responses electronically through OpenBids; you will only incur a fee if you opt to receive e-notifications directly from OpenBids. You must select "Columbus Consolidated Government" as your free agency (see registration instructions). Solicitations may be accessed thru the OpenBids link that is posted at: https://columbusga.gov/finance/bid-opportunities. Per Georgia HB489, the Purchasing Division will continue to post solicitations on the Georgia Procurement Registry. To receive future procurement notifications, you must register with the Team Georgia Marketplace at https://doas.ga.gov/state-purchasing/getting-started-supplier.

Excluding responses to Requests for Proposals (RFP), a tabulation of responses will be available on OpenBids shortly after the solicitation closes. The Purchasing Division will also continue to post tabulations at https://columbusga.gov/finance/bid-tabulations.

Failure to submit electronic responses, via OpenBids, will result in the rejection of your response. Submittals received via U.S. Postal Service, FedEx, UPS, etc., will be returned unopened at the expense of the sender. The Purchasing Division will not accept hand-delivered submittals and will immediately discard any submittal left in the reception area of the Finance Department.

The Purchasing Division sincerely appreciates your cooperation.

ELECTRONIC SUBMITTAL CHECKLIST

Carver Lake Park – Phase 1
RFB No. 27-0017

Please submit your electronic response as instructed below:

Submit your electronic response as instructed below:

1. Vendors shall submit **only** the required documents listed using the **"Bidder Response ALL Documents"** function.
2. Zip files with multiple files are not acceptable; vendors shall submit one PDF file of their submittal.
3. Due to file size and/or page limitations that **may** occur, **please do not** resend the City's RFP specifications document. This information is already on file.
4. **In the event OpenBids requires a dollar value for your submittal, enter "0".**

- ☐ Contractor's E-Verify Affidavit (page 9 of RFB document) *
- ☐ Communication Concerning this Solicitation form (page 12 of RFB document) *
- ☐ DBE Forms (pages 14 and 15 of RFB document)
- ☐ Conflict of Interest Affidavit (page 16 of RFB document) *
- ☐ Federal Compliance form (page 17 of RFB document)
- ☐ Business License
- ☐ Page 1 of Form W-9 (https://www.irs.gov/pub/irs-pdf/fw9.pdf)

Refer to the Contract Documents / Plan Book for the following items:

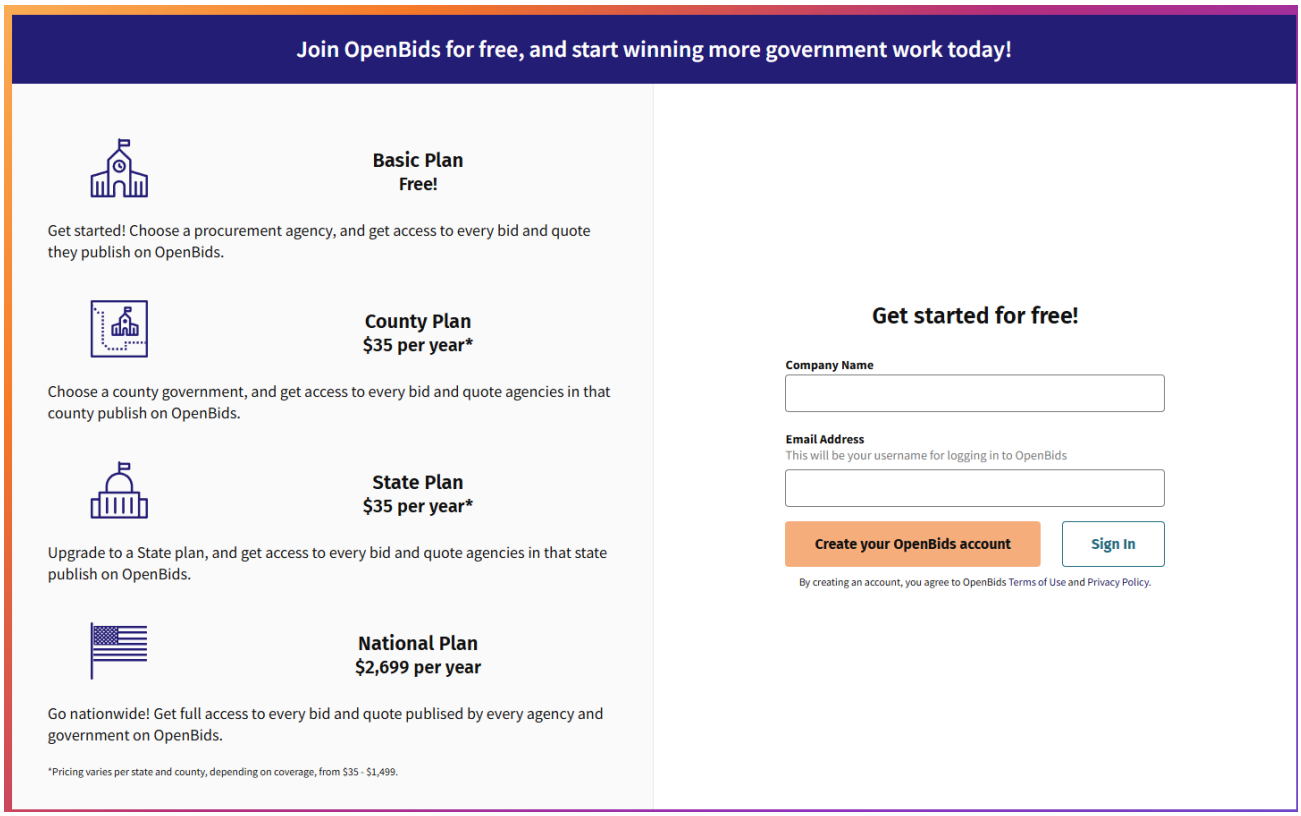
- ☐ Bid Bond *
- ☐ Non-Collusion Affidavit of Prime Bidder *
- ☐ Bid Form *

* Denotes mandatory submission requirement(s).

Registering for OpenBids (formerly DemandStar)

The following pages provide the steps for registering with OpenBids and submitting electronic responses.

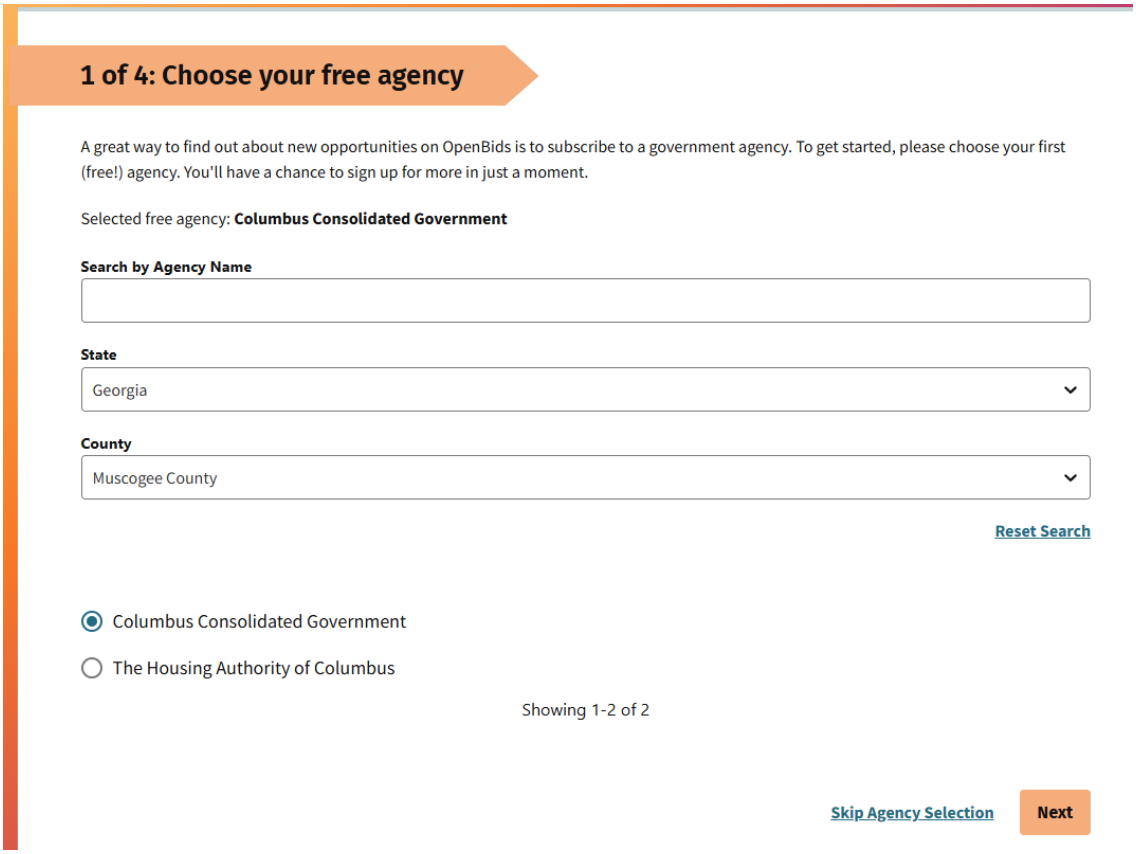
It's **free** to register with the **Basic Plan**. Go to: https://www.demandstar.com/registration



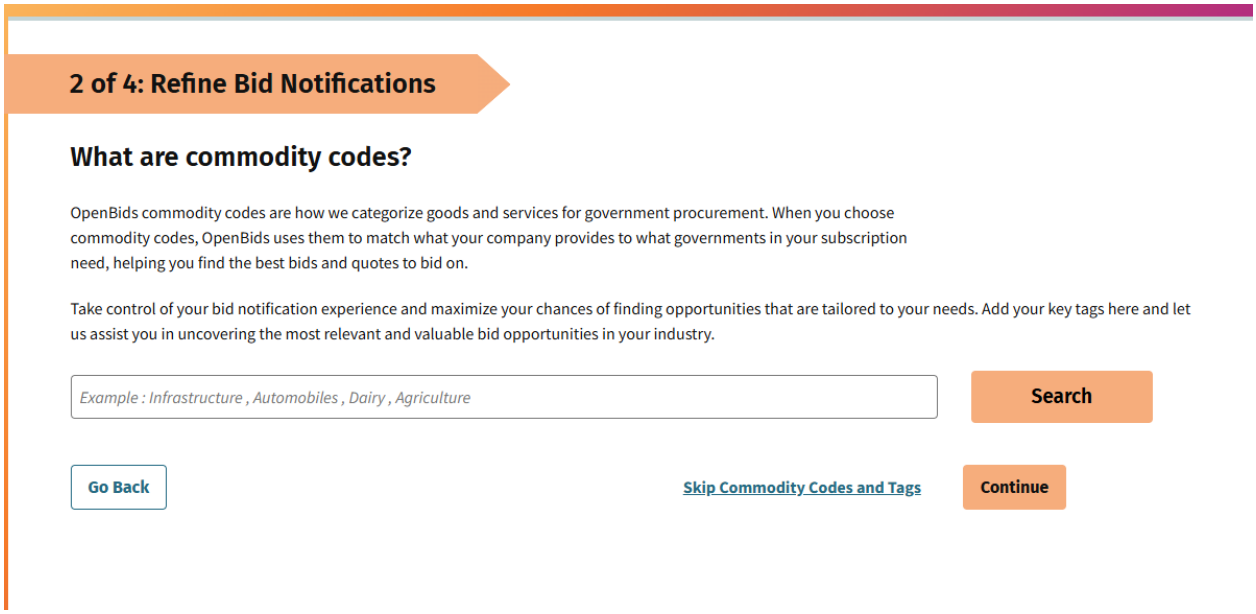
Step 1: Choose your free agency

- Search by Agency Name: Columbus Consolidated Government
- *or* search by State (GA) and County (Muscogee)

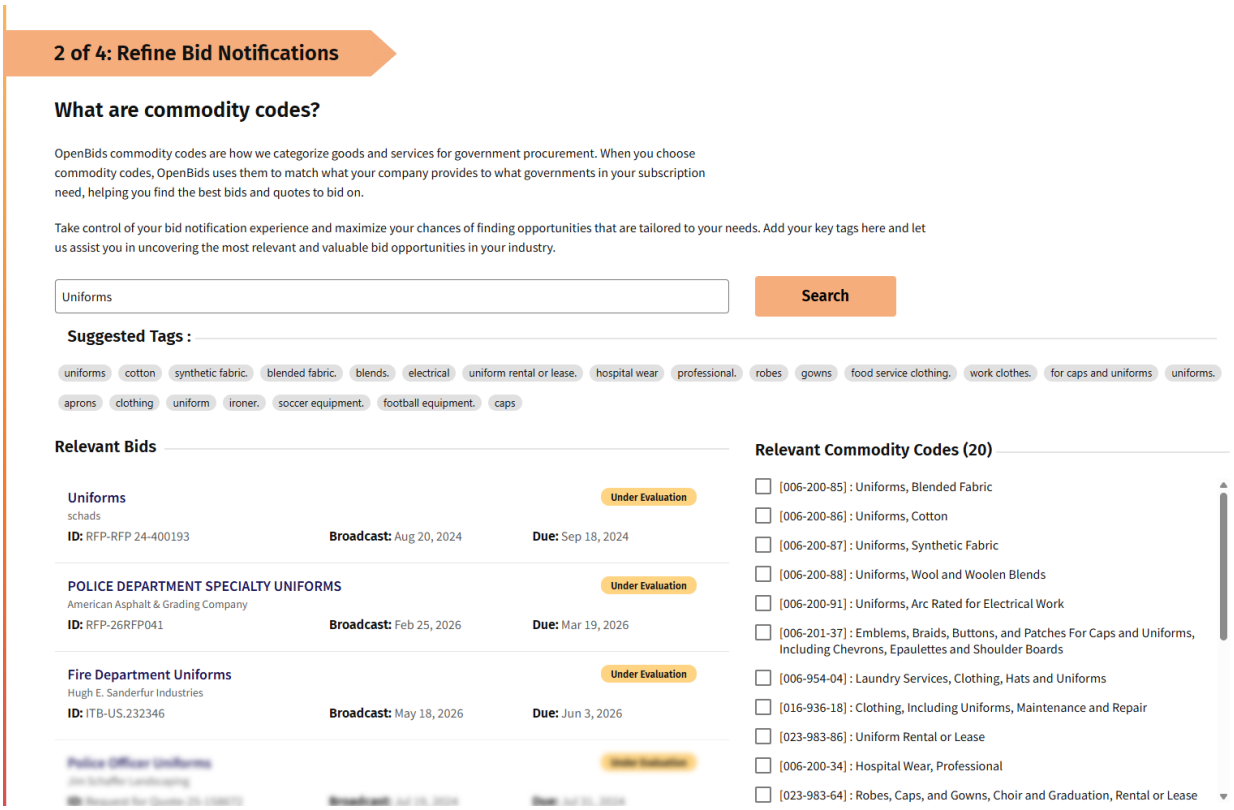
Select "Columbus Consolidated Government" as your free agency



Step 2: Select commodity codes (this step can be skipped).



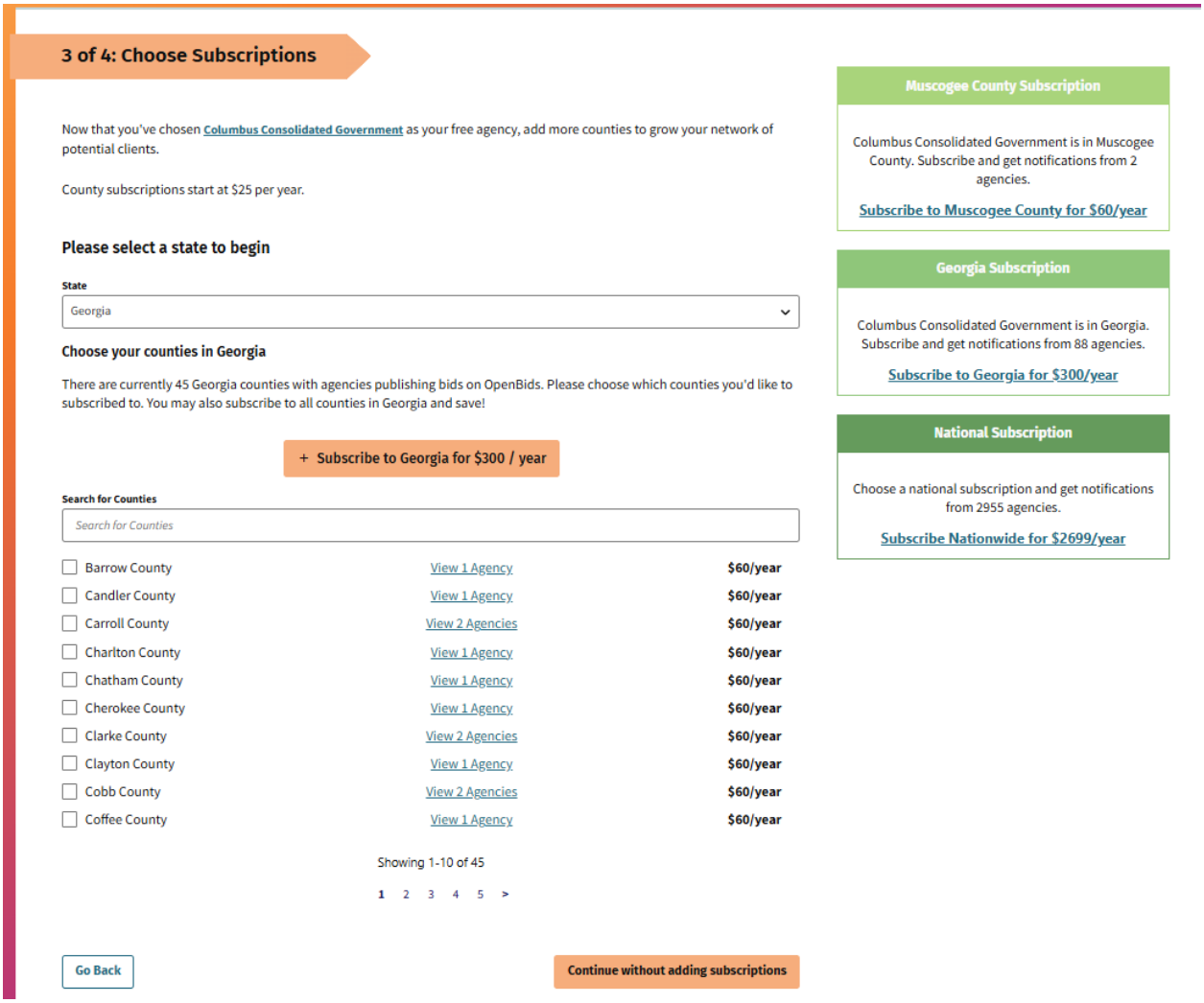
If selecting codes, the following screen will appear:



Selecting commodity codes will narrow down results to ensure you are receiving notifications for the most applicable bids only.

Step 3: Choose Subscriptions

- You've already selected Columbus Consolidated Government as your **free** agency.
- There is a fee to add additional subscriptions. However, you can continue without adding any additional subscriptions.



Step 4: Complete your profile

- Add your contact information and finish registration.
- Check your email for a link to set a password.

4 of 4: Complete your profile

We've saved your selections. Now that you've set up your subscriptions on OpenBids, tell us a little bit more about yourself.

Your contact information

First Name

Last Name

Phone Number

Test Company for CCG Information

Company Phone Number

Website (Optional)

Address

Suite, Floor, etc. (Optional)

Postal Code

City

State

Select...

County (Optional)

Select...

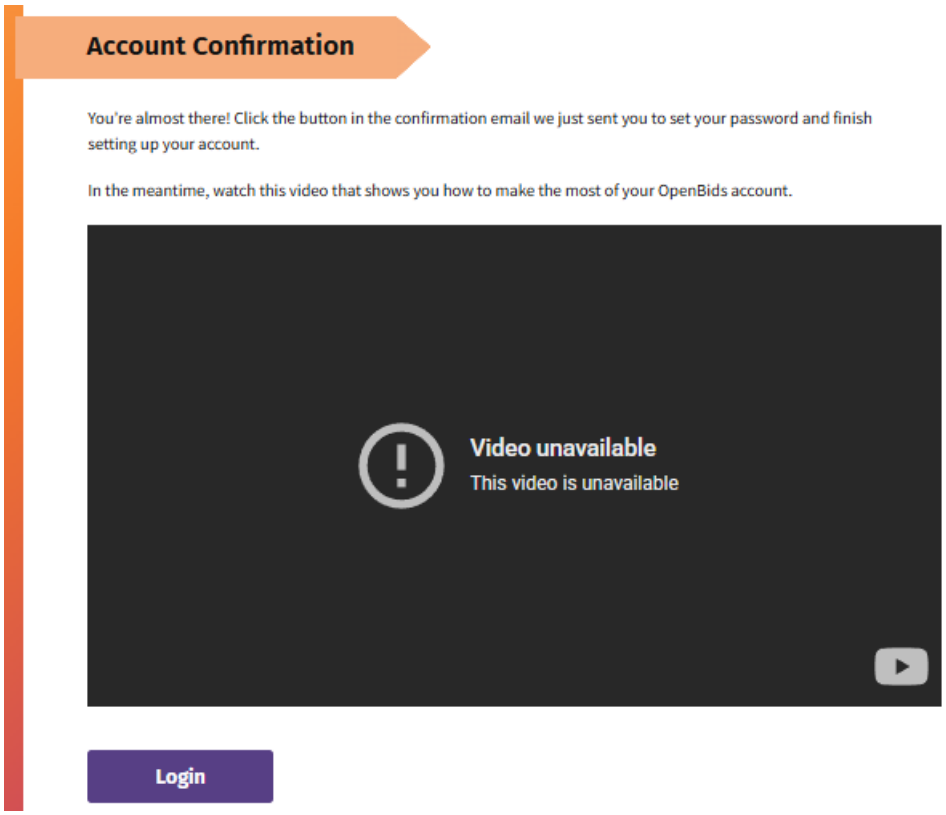
Country

Select...

Go Back

Finish registration

After finishing, the **Account Confirmation** screen will appear. However, you should also have an email from OpenBids to set your password.



Check your email for instructions to set a password.

Welcome to OpenBids!

Dear Heather Buyer,

Thank you for signing up for OpenBids.

Now you need to set your password. Please click the button below to set your password and log in.

This link will expire in three days. Once it expires, you'll need to request a new password reset link.

As a reminder, your username is [redacted]

Set Password

Once you log in, it is critical you add commodity and service codes that best match your business's line of work - this is how we know which bids to send you.

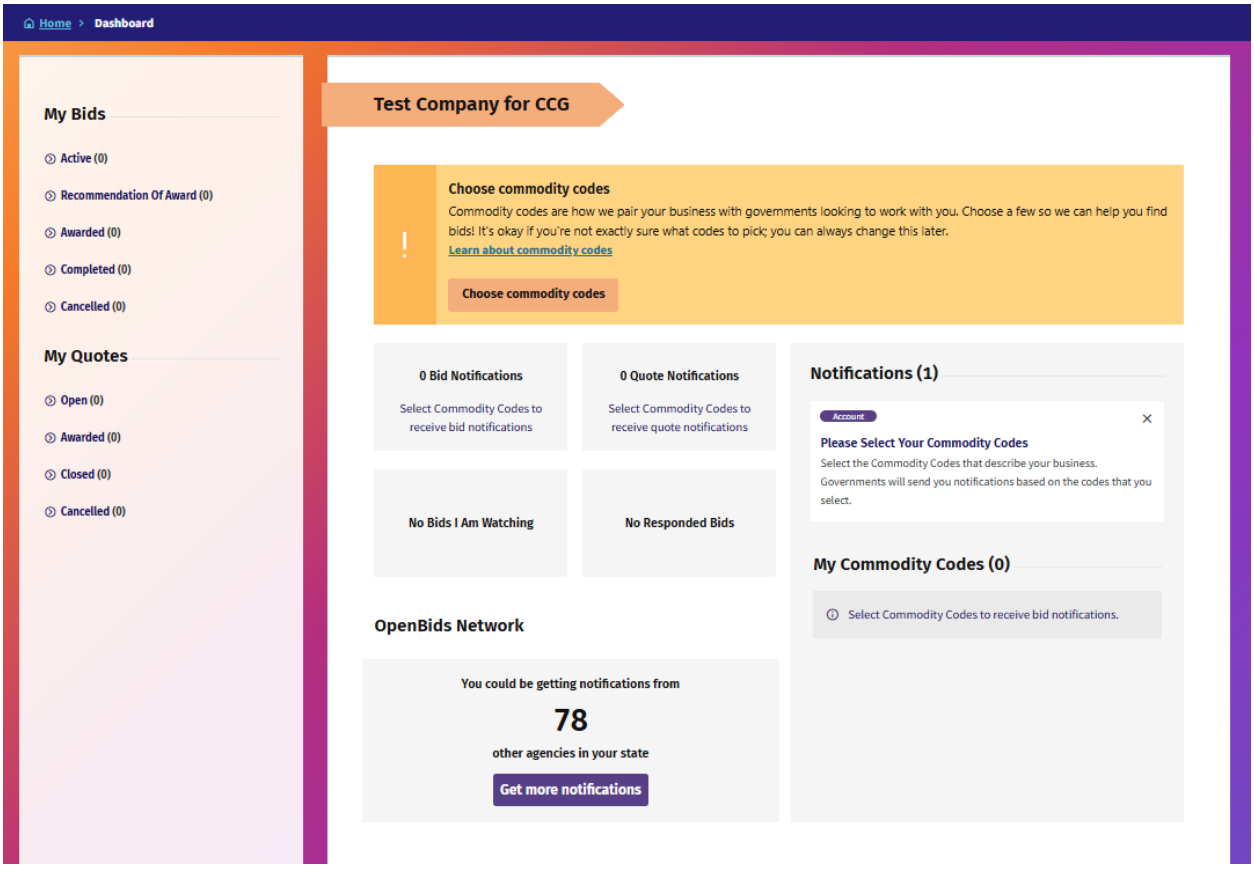
Add Commodity Codes here (or, once logged in, click on your name in the top right then choose Commodity Codes).

We look forward to helping you win more government contracts!

Sincerely,
The OpenBids team

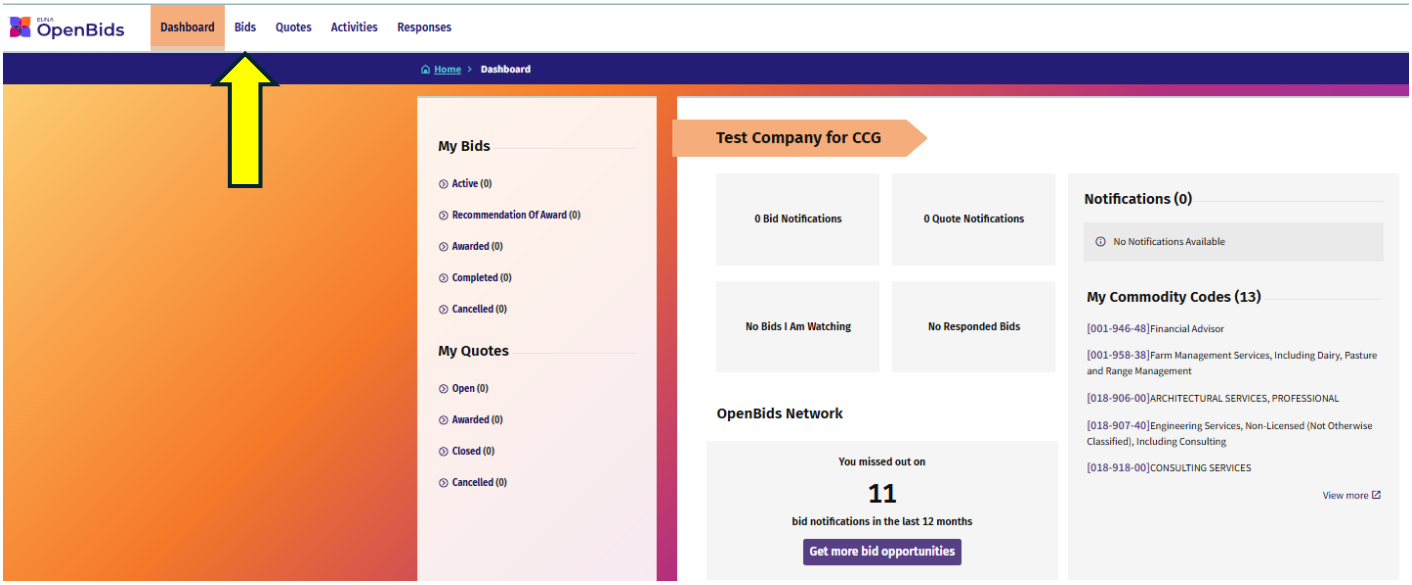
EUNA OpenBids

Create password and login to view the dashboard.


Home
Dashboard
My Bids
Active (0)
Recommendation Of Award (0)
Awarded (0)
Completed (0)
Cancelled (0)
My Quotes
Open (0)
Awarded (0)
Closed (0)
Cancelled (0)
Test Company for CCG
Choose commodity codes
Commodity codes are how we pair your business with governments looking to work with you. Choose a few so we can help you find bids! It's okay if you're not exactly sure what codes to pick; you can always change this later.
Learn about commodity codes
Choose commodity codes
0 Bid Notifications
Select Commodity Codes to receive bid notifications
0 Quote Notifications
Select Commodity Codes to receive quote notifications
No Bids I Am Watching
No Responded Bids
OpenBids Network
You could be getting notifications from
78
other agencies in your state
Get more notifications
Notifications (1)
Account
Please Select Your Commodity Codes
Select the Commodity Codes that describe your business. Governments will send you notifications based on the codes that you select.
My Commodity Codes (0)
Select Commodity Codes to receive bid notifications.

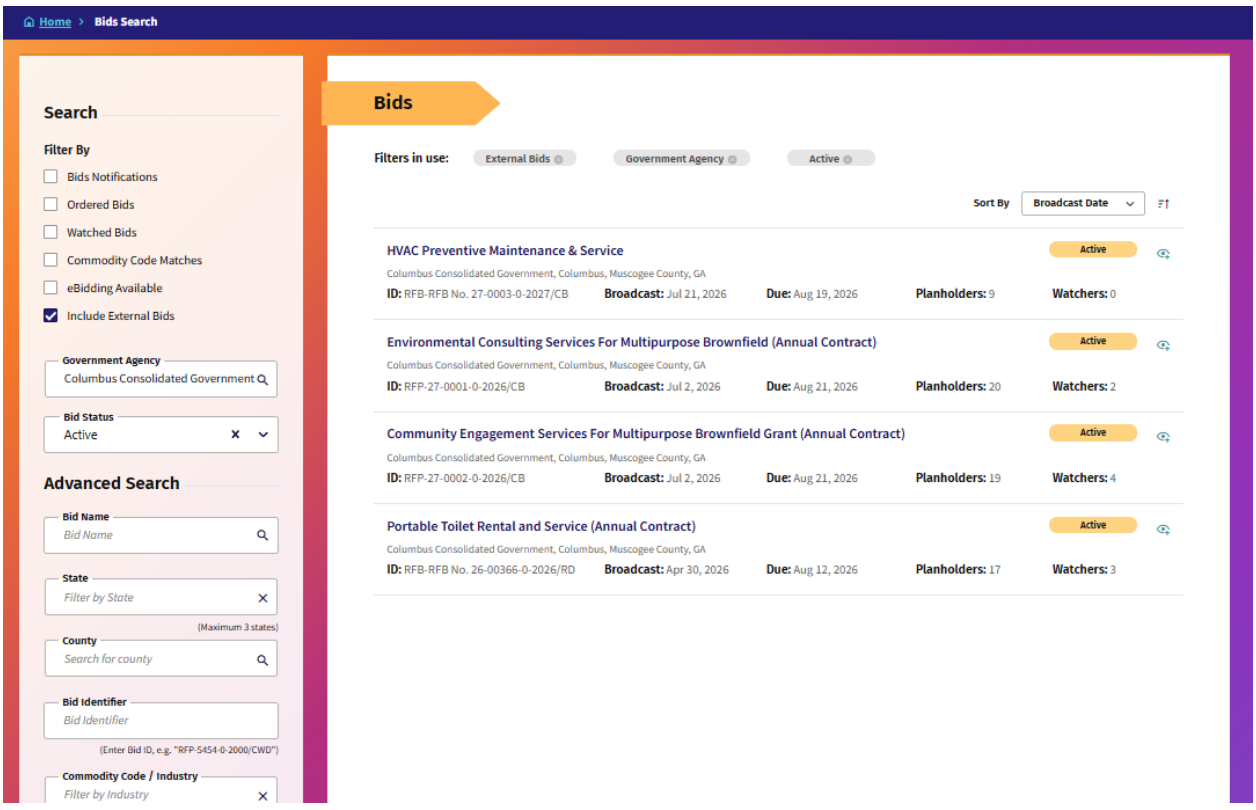
To submit a response on OpenBids

From the Home screen, select "bids" at the top of the screen:

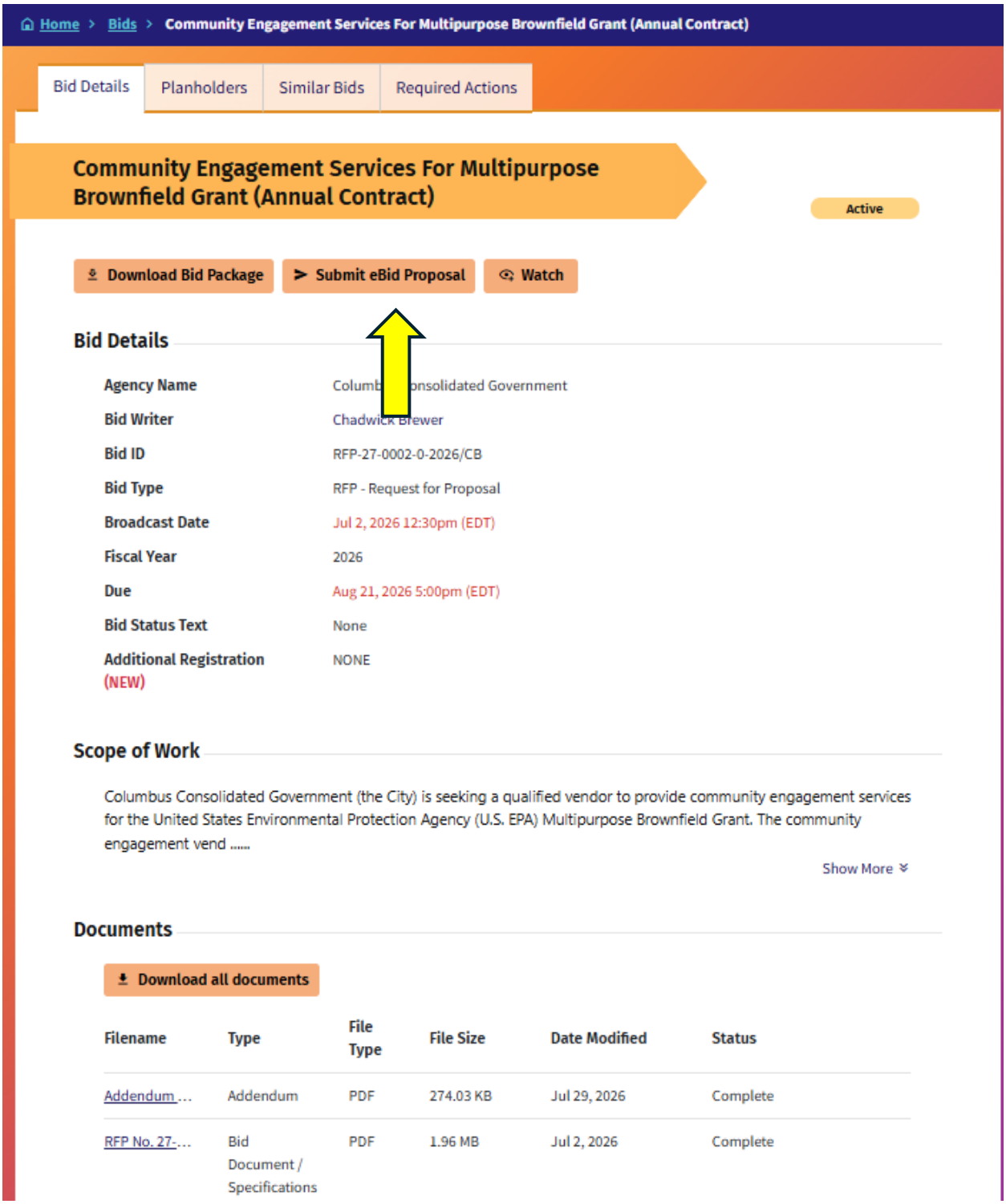


In the Bids Search page, search by Government Agency, Columbus Consolidated Government.

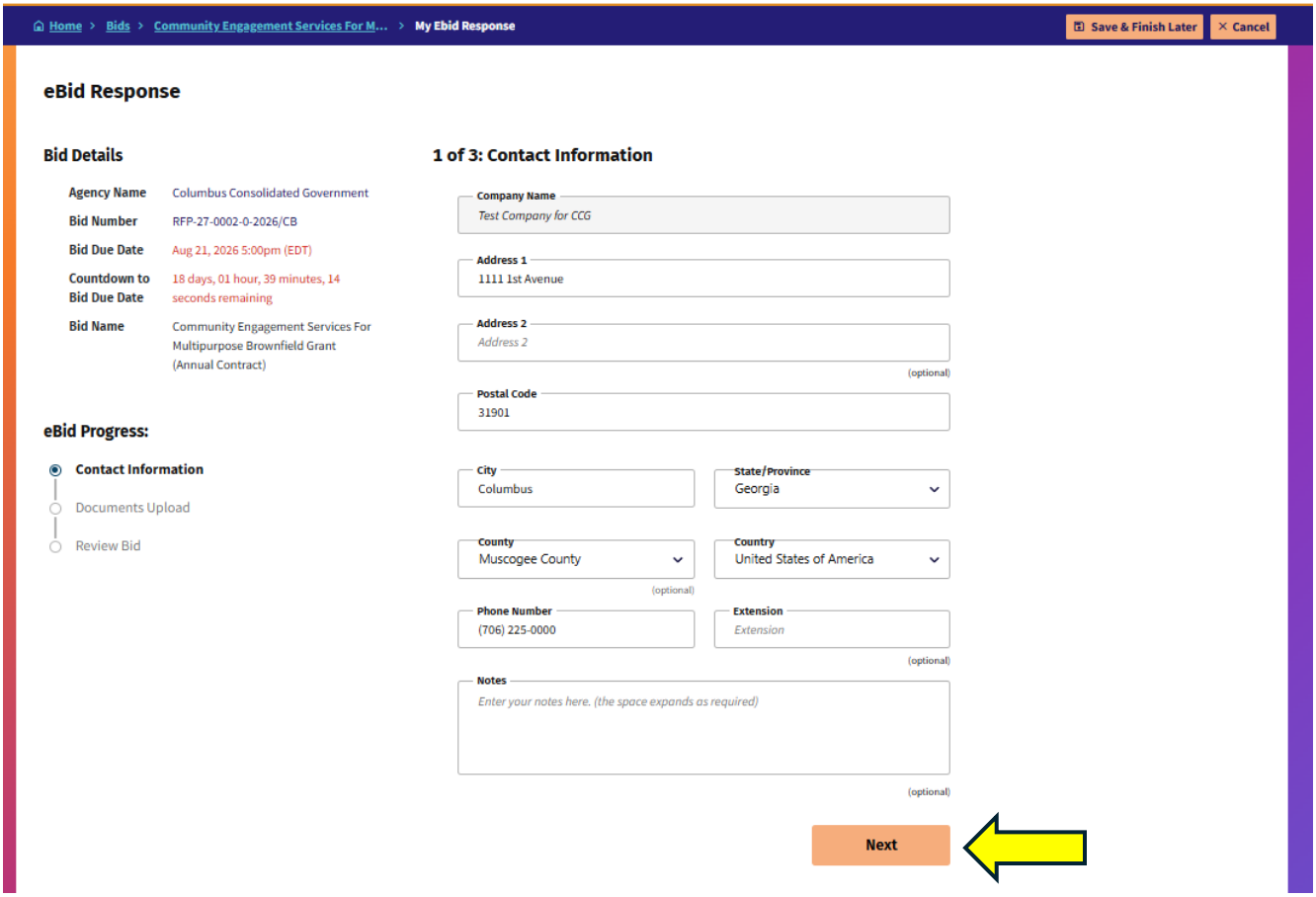
Note: Even though this is your selected agency, you can still search and submit responses for any bid/any agency.



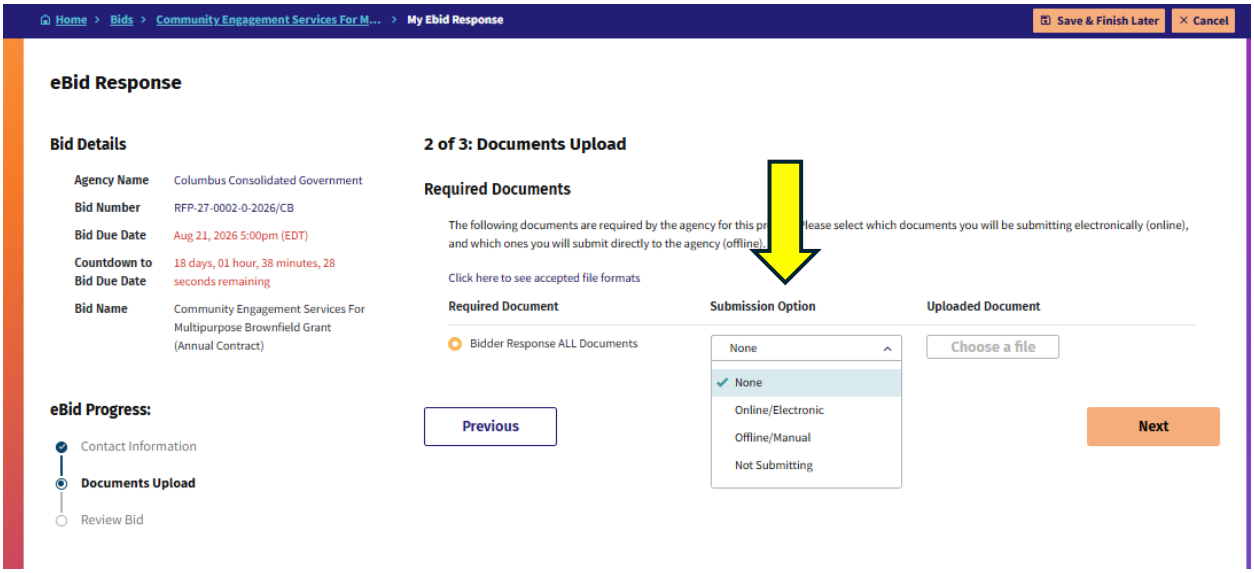
Select a solicitation to view documents and submit an electronic response.

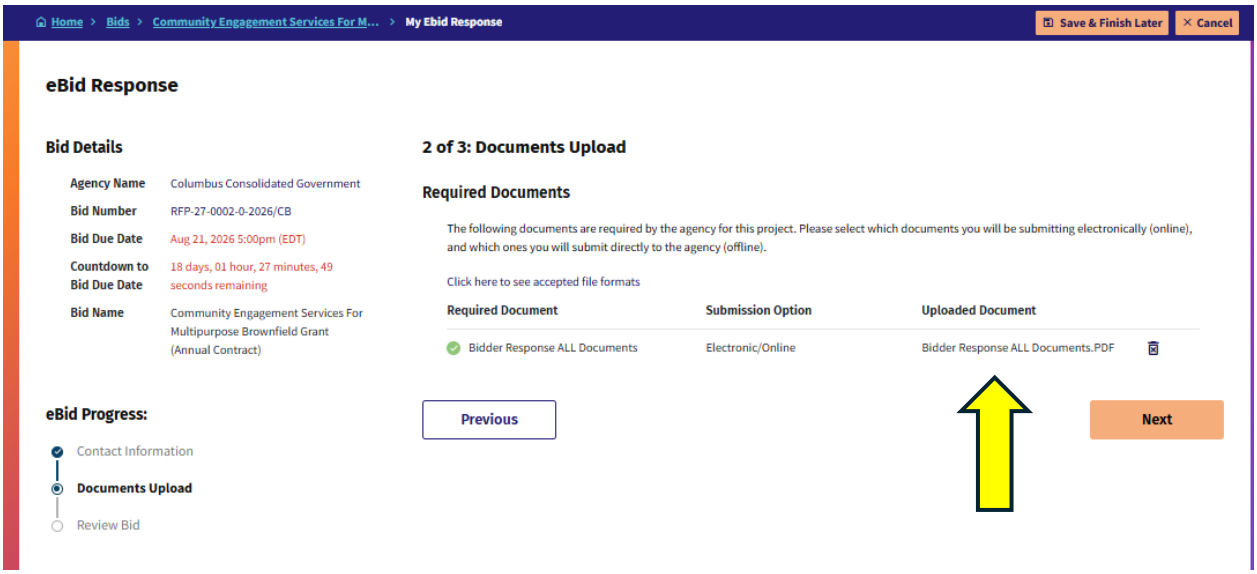


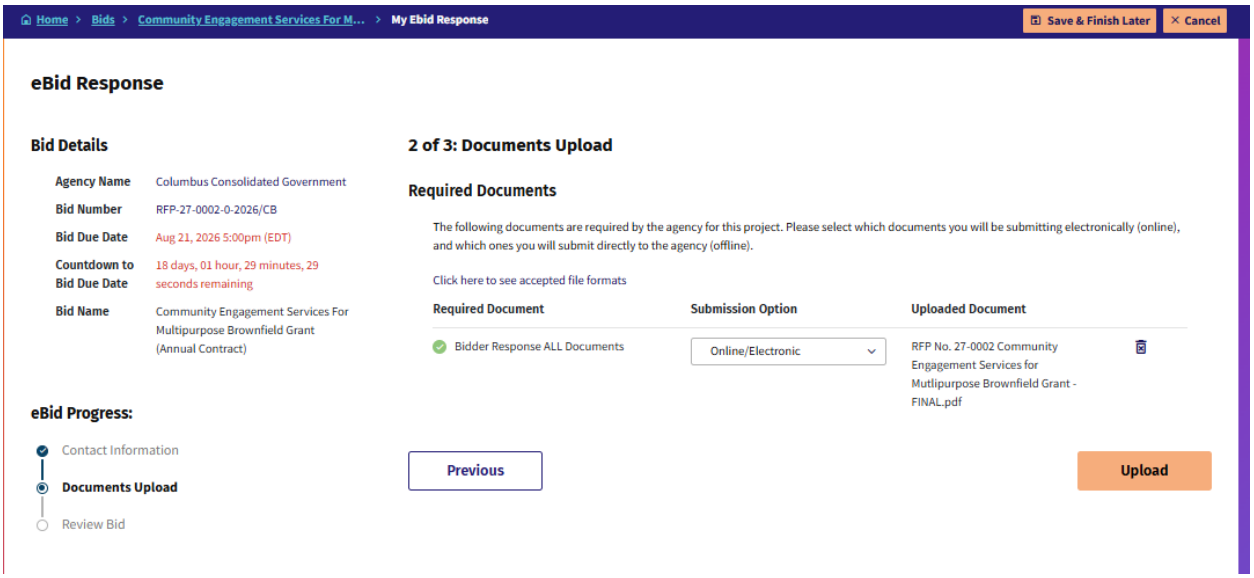
The contact information will auto-populate on this page. Select “next”.



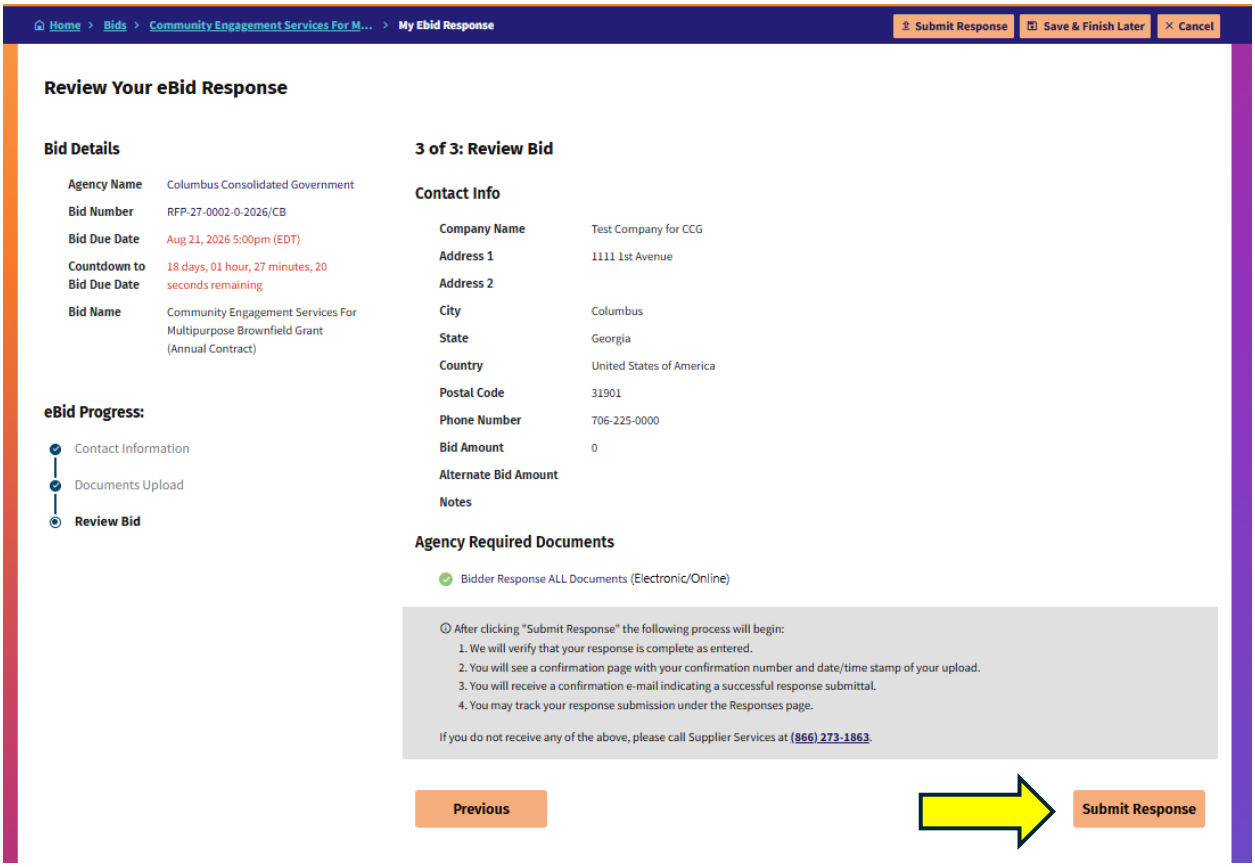
In the “Submission Option” field, select “Online/Electronic” and choose a file to upload.




Home > Bids > Community Engagement Services For M... > My Ebid Response
Save & Finish Later
Cancel
eBid Response
Bid Details
Agency Name
Columbus Consolidated Government
Bid Number
RFP-27-0002-0-2026/CB
Bid Due Date
Aug 21, 2026 5:00pm (EDT)
Countdown to Bid Due Date
18 days, 01 hour, 27 minutes, 49 seconds remaining
Bid Name
Community Engagement Services For Multipurpose Brownfield Grant (Annual Contract)
eBid Progress:
Contact Information
Documents Upload
Review Bid
2 of 3: Documents Upload
Required Documents
The following documents are required by the agency for this project. Please select which documents you will be submitting electronically (online), and which ones you will submit directly to the agency (offline).
Click here to see accepted file formats
Required Document
Submission Option
Uploaded Document
Bidder Response ALL Documents
Electronic/Online
Bidder Response ALL Documents.PDF
Previous
Next


Home > Bids > Community Engagement Services For M... > My Ebid Response
Save & Finish Later
Cancel
eBid Response
Bid Details
Agency Name
Columbus Consolidated Government
Bid Number
RFP-27-0002-0-2026/CB
Bid Due Date
Aug 21, 2026 5:00pm (EDT)
Countdown to Bid Due Date
18 days, 01 hour, 29 minutes, 29 seconds remaining
Bid Name
Community Engagement Services For Multipurpose Brownfield Grant (Annual Contract)
eBid Progress:
Contact Information
Documents Upload
Review Bid
2 of 3: Documents Upload
Required Documents
The following documents are required by the agency for this project. Please select which documents you will be submitting electronically (online), and which ones you will submit directly to the agency (offline).
Click here to see accepted file formats
Required Document
Submission Option
Uploaded Document
Bidder Response ALL Documents
Online/Electronic
RFP No. 27-0002 Community Engagement Services for Mutlipurpose Brownfield Grant - FINAL.pdf
Previous
Upload

Review submission and “Submit”



PROJECT MANUAL

CARVER LAKE PARK PHASE 1

Columbus, GA SM

CONSOLIDATED GOVERNMENT

What progress has preserved.

COLUMBUS CONSOLIDATED GOVERNMENT
COLUMBUS, GEORGIA

MAY 2026

BARGE DESIGN SOLUTIONS

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00 21 13	Instructions to Bidders
00 41 00	Bid Form
00 43 13	Bid Bond
00 43.39.13	Local and MBE-WBE Agreement
00 43 39.16	Statement of Local and Minority Owned Firm Utilization
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CARVER LAKE PARK PHASE 1

COLUMBUS PARK AND RECREATION
COLUMBUS, GEORGIA

Sealed Bids for furnishing all materials, labor, tools, equipment and appurtenances necessary for the construction of the Carver Lake Park Phase 1 will be received electronically via the OpenBids platform until 2:30 p.m., local time, on December 16, 2026. Refer to page 1 of the package for Submission Requirements and public bid opening information.

Project consists of improvements to Carver Lake Park, including demolition and removal of existing site improvements; clearing and grubbing; earthwork and grading; construction and reconstruction of access drives and parking areas; asphalt pavement, permeable pavers, concrete sidewalks, curb and gutter; pedestrian trails; playground and pavilion areas; fencing; site signage and pavement markings; landscaping and site restoration; and associated storm drainage and utility improvements.

The Work also includes construction of a 10-foot-wide multi-use trail, parking and accessible parking improvements, pedestrian crossings, park benches, landscape islands, and supporting infrastructure associated with the redevelopment of the park. Recreational improvements include playground and pavilion areas and improvements surrounding the existing splash pad. All Work shall be completed in accordance with the Contract Documents.

The work will be awarded in one Contract based on Base Bid Total Phase 1.

The Instructions to Bidders, Bid, Contract Agreement, Drawings, Specifications and forms of Bid Bond, Performance Bond, Payment Bond and other Contract Documents may be examined at the following:

Columbus Parks and Recreation
1111 1st Avenue, 2nd Floor
Columbus, Georgia 31901

Barge Design Solutions, Inc.
1201 Front Ave, Suite F
Columbus, Georgia 31901
(706) 321-4590

Copies of Bidding Documents may be purchased from Memphis Reprographics. Details for ordering are available at https://bidding.bargedesign.com or via phone at 901-381-9811. No part of the purchase price will be refunded.

Each Bid must be accompanied by a Bid Bond, prepared on the form of Bid Bond attached to the Contract Documents or a Surety Company's Standard Bid Bond, duly executed by the Bidder as principal and having as surety thereon a surety company licensed to do business in the State of Georgia and listed as a certified company in the latest issue of U.S. Treasury Circular 570, in the amount of five percent of the Bid.

Equal Employment Opportunity Clause: Bidders must comply with the Equal Employment Opportunity requirements specified in the Instructions to Bidders.

Minority Participation: Bidders will be required to demonstrate their good faith efforts to achieve compliance with the Owner's goal that a minimum of ten percent of the Bid Amount be done by Minority Owned Firms (MBE) and five percent of the Bid Amount be done by Women Owned Firms (WBE).

Employment of Local Businesses and Contractors: It is the wish of the Owner that local businesses, including contractors, be given the opportunity to bid on the various parts of the work.

The desire on the part of the Owner to encourage participation of minority and locally owned businesses and contractors is not intended to restrict or limit competitive bidding or to increase the cost of the work. The Owner supports a healthy, free market system that seeks to include responsible local businesses and provide ample opportunities for local business growth and development.

No bid may be withdrawn within 60 calendar days after the scheduled time for receipt of bids.

The Owner will in no way be liable for any costs incurred by any bidder in the preparation of its Bid in response to this Invitation to Bid.

The successful Bidder for this Contract will be required to furnish a satisfactory Performance Bond and Payment Bond each in the amount of 100 percent of the Bid.

The Owner reserves the right to reject all Bids, to waive informalities and to readvertise.

COLUMBUS PARKS AND RECREATION
Holli Browder
Director

END OF SECTION

ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office* – The office from which the bidding procedures are to be administered. The issuing office for this Project is as stated in the Advertisement for Bids.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement for Bids may be obtained from the Issuing Office, or its designated printing facility, as indicated in the Advertisement for Bids.

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 The minimum qualifications of a responsible Bidder includes the following requirements:

A. The Bidder shall maintain a permanent place of business. This requirement applies to the Bidder where the Bidder is a division of a corporation, or where the Bidder is 50 percent or more owned by a person, corporation or firm.

B. The Bidder is licensed as a Contractor by the State of Georgia.

C. The Bidder shall demonstrate adequate construction experience and sufficient equipment resources to properly perform the work under and in conformance with the Contract Documents. This evaluation will be based upon a list of completed or active projects and a list of construction equipment available to the Bidder to perform the work. The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may reasonably request. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the Project contemplated therein. Adequate construction experience, for the purposes of this Project, may be defined in the Supplemental Instructions to Bidders.

D. The Bidder shall demonstrate financial resources of sufficient strength to meet the obligations incident to the performance of the work covered by these Contract

Documents. The ability to obtain the required Performance and Payment Bonds will not alone demonstrate adequate financial capability.

E. The Bidder shall demonstrate that he is familiar with the work covered by these Contract Documents.

3.02 To demonstrate Bidder's qualifications to perform the Work and as evidence of adequate construction experience, Bidder shall submit with the Bid written evidence such as previous experience, present commitments, and such other data as may be called for below.

A. Completion of Statement of Bidder's Qualifications, as indicated in Section 00 45 13.

B. Bidder's Georgia Utility Contractor license, as indicated in Section 00 45 77.

3.03 To demonstrate Bidder's qualifications to perform the Work, within three days of Owner's request, Bidder shall submit written evidence such as financial data and such other data as may be requested by Owner.

3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

3.05 A Bidder may be deemed as not responsible if:

A. Bidder fails to furnish adequate information for the Owner to determine if the Bidder is deemed to possess adequate construction experience and sufficient equipment resources or fails to provide such documentation in a timely manner.

B. Bidder fails to furnish information, evidence, and statements of the principal owner when the Bidder is owned 50 percent or more by another firm, corporation, or person.

C. Bidder is in arrears on any existing contracts, interested in any litigation against the Owner or has defaulted on a previous contract.

D. Bidder fails to have access to adequate equipment.

E. Bidder has uncompleted work which in the judgment of the Owner will hinder or prevent prompt completion of additional work, if awarded.

3.06 Acceptance of the Bidder's documentation and substantiation or Contract Award by the Owner does not relieve the Bidder of liability for non-performance as covered in the Contract Documents, nor will the Bidder be exempted from any other legal recourse the Owner may elect to pursue.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions*

A. The Supplementary Conditions identify:

1. Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site.

2. Those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in Paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.02 *Underground Facilities*

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

4.03 *Hazardous Environmental Condition*

A. The Supplementary Conditions identify any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.

B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions.

4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition

upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

4.06 Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

4.07 It is the responsibility of each Bidder before submitting a Bid to:

A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;

B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;

D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in the Paragraph 4.06 of the Supplementary Conditions as containing reliable "technical data";

E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder’s safety precautions and programs;

F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;

G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and

I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 – PRE-BID CONFERENCE

5.01 A Pre-Bid Conference will be held if so indicated in the Advertisement for Bids. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6 – SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed, delivered or otherwise issued to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

7.03 Questions and other inquiries shall be submitted to the Issuing office, as indicated in the Supplemental Instructions to Bidders.

ARTICLE 8 – BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of Bidder’s maximum Bid price and in the form of a Bid bond (on the form attached or on a surety company’s standard bid bond form) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.

8.02 If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within ten days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.

8.03 Attorneys-in-Fact of other officers who sign bid bonds for a surety company must file with such bonds a certified copy of his power of attorney authorizing him to sign said bonds.

ARTICLE 9 – CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents. No substitution requests will be considered.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS

12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute without an increase in the Bid.

12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.

12.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

ARTICLE 13 – PREPARATION OF BID

13.01 The Bid Form is included with the Bidding Documents.

13.02 All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each Bid item and alternate item listed therein. In the case of optional alternatives or optional Divisions of work, the words "No Bid," "No Change," or "Not Applicable" may be entered.

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.

13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

13.06 A Bid by an individual shall show the Bidder's name and official address.

13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.

13.08 All names shall be printed in ink below the signatures**.**

13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.

13.10 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS

14.01 *Lump Sum and Unit Prices*

A. Bidders shall submit a bid on a lump sum or unit price basis, as indicated on the Bid schedule, for each item of Work listed in the Bid schedule.

B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.02 *Allowances*

A. For cash allowances the various other Bid prices shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 11.02.B of the General Conditions.

ARTICLE 15 – SUBMITTAL OF BID

15.01 With each set of the Bidding Documents, a Bidder is furnished one separate unbound copy of the required documents listed below. The Bidder shall complete and submit one original of all documents listed below in the envelope.

A. Bid Form

B. Bid Bond Form

C. Local and MBE/WBE Agreement

D. Statement of Local and Minority Owned Utilization

E. Statement of Bidders Qualifications

F. Non-Collusion Affidavit of Prime Bidder

G. Drug-Free Workplace Certificate

H. Corporate Certificate, if Bidder is a corporation

I. Georgia Security and Immigration Compliance Act Affidavits

J. Contractor's License Certification

15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement for Bids and shall be enclosed in a sealed envelope which shall also contain the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.” A mailed Bid shall be addressed to the place indicated in the Advertisement for Bids.

15.03 In addition to the requirements of Article 15.02 above, the Bidder shall provide on the outside of the envelope containing the bid the Bidder’s name and “Bid for Bull Creek 54-Inch Gravity Trunk Sewer”.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

16.02 If a Bidder, after the Bid opening determines that its Bid contained an appreciable error in the calculation of its Bid, the Bidder may withdraw its Bid, subject to the provisions of, and, if the mistake meets the criteria in, O.C.G.A. 36-91-52.

16.03 A bid may be withdrawn after the time period stated in the Advertisement for Bids after the date of the opening of the bids, provided that the Bidder has not been notified within said time period that his bid has been accepted.

ARTICLE 17 – OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Advertisement for Bids, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 A bid may be declared by the Owner to be non-responsive for, but not limited to, any of the following reasons:

A. Bid contains blanks, Proposal is not complete or required accompanying documents, certifications, and statements are not included.

B. Bid contains modifications or alterations of the Bid Form or other Contract Documents.

C. Bid is a qualified or conditional bid.

D. Bid contains unrealistic data, erroneous data, inaccurate data, or data that cannot be documented or substantiated.

19.05 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.06 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.

19.07 The Contracts will be awarded to the responsive, responsible Bidders submitting the lowest Bid complying with the conditions of the Contract Documents and determination by the Owner of the Bidder's responsiveness and responsibility. Award will be made on the basis of the prices given in the Base Bid.

ARTICLE 20 – CONTRACT SECURITY AND INSURANCE

20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner’s requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner or Engineer issues a Notice of Award to the Successful Bidder, the Notice of Award will be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents, which are identified in the Agreement as attached thereto. Within ten days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

21.02 Upon failure of the Bidder to execute the required bonds or to sign the required contract within ten days after the contract is awarded, he will be considered to have abandoned his proposal and the Owner may annul the award. By reason of the uncertainty of market prices of materials and labor, and it being impracticable and extremely difficult to fix the amount of damages to which the Owner would be put by reason of said Bidder's failure to execute said bonds and contract within ten days, the bid security accompanying the proposal shall be the agreed amount of damages which the Owner will suffer by reason of such failure on the part of the Bidder and shall thereupon immediately be forfeited to the Owner. The filing of a proposal will be considered as an acceptance of this provision.

ARTICLE 22 – DELETED

ARTICLE 23 – RETAINAGE

23.01 Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Agreement.

ARTICLE 24 – DELETED

ARTICLE 25 – DELETED

ARTICLE 26 – PERMITS, EASEMENTS AND RIGHTS-OF-WAY

26.01 See Supplemental Instructions to Bidders.

ARTICLE 27 – EQUAL EMPLOYMENT OPPORTUNITY

27.01 During the performance of this Contract, the Contractor agrees as follows:

A. The Contractor shall not discriminate against any employee, or applicant for employment, because of race, religion, color, sex, or national origin. As used herein, the words "shall not discriminate" shall mean and include, without limitation, 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.

B. The Contractor shall in all solicitation or advertisement for employees, placed by or on behalf of the Contractor; state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

C. The Contractor shall send to each labor union or representative of the workers, with which the Contractor has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or worker's representative of the Contractor's commitments under the Equal Employment Opportunity Program of the Columbus Water Works and under this Article and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

D. The Contractor and his subcontractors, if any, shall file compliance reports at reasonable times and intervals with the Owner in the form and to the extent prescribed by the Columbus Water Works. Compliance reports filed at such times as directed shall contain information as to the employment practices, policies, programs and statistics of the Contractor and their subcontractors.

E. The Contractor shall demonstrate by the documentation required in Paragraph 7. below, that a "Good Faith Effort" has been made to achieve compliance with the Owner's goal, that a minimum of ten percent of the Contract Amount sum shall be to Minority Owned Firms (MBE) and five percent of the Contract Amount sum shall be to Women Owned Firms (WBE).

F. The Contractor shall include the provisions of paragraphs 1 through 7 of this Equal Employment Opportunity Clause in every subcontract or purchase order so that such provisions will be binding upon each subcontractor or vendor.

G. To determine whether a bidder may receive a Contract, the Owner must, among other things, know whether the effort the bidder made to obtain MBE/WBE participation were "Good Faith Efforts".

27.02 In determining whether a Contractor has made "Good Faith Efforts", it is important for the recipient (Owner) to look not only at the different kinds of effort that a Contractor has made, but also the quantity and intensity of these efforts.

27.03 The following list of kinds of efforts are provided for consideration:

A. Whether the Contractor attended any pre-solicitation or pre bid meetings that were scheduled by the Owner to inform MBE/WBEs of contracting and subcontracting opportunities;

B. Whether the Contractor advertised in general circulation, trade association, and minority focus media concerning the sub-contracting opportunities;

C. Whether the Contractor provided written notice to a reasonable number of specific MBE/WBEs that their interest in the Contract was being solicited, in sufficient time to allow the MBE/WBEs to participate effectively;

D. Whether the Contractor followed up initial solicitations of interest by contacting MBE/WBEs to determine with certainty whether the MBE/WBEs were interested;

E. Whether the Contractor selected portions of the work to be performed by MBE/WBEs in order to increase the likelihood of meeting the MBE/WBE goals (including, where appropriate, breaking down contracts into economically feasible units to facilitate MBE/WBE participation);

F. Whether the Contractor provided interested MBE/WBEs with adequate information about the Drawings, Specifications and requirements of the Contract Documents;

G. Whether the Contractor negotiated in good faith with interested MBE/WBEs, not rejecting MBE/WBEs as unqualified without sound reasons based on a thorough investigation of their capabilities;

H. Whether the Contractor made efforts to assist interested MBE/WBEs in obtaining bonding, lines of credit, or insurance required by the Owner or Contractor; and

I. Whether the Contractor effectively used the services of available minority community organizations; minority contractor's groups; local, state and federal minority business assistance offices and other organizations that provide assistance in the recruitment and placement of MBE/WBEs.

27.04 Each Bidder shall include with his or her Bid properly executed local and MBE/WBE agreement. Prior to award, the apparent low Bidder shall submit a plan for meeting the requirements of Paragraph A.5. above. Such plan shall include, as a minimum, the names

and addresses of all subcontractors including minority owned firms providing subcontracting services, furnishing products or materials, etc.; the nature of the work to be contracted; and the anticipated cost of the services by each named firm as a percentage of the total Contract amount in the Proposal. The percentage participation should be calculated on the basis of the proportion of total dollar value of the Contract, including bulk purchase materials supplied to MBE/WBE firms. The maximum credit for MBE/WBE material and equipment suppliers will be a total of 10 percent of the material and equipment provided by the MBE/WBE supply firm.

27.05 It is the wish of the Owner that minority businesses be given the opportunity to bid on the various parts of the work. This desire on the part of the Owner is not intended to restrict or limit competitive bidding or to increase the cost of the work. The Owner supports a healthy, free market system that seeks to include responsible businesses and provide ample opportunities for business growth and development.

27.06 Lack of sufficient insurance, with the exception of Workman's Compensation, is not reason to disqualify a local nor MBE/WBE subcontractor. Costs related to increased insurance limits to satisfy the contract requirements by the local MBE/WBE subcontractors shall be included in the Contractor's pricing.

ARTICLE 28 – EMPLOYMENT OF LOCAL LABOR

28.01 Preference in employment on the Project shall, insofar as practical, be given to qualified local labor.

ARTICLE 29 – EMPLOYMENT OF LOCAL BUSINESSES AND CONTRACTORS

29.01 Preference in procurement for the Project shall, insofar as practical, be given to qualified local businesses and contractors.

29.02 It is the wish of the Owner that local businesses, including contractors, be given the opportunity to bid on the various parts of the work. This desire on the part of the Owner is not intended to restrict or limit competitive bidding or to increase the cost of the work. The Owner supports a healthy, free market system that seeks to include responsible local businesses and provide ample opportunities for local business growth and development.

29.03 In determining whether a Contractor has made Good Faith Efforts, it is important for the Owner to look not only at the different kinds of effort that a Contractor has made, but also the quantity and intensity of these efforts.

29.04 The following list of kinds of efforts is provided for consideration:

1. Whether the Contractor attended any pre-solicitation or pre-bid meetings that were scheduled by the Owner to inform local businesses of opportunities on this Project;

2. Whether the Contractor advertised in general circulation, trade association, and local media concerning the business opportunities;

3. Whether the Contractor provided written notice to a reasonable number of specific local businesses that their interest in the Contract was being solicited, in sufficient time to allow the local business to participate effectively;

4. Whether the Contractor followed up initial solicitations of interest by contacting local businesses to determine with certainty whether the local businesses were interested;

5. Whether the Contractor selected portions of the work to be performed by local businesses in order to increase the likelihood of meeting the Owner's desire to support local businesses and contractors (including, where appropriate, breaking down contracts into economically feasible units to facilitate local business participation);

6. Whether the Contractor provided interested local businesses with adequate information about the Drawings, Specifications and requirements of the Contract Documents;

7. Whether the Contractor negotiated in good faith with interested local businesses, not rejecting local businesses as unqualified without sound reasons based on a thorough investigation of their capabilities;

8. Whether the Contractor made efforts to assist interested local businesses in obtaining bonding, lines of credit, or insurance required by the Owner or Contractor; and

9. Whether the Contractor effectively used the services of available local community organizations and local contractors' groups.

29.05 The apparent low Bidder will be required to demonstrate the results of its Good Faith Efforts to contact and negotiate with local businesses for any items of work which are procured or are constructed via a subcontract. Such results shall include, as a minimum, the names and addresses of all subcontractors providing subcontracting services and furnishing products or materials, etc.; the nature of the work to be contracted; and the anticipated cost of the services by each named firm as a percentage of the total Contract amount in the Proposal. The percentage participation should be calculated on the basis of the proportion of total dollar value of the Contract, including bulk purchase materials supplied by the local business.

29.06 The apparent low Bidder shall be prepared to present documentation of its Good Faith Efforts to contact and negotiate with local businesses. This documentation shall specifically address efforts similar to those stated in Paragraph D. above. The documentation shall include the business name, address, phone number, contact person, method of contact, and type of service solicited for each effort made towards local businesses.

ARTICLE 30 – LOCAL LICENSES, TAXES AND FEES

30.01 See Columbus Code, Article IV, Business License and Occupation Tax, Section 19-36, Items a and b. If additional clarification is required, contact the Revenue Division Manager at 706.653.4100.

END OF SECTION

This document was prepared in part from material (EJCDC C-200 Suggested Instructions to Bidders for Construction Contracts) which is copyrighted as indicated below:

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www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

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2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
(703) 548-3118
www.agc.org

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CARVER LAKE PARK PHASE 1

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Columbus Parks and Recreation
1111 1st Avenue, 2nd Floor
Columbus, Georgia 31901

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for period of time after the Bid opening as stated in the Advertisement for Bids, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	Addendum Date

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that

have been identified in SC-4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."

E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

J. Where this Bid Form contains the provision for a bid based on a lump sum price, the Bidder shall be responsible for having prepared its own estimate of the quantities necessary for the satisfactory completion of the Work specified in these Contract Documents and for having based the lump sum price bid on its estimate of quantities.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

CARVER LAKE PARK PHASE 1 – BASE BID

Item No.	Description	Estimated Qty.	Unit	Unit Price	Total Price
1.	Carver Lake Park Phase 1				
a.	All Items Necessary to Complete	1	LS	$	$
b.	Owner Contingency for Material Testing (Allowance)	1	LS	$ 25,000.00	$ 25,000.00

BASE BID (PHASE 1) TOTAL _____

_____ DOLLARS ($_____).

BID ALTERNATE NO. 1

Item No.	Description	Estimated Qty.	Unit	Unit Price	Total Price
1a.	Replace Asphalt Walking Trail with 4” Concrete Trail	1	LS	$	$

BID ALTERNATE NO. 1 TOTAL _____

_____ DOLLARS ($_____).

Bidder acknowledges Unit Prices have been determined in accordance with Paragraph 11.03.C of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

A. Bid Bond

B. Local and MBE/WBE Agreement

C. Statement of Local and Minority Owned Utilization

D. Statement of Bidders Qualifications

E. Non-Collusion Affidavit of Prime Bidder

F. Drug-Free Workplace Certificate

G. Corporate Certificate, if Bidder is a corporation

H. Georgia Security and Immigration Compliance Act Affidavits

I. Contractor's License Certification

ARTICLE 8 – DEFINED TERMS

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID DATA

9.01 The Bidder shall designate below the one manufacturer for each product to be furnished and installed if awarded the work with the understanding that no changes or substitutions will be considered for these manufacturers unless directed by the Owner. The Bidder understands that if this information is not provided, offering products meeting all specification requirements and having the approval of the Engineer, then the Owner reserves the right either to determine the Bidder non-responsive and reject the Bid or to designate the manufacturer of the products to be provided which will meet all specification requirements, which Owner-designated manufacturer products must be furnished by the Bidder at no increase in the Contract Price.

ARTICLE 10 – BID SUBMITTAL

10.01 This Bid submitted by:

An Individual

Name (typed or printed): _____

By: _____

_____ (SEAL)

(Individual's signature)

Doing business as: _____

Attest: _____

(Notary)

Name (typed or printed): _____

A Partnership

Partnership Name: _____
_____ (SEAL)

By: _____
(Signature of general partner – attach evidence of authority to sign)

Name (typed or printed): _____

Attest: _____
(Signature of another Partner)

Name (typed or printed): _____

A Corporation

Corporation Name: _____
_____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____
(Signature)

Name (typed or printed): _____

Title: _____
(CORPORATE SEAL)

Attest: _____
(Signature of Corporate Secretary)

Name (typed or printed): _____

A Joint Venture

Name of Joint Venturer: _____

First Joint Venturer Name: _____
_____ (SEAL)

By: _____
(Signature of first joint venture partner)

Name (typed or printed): _____

Title: _____

Second Joint Venturer Name: _____
_____ (SEAL)

By: _____
(Signature of second joint venture partner)

Name (typed or printed): _____

Title: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

All Bidders shall complete the following:

Bidder's Business address: _____

_____

Phone: _____ Facsimile: _____

Primary Contact: _____

Primary Contact E-mail: _____

Submitted on _____, 20___.

This document was prepared in part from material (EJCDC C-410 Suggested Bid Form for Construction Contracts) which is copyrighted as indicated below:

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1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Associated General Contractors of America
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
(703) 548-3118
www.agc.org

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Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER *(Name and Address)*:

SURETY *(Name and Address of Principal Place of Business)*:

OWNER *(Name and Address)*:
Columbus Parks and Recreation
1111 1st Avenue, 2nd Floor
Columbus, Georgia 31901

BID
Bid Due Date:
Description *(Project Name)*: Carver Lake Park Phase 1

BOND
Bond Number:
Date *(Not earlier than Bid due date)*:
Penal sum _____ $ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER	**SURETY**
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2 All Bids are rejected by Owner, or

3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

I, _____, hereby certify that I am _____ of the named Bidder in the foregoing Bid; that I have read the requirements of the Contract Documents related to local, MBE/WBE utilization for the Project, and hereby agree to comply with all requirements of the Contract Documents related to issuance of the Notice of Award.

BIDDER: _____

By: _____
(name signed)

_____
(name printed or typed)

Title: _____

Date: _____

Subscribed and sworn to me this ____ day of _____, 20__.

NOTARY PUBLIC: _____
(name signed)

_____
(name printed or typed)

Commission Expires: _____
(date)

(SEAL)

END OF SECTION

Statement of Local and Minority Owned Firm Utilization

The Bidder shall list all subcontractors, including minority, women and local owned firms providing subcontracting services, furnishing products or materials, etc., to be utilized in the performance of the work. This list shall be submitted in the following format:

Subcontractor (Name & Address)	Nature of Work to be Contracted	Group (Local, MBE/WBE)	Anticipated Cost of Services ($ Value, %)
			$
			%
			$
			%
			$
			%
			$
			%
			$
			%
			$
			%
			$
			%
			$
			%
			$
			%

NOTE: Any proposed changes from the above list shall be submitted in writing to the Owner prior to initiation of the action, with the reason for the proposed deviation.

END OF SECTION

Non-Collusion Affidavit of Prime Bidder

STATE OF _____ COUNTY OF _____

I, _____, being first duly sworn, deposes and says that:

He or she is _____

(Owner, Partner, Officer, Representative or Agent)

of _____, the Bidder that has submitted the attached Bid;

He or she is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

Such Bid is genuine and is not a collusive or sham Bid;

Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this Affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against Columbus Water Works or any person interested in the proposed Contract; and

The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this Affiant.

BIDDER: _____

By: _____

(name signed)

_____

(name printed or typed)

Title: _____

Date: _____

Subscribed and sworn to me this ___ day of _____, 20____

NOTARY PUBLIC: _____

(name signed)

_____

(name printed or typed)

Commission Expires: _____

(SEAL)

END OF SECTION

I, _____, certify that I am the Secretary of the Corporation named as Bidder in the foregoing Bid; that _____, who signed said Bid on behalf of the Contractor was then _____ of said Corporation; that said Bid was duly signed for and on behalf of said Corporation by authority of its Board of Directors, and is within the scope of its corporate powers; that said Corporation is organized under the laws of the State of Georgia.

This _____ day of _____, 20__.

Corporate Secretary: _____

(name signed)

_____

(name printed or typed)

(SEAL)

END OF SECTION

Drug-Free Workplace Certificate

By signature on this certificate, the Bidder/Contractor agrees to comply with and accepts the provisions of O.C.G.A. Section 50-24-1 through 50-24-6, the “Drug-free Workplace Act”. The Contractor certifies that:

1. A drug-free workplace will be provided for the Contractor's employees during the performance of the Contract; and

2. Each Contractor who hires a subcontractor to work in a drug-free workplace shall secure from that subcontractor the following written certification: “As part of the subcontracting agreement with _____ (Contractor's name), _____ (subcontractor's name) certifies to the Contractor that a drug-free workplace will be provided for the subcontractor's employees during the performance of this Contract pursuant to paragraph (7) of subsection (b) of Code Section 50-24-3”.

By signature on this certificate, the Bidder/Contractor further certifies that it will not engage in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the Contract.

Bidder/Contractor: _____

By: _____
(name signed)

_____
(name printed or typed)

Title: _____

Date: _____

END OF SECTION

The Columbus Parks and Recreation (Owner) and Contractor agree that compliance with the requirements of O.C.G.A. 13-10-91 and Rule 300-10-1 of the Rules of the Georgia Department of Labor (DOL) are conditions of this Agreement for the physical performance of services.

The Contractor further agrees that its compliance with the requirements of O.C.G.A. 13-10-91 and DOL Rule 300-10-1-.02 is attested to on the executed Contractor Affidavit and Agreement attached hereto as EXHIBIT A.

If employing or contracting with any subcontractor(s) in connection with this Agreement, Contractor further agrees:

(1) To secure from the subcontractor(s) such subcontractor(s)') indication of the employee-number category applicable to the subcontractor(s); and

(2) To secure from the subcontractor(s) an affidavit attesting to the subcontractor's compliance with O.C.G.A. Sec. 13-10-91 and DOL Rule 300-10-1; such affidavit being in the form attached hereto and referenced as EXHIBIT A-1; and

(3) To submit such subcontractor affidavit(s) to the Owner when the subcontractor(s) is retained, but in any event, prior to the commencement of work by the subcontractor(s).

The Contractor shall check, initial or otherwise affirmatively indicate below the employee-number category applicable to the Contractor:

____ 500 or more employees

____ 100 or more employees

____ fewer than 100 employees

The failure of Contractor to supply the affidavit of compliance at the time of execution of this Agreement and/or the failure of Contractor to continue to satisfy the obligations of O.C.G.A. 13-10-91 and DOL Rule 300-10-1 as set forth in this Agreement during the term of the Agreement shall constitute a material breach of the contract. Upon notice of such breach, Contractor shall be entitled to cure the breach within ten days, upon providing satisfactory evidence of compliance with the terms of this Agreement and State law. Should the breach not be cured, the Owner shall be entitled to all available remedies, including termination of the contract and damages.

SEE AFFIDAVITS ON FOLLOWING PAGES

CONTRACTOR AFFIDAVIT AND AGREEMENT
EXHIBIT A

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 contracting with Columbus Water Works, has registered with, is authorized to use and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. § 13-10-91. The undersigned affirms that it is using and will continue to use the federal work authorization program throughout the contract period.

The undersigned further agrees that should it employ or contract with any subcontractor(s) for the physical performance of services pursuant to the contract with Columbus Water Works, the Contractor will secure from the subcontractor(s) verification of compliance with O.C.G.A. § 13-10-91 on the attached Subcontractor Affidavit. (EXHIBIT A-1). The Contractor further agrees to maintain records of such compliance and shall provide a copy of each such verification to Columbus Water Works, at the time the subcontractor(s) is retained to perform such services.

_____
EEV / Basic Pilot Program* User Identification Number

_____ _____
BY: Authorized Officer or Agent Date Signed

_____
[Contractor Name]

_____
Title of Authorized Officer or Agent of Contractor

_____
Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

DAY OF _____, 20___

_____
Notary Public
My Commission Expires: _____

**As of the effective date of O.C.G.A 13-10-91, the applicable federal work authorization program is the "EEV / Basic Pilot program" operated by the the U.S. Citizenship and Immigration Service Bureau of the U.S. Department of Homeland Security. In conjunction with the Social Security Administration (SSA).*

SUBCONTRACTOR AFFIDAVIT
EXHIBIT A-1

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 _____ on behalf of Columbus Water Works, has registered and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. § 13-10-91.

_____
EEV / Basic Pilot Program* User Identification Number

_____ _____
BY: Authorized Officer or Agent Date Signed

_____
[Subcontractor Name]

_____
Title of Authorized Officer or Agent of Subcontractor

_____
Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

____ DAY OF _____, 2025

_____
Notary Public
My Commission Expires: _____

** As of the effective date of O.C.G.A 13-10-91, the applicable federal work authorization program is the "EEV / Basic Pilot Program" operated by the U.S. Citizenship and Immigration Service Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration.*

END OF SECTION

Contractor's License Certification

Bidder/Contractor's Name: _____

Georgia Utility Contractor's License Number: _____

Expiration Date of License: _____

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

BIDDER: _____

By: _____
(name signed)

_____
(name printed or typed)

Title: _____

Date: _____

END OF SECTION

THIS AGREEMENT is by and between Columbus Parks and Recreation ("Owner") and

_____
_____ ("Contractor")

Owner and Contractor agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Carver Lake Park Phase 1

ARTICLE 2 – THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Carver Lake Park Phase 1

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by Barge Design Solutions, Inc. (Engineer), which is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Days to Achieve Substantial Completion and Final Payment*

A. The Work will be substantially completed within 550 consecutive calendar days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 580 consecutive calendar days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the

delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time.

1. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner $500.00 for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete.

2. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner $500.00 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

B. Liquidated Damages associated with Substantial Completion, Final Completion and Milestones shall be additive and cumulative.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A below:

A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit, the sum of which is _____ (Dollars) ($_____).

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on account of the Contract Price, on the basis of Contractor's Applications for Payment submitted and recommended for payment in accordance with Article 14 of the General Conditions, and as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.

a. 95 percent of Work completed (with the balance being retainage).; and

b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

c. If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage.

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate as stipulated in Article 14 of the General Conditions.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."

E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and

observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement.

2. Performance bond.

3. Payment bond.

4. General Conditions.

5. Supplementary Conditions.

6. Specifications as listed in the table of contents of the Project Manual.

7. Drawings as listed on the Drawing Index on plan sheet C-001, with each sheet bearing the following general title: *Bull Creek 54-Inch Gravity Trunk Sewer*.

8. Addenda (numbers ___ to ____, inclusive), incorporated herein.

9. Exhibits to this Agreement (enumerated as follows):

a. Contractor's Bid, as shown in Section 00 41 00 of this Project Manual.

10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

    a. Notice to Proceed.

    b. Work Change Directives.

    c. Change Orders.

B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Six counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on ____ day of _____, 20 ___, (which is the Effective Date of the Agreement).

Approved as to Form Before Execution:

By: _____
Signature

_____
Printed Name

Title: Attorney for Owner

OWNER:

Columbus Water Works

By: _____
Signature

_____

Title: _____

Attest: _____
Signature

_____
Printed Name

Title: _____

Address for giving notices:

1421 Veterans Parkway

Columbus, Georgia 31901

CONTRACTOR

By: _____
Signature

_____
Printed Name

Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
Signature

_____
Printed Name

Title: _____

Address for giving notices:

_____

_____

_____

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1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Associated General Contractors of America
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
(703) 548-3118
www.agc.org

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STATE OF GEORGIA COUNTY OF MUSCOGEE

In accordance with O.C.G.A. §36-91-21(e), we, the undersigned of

_____,

being first duly sworn, deposes and says that:

We have not directly or indirectly violated O.C.G.A. §36-91-21 (d), and more specifically, we have not

- prevented or attempted to prevent competition in such bidding or proposals by any means whatever,
- prevented or endeavored to prevent anyone from making a bid or proposal thereof by any means whatever, nor
- caused or induced another to withdraw a bid or proposal for the work.

We, the undersigned, to the best of our knowledge, affirm that no other officers, agents or other persons acted for or represented the Contractor in the bidding for and procurement of this Contract.

Signature	Printed Name	Title	Date

_____ My Commission Expires: _____
(Notary Public)

(SEAL)

END OF SECTION

Affidavit Verifying Residency Status of an Applicant as Required by The Georgia Security and Immigration Compliance Act

By executing this affidavit under oath, as an applicant for a Columbus Parks and Recreation contract or other public benefit as referenced in the Georgia Security and Immigration Compliance Act (O.C.G.A. § 50-36-1), I am stating the following with respect to my application and award for a contract with Columbus Parks and Recreation.

_____ **I am a United States citizen**

OR

_____ **I am a legal permanent resident 18 years of age or older or I am an otherwise qualified alien or non-immigrant under the Federal Immigration and Nationality Act 18 years of age or older and lawfully present in the United States.***

Attach a copy of the document verifying your status (front and back) to this Affidavit.

In making the above representation under oath, I understand that any person who knowingly and willfully makes a false, fictitious, or fraudulent statement or representation in an affidavit shall be guilty of a violation of Code Section 16-10-20 of the Official Code of Georgia.

_____ _____
Signature of Applicant Date

_____
Printed Name

_____
*Alien registration number for non-citizens

_____
Applying on Behalf of/Name of Associated Business

SUBSCRIBED AND SWORN BEFORE ME
ON THIS _____ DAY OF _____,
2026

_____
Notary Public

My Commission Expires:
_____

*Note: O.C.G.A. 50-36-1(e)(2) requires that aliens under the federal Immigration and nationality Act, Title 8 U.S.C., as amended, provide their alien registration number. Because legal permanent residents are included in the federal definition of “alien”, legal permanent residents must also provide their alien registration number.

END OF SECTION

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:
Columbus Parks and Recreation
1111 1st Avenue, 2nd Floor
Columbus, GA 31901

CONSTRUCTION CONTRACT
Effective Date of the Agreement: _____
Amount:
Description: Carver Lake Park Phase 1

BOND
Bond Number: _____
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*: _____
Amount:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ *(seal)*	_____ *(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Printed Name	Printed Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Printed Name	Printed Name
_____	_____
Title	Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after Owner terminates for cause in accordance with General Conditions Paragraph 15.02.

4. Failure on the part of the Owner to comply with the notice requirement in General Conditions Paragraph 15.02 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take the following action:

5.1 Waive its right to perform and complete, to arrange for completion, or to obtain a new contractor, and with reasonable promptness under the circumstances:

5.1.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.1.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

6.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

6.2 additional legal, design professional, and delay costs resulting from the Contractor's Default; and

6.3 liquidated damages caused by delayed performance or non-performance of the Contractor.

7. The Surety's liability is limited to the amount of this Bond.

8. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

9. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

10. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

11. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

12. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

13. Definitions

13.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

13.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

13.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

13.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

13.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

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1420 King Street, Alexandria, VA 22314-2794
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American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Associated General Contractors of America
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
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www.agc.org

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Part 1 General

1.1 Section Includes

A. Work by Contractor.

B. Contractor Use of Site and Premises

C. Partial Owner Occupancy

D. Quantities

1.2 Work by Contractor

A. The work to be performed under this Contract shall consist of furnishing all labor, materials, tools, equipment and incidentals and performing all work required to construct complete in place and ready to operate the improvements shown in the Contract Documents. These improvements include, but are not limited to, the following:

Project consists of improvements to Carver Lake Park, including demolition and removal of existing site improvements; clearing and grubbing; earthwork and grading; construction and reconstruction of access drives and parking areas; asphalt pavement, permeable pavers, concrete sidewalks, curb and gutter; pedestrian trails; playground and pavilion areas; fencing; site signage and pavement markings; landscaping and site restoration; and associated storm drainage and utility improvements.

The Work also includes construction of a 10-foot-wide multi-use trail, parking and accessible parking improvements, pedestrian crossings, park benches, landscape islands, and supporting infrastructure associated with the redevelopment of the park. Recreational improvements include playground and pavilion areas and improvements surrounding the existing splash pad.

B. Project Location

1. The equipment and materials to be furnished will be installed at the locations shown on the Drawings.

1.3 Contractor Use of Site and Premises

A. See Section 01 35 00.

1.4 Partial Owner Occupancy

A. The Owner will occupy existing facilities to which these improvements are being made and will continue operation during the period of construction.

B. There shall not be any interruption in service. The Contractor is responsible for fines assessed due to his activities.

C. Whenever, in the opinion of the Engineer, any section or portion of the work or any structure is in suitable condition, it may be put into use upon the written order of the Engineer and such usage will not be held in any way as an acceptance of said work or structure, or any part thereof, or as a waiver of any of the provisions of these Specifications and the Contract. Pending final completion and acceptance of the Work, all necessary repairs and replacements, due to defective materials or workmanship or operations of the Contractor, for any section of the work so put into use shall be performed by the Contractor at Contractor's own expense.

1.5 Quantities

A. The Owner reserves the right to alter the quantities of work to be performed or to extend or shorten the improvements at any time when and as found necessary, and the Contractor shall perform the work as altered, increased or decreased. Payment for such increased or decreased quantity will be made in accordance with the Instructions to Bidders. No allowance will be made for any change in anticipated profits nor shall such changes be considered as waiving or invalidating any conditions or provisions of the Contract and Bond.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Scope

A. The Bid shall be submitted on a Lump Sum basis for completion of the entire Project as shown on the Drawings and specified in the Contract Documents.

B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid, 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 Bid. The Contractor shall prepare the Bid accordingly.

C. Work includes furnishing all plant, labor, equipment, tools and materials, which are not furnished by the Owner and performing all operations required to complete the work satisfactorily in place as specified and as indicated on the Drawings.

1.2 Descriptions

A. No separate measurement of quantities will be made for payment. The Lump Sum Bid shall constitute full compensation for completion of the Work.

B. Progress payments shall be based on the Contractor’s approved Schedule of Values and the percentage of satisfactorily completed Work.

C. Payment will include all necessary and incidental related work required for a complete Project in accordance with the Contract Documents.

D. Unless otherwise stated in individual sections of the Specifications or in the Bid, 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 Lump Sum Bid.

E. The Lump Sum Bid shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the entire Project complete in place as specified and as indicated on the Drawings.

F. “Products” shall mean materials or equipment permanently incorporated into the work.

1.3 Work Included in Lump Sum Bid

A. Unless specifically indicated otherwise in the Bid or Contract Documents, all Work necessary for the complete construction of the Project shall be included in the Lump Sum Bid. No separate or additional payment will be made based on actual quantities of Work performed.

B. The Lump Sum Bid shall include, but not be limited to, clearing and grubbing, erosion and sedimentation control, earthwork, excavation, rock excavation, trenching, bedding, backfill, dewatering, storm drainage, utilities, pavement, curb and gutter, sidewalks, site improvements, landscaping, restoration, testing required of the Contractor, and all other Work shown or specified in the Contract Documents.

C. Rock excavation, if encountered, shall be considered incidental to the Work and shall be included in the Lump Sum Bid. No separate measurement or payment will be made for rock excavation.

D. The Contractor shall include in the Lump Sum Bid all costs associated with its means and methods and with providing a complete and functional Project in accordance with the Contract Documents.

1.4 Cash Allowances

A. General

1. The Contractor shall include in the Bid Total all allowances stated in the Contract Documents. These allowances shall cover the net cost of the services provided by a firm selected by the Owner. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the Lump Sum Bid and not in allowances.

2. 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.

3. No payment shall be provided for services that fail to verify required results.

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. Submit copies of the invoices with each periodic payment request from the firm providing the services.

2. Submit results of services provided which verify required results.

D. Schedule of Cash Allowances

1. Soils, Concrete and Material Testing: Allow the amount provided in the Bid for the services of a geotechnical engineering firm and testing laboratory to verify soils

conditions including trench excavation, backfill, and similar issues, for compaction testing, and for the testing of concrete cylinders for poured in place concrete.

END OF SECTION

Part 1 General

1.1 Scope

This section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.

1.2 Definitions

A. For the purposes of these Contract Documents, a “substitute item” shall be defined as one of the following:

1. A product or manufacturer offered as a replacement to a specified product or manufacturer.

2. A product or manufacturer offered in addition to a specified product or manufacturer.

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.

1.3 General

A. An item or construction method, which is offered where no specific product, manufacturer, 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 manufacturer which meets the requirements of the Specifications, unless indicated otherwise in the Contract Documents.

C. If the manufacturer is named on the Drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer 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 manufacturer, that manufacturer will be shown on the Drawings and/or listed first in the list of approved manufacturers in the Specifications. Any Bidder intending to furnish products of other than the first listed manufacturer, 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.

1.4 Approvals

Approval, of a substitution as an acceptable manufacturer, of the Engineer is dependent on 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.

1.5 Substitutions and Options

A. After Notice to Proceed

1. Substitute items will be considered only if the term “equal to” precedes the names of acceptable manufacturers in the Specification.

2. Where items are specified by referenced standard or specified as indicated in Article 1.3, Paragraph B above, such items shall be submitted to the Engineer for review.

3. The Contractor shall submit shop drawings on the substitute item for the Engineer's review in accordance with Section 01 33 00.

4. No substitutions will be considered for the manufacturers listed in the Bid.

B. Prior to Opening of Bids

1. No consideration or approvals will be made for products specified by a referenced standard, or specified as indicated in Article 1.3, Paragraph B, above. Such consideration may occur only after the Notice to Proceed.

2. No consideration or approvals will be made for products being offered where the term “equal to” precedes the name of an approved product. Such substitution consideration may occur only after the Notice to Proceed.

3. If the term “or equal” follows the names of acceptable manufacturers, then other manufacturers desiring approval as an acceptable manufacturer may submit the product information to the Engineer for approval during the bidding phase, as

indicated below. With the exception of where the phrase “no substitutions” is associated with a list of manufacturers, where a list of acceptable manufacturers is not preceded by the phrase “equal to”, the list of acceptable manufacturers shall be considered as having the phrase “or equal” following the list, and the list being subject to the “or equal” provisions of this section.

4. The manufacturer shall include the following items in its “or equal” submittal:

   a. Descriptive literature including information on materials used, minimum design standards, standard design features, manufacturing processes and facilities, and similar information which will indicate experience and expertise in the manufacture of the product being evaluated.

   b. Performance specifications applicable to the manufacturer's standard design which indicates the level of performance to be expected from the product.

   c. A complete set of submittal drawings of similar products which have been completed and placed into operation.

   d. A list of existing installations of products similar in type and size, information required to satisfy specified experience requirements, or a copy of the bond to be submitted in lieu of experience.

   e. Evidence of technical ability of the manufacturer to design and manufacture products meeting Project requirements.

   f. Evidence submitted shall include, as a minimum, descriptions of engineering and manufacturing staff capabilities.

   g. A copy of the manufacturer's most recent annual business report. Include a statement comparing the present net worth of the manufacturer in comparison to the total value of all products proposed to be furnished. Net worth must exceed the total value of all products proposed.

   h. 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.

   i. 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.

   j. If descriptive literature or drawings illustrate standard products with design features or materials not in compliance with Project requirements then these exceptions must be specifically listed. Failure to do so will indicate intent by the manufacturer to modify design features and alter materials to meet Project requirements.

   k. Where additional information is submitted to supplement the submittal, all changes to the list of exceptions shall be specifically noted.

l. All other information necessary to fully evaluate the product for consideration.

5. This “or equal” submittal shall reach the Engineer no later than 15 days prior to the Bid date. Submittals which do not include a complete list of exceptions to Project requirements, or the statement “No exceptions to the Specifications will be taken”, will automatically be rejected by the Engineer. Manufacturers will be advised of approval or rejection in writing no later than 10 days prior to the Bid date. Rejected submittals may be supplemented with additional information and resubmitted no later than five days prior to the Bid date. Manufacturers making supplementary submittals will be advised of approval or rejection in writing no later than two days prior to the Bid date.

6. Bids based on products which have not received the approval of the Engineer may be determined non-responsive by the Owner and rejected.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 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 Engineer:

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.

1.2 Preconstruction Conference

A. The Engineer shall schedule the preconstruction conference prior to the issuance of the Notice to Proceed.

B. Representatives of the following parties are to be in attendance at the meeting:

1. Owner.

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 as 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 Owner's requirements.
10. Major equipment deliveries and priorities.
11. Safety and first aid procedures.
12. Security procedures.
13. Housekeeping procedures.
14. Work hours.

1.3 Project Coordination Meetings

A. Attend regular monthly meetings as directed by the Engineer.

B. Hold called meetings as the progress of the work dictates.

C. The meetings shall be held at the location indicated by the Engineer.

D. Representatives of the following parties are to be in attendance at the meetings:

1. Engineer.
2. Contractor and superintendent.
3. Major subcontractors as pertinent to the agenda.
4. Owner's representative as appropriate.
5. 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 Owner for their effect on the construction schedule and completion date.

11. Complete other current business.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Scope

A. 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.

1.2 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.

1.3 Approval

A. 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.

1.4 Overall Project Schedule (OPS)

A. The Contractor shall submit to the Owner 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.

1.5 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.

1.6 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 Progress 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 Owner.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Scope

A. The Contractor shall furnish all equipment and labor materials required to provide the Owner with digital construction videos and photographs of the Project. The requirements of this section are independent of and in addition to the requirements in Division 33 of the Specifications.

B. Photo and video files shall become the property of the Owner and none of the videos or photographs shall be published without express permission of the Owner.

1.2 Pre and Post Construction Videos and Photographs

A. Prior to the beginning of any work, the Contractor shall take videos and photographs of the work area to record existing conditions.

B. Following completion of the work, another set of videos and photographs shall be made showing the same areas and features as in the pre-construction videos and photographs.

C. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.

1.3 File Format, Media and Submittals

A. Photographs shall be in “jpg” format.

B. Videos shall be in a format viewable by Microsoft Windows Media Player or Apple QuickTime Player. Audio narration is desirable.

C. Files shall be named such that what is being viewed is self-evident.

D. Files shall be submitted on a flash drive, compact disk (CD) or a digital video disk (DVD). If submitted on DVD, disk shall be recorded in “Minus R” format.

E. The pre-construction videos and photographs shall be submitted to the Engineer within 25 calendar days after the date of receipt by the Contractor of Notice to Proceed. Postconstruction videos and photographs shall be provided prior to final acceptance of the Project.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 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. Shop Drawings

a. Shop drawings shall include technical data, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.

b. Provide newly-prepared information, on bond sheets, with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings. Show dimensions and note dimensions that are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawings to be used in connection with the Work without appropriate final “Action” markings by the Engineer.

c. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, Specification Section, schedule or room numbers shown on the Contract Drawings.

d. Minimum assembly drawings sheet size shall be 22 x 34 inches.

e. Minimum detail sheet size shall be 8-1/2 x 11 inches.

f. Minimum Scale

i. Assembly Drawings Sheet, Scale: 1inch = 30 feet.

ii. Detail Sheet, Scale: 1/4-inch = 1 foot.

2. 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 manufacturer'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.

3. 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 manufacturer, 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.

4. 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.

1.2 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. Manufacturer

5. Identification of the product, with the Specification Section number, permanent equipment tag numbers and applicable Drawing Number.

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.

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.

1.3 Routing of Submittals

A. Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable)

2. Contractor to Engineer

3. Engineer to Contractor and Owner

4. Contractor to Supplier

Part 2 Products

2.1 Shop Drawings

A. Unless otherwise specifically directed by the Engineer, 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.

2.2 Manufacturer's Literature

A. Where content of submitted literature from manufacturers 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.

2.3 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.

2.4 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

3.1 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 manufacturer'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 Owner may backcharge 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

1. 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.

3.2 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.

3.3 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 Engineer's and the Owner'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 “Exceptions 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 “Revise and Resubmit” must be revised to reflect required changes and the initial review procedure repeated.

5. The “Rejected” 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 “Revise and Resubmit” and “Rejected” 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.

3.4 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

Part 1 General

1.1 Scope

A. Permits and Responsibilities: The Contractor shall, without additional expense to the Owner, 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.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Description

A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.

B. The inclusion of an organization under one category does not preclude that organization’s standards from applying to another category.

C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.

D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

E. The standards which apply to this Project are not necessarily restricted to those from organizations which are listed in Article 1.2.

1.2 Standard Organizations

A. Piping and Valves

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute
Uni-Bell	PVC Pipe Association

B. Materials

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

C. Painting and Surface Preparation

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. Electrical and Instrumentation

AEIC	Association of Edison Illuminating Companies
AIEE	American Institute of Electrical Engineers
EIA	Electronic Industries Association
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	The Instrumentation, Systems, and Automation Society
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
REA	Rural Electrification Administration
TIA	Telecommunications Industries Association
UL	Underwriter's Laboratories
VRCI	Variable Resistive Components Institute

E. Aluminum

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

F. Steel and Concrete

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute
NRMA	National Ready-Mix Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

G. Welding

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

H. Government and Technical Organizations

AIA	American Institute of Architects
APHA	American Public Health Association
APWA	American Public Works Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FmHA	Farmers Home Administration
FS	Federal Specifications
IAI	International Association of Identification
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
NBFU	National Board of Fire Underwriters
NFPA	National Fluid Power Association
NBS	National Bureau of Standards
NISO	National Information Standards Organization
OSHA	Occupational Safety and Health Administration
SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

I. General Building Construction

AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AITC	American Institute of Timber Construction
APA	American Parquet Association, Inc.
APA	American Plywood Association
BHMA	Builders Hardware Manufacturers Association
BIFMA	Business and Institutional Furniture Manufacturers Association
DHI	Door and Hardware Institute
FM	Factory Mutual Fire Insurance Company
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
IME	Institute of Makers of Explosives
ISANTA	International Staple, Nail and Tool Association
ISDSI	Insulated Steel Door Systems Institute
IWS	Insect Screening Weavers Association
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NAGDM	National Association of Garage Door Manufacturers

NCCLS	National Committee for Clinical Laboratory Standards
NFPA	National Fire Protection Association
NFSA	National Fertilizer Solutions Association
NKCA	National Kitchen Cabinet Association
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
RMA	Rubber Manufacturers Association
SBC	SBCC Standard Building Code
SDI	Steel Door Institute
SIA	Scaffold Industry Association
SMA	Screen Manufacturers Association
SPRI	Single-Ply Roofing Institute
TCA	Tile Council of America
UBC	Uniform Building Code

J. Roadways

AREA	American Railway Engineering Association
DOT	Department of Transportation

K. Plumbing

AGA	American Gas Association
NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

L. Refrigeration, Heating, and Air Conditioning

AMCA	Air Movement and Control Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
CGA	Compressed Gas Association
CTI	Cooling Tower Institute
HEI	Heat Exchange Institute
IIAR	International Institute of Ammonia Refrigeration
NB	National Board of Boilers and Pressure Vessel Inspectors
PFMA	Power Fan Manufacturers Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMC	SBCC Standard Mechanical Code
TEMA	Tubular Exchangers Manufacturers Association

M. Equipment

AFBMA	Anti-Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
ALI	Automotive Lift Institute
CEMA	Conveyor Equipment Manufacturers Association

CMAA	Crane Manufacturers Association of America
DEMA	Diesel Engine Manufacturers Association
MMA	Monorail Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.
RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

1.3 Symbols

Symbols and material legends shall be as scheduled on the Drawings.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Scope

A. This Section includes testing which the Owner may require, beyond that testing required of the manufacturer, to determine if materials provided for the Project meet the requirements of these Specifications.

B. This work also includes all testing required by the Owner 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 manufacturer, e.g., testing of pipe.

D. The testing laboratory or laboratories will be selected by the Owner. The testing laboratory or laboratories will work for the Owner.

1.2 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 Owner through the CASH ALLOWANCE, i.e., concrete testing, soil compaction, material testing, and asphalt testing.

B. The cost of additional testing services not specifically required in the Specifications, but requested by the Owner or Engineer, shall be paid for by the Owner 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 manufacturer, shall be included in the price bid for that item and shall not be paid for by the Owner.

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 Owner.

1.3 Laboratory Duties

A. Cooperate with the Owner, 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 irregularities or deficiencies 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.

1.4 Contractor Responsibilities

A. Cooperate with laboratory personnel, provide access to work and/or comply with manufacturer'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.

1.5 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).

1.6 Product Handling

Promptly process and distribute all required copies of test reports and related instructions to ensure all necessary retesting or replacement of materials with the least possible delay in the progress of the work.

1.7 Furnishing Materials

The Contractor shall be responsible for furnishing all materials necessary for testing.

1.8 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.

1.9 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 Owner, 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 Owner.

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.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Scope

A. Temporary facilities required for this work include, but are not necessarily limited to:

1. Temporary utilities such as water and electricity.

2. First aid facilities.

3. Sanitary facilities.

4. Potable water.

5. Temporary enclosures and construction facilities.

1.2 General

A. First aid facilities, sanitary facilities and potable water shall be available on the Project site on the first day that any activities are conducted on site. The other facilities shall be provided as the schedule of the Project warrants.

B. Maintenance: Use all means necessary to maintain temporary facilities in proper and safe condition throughout progress of the work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the Owner.

C. Removal: Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

1.3 Quality Assurance

A. Temporary Electric: Installation of all temporary electric facilities shall comply with NECA, NEMA and UL standards and regulations for such facilities. Install service to comply with NFPA 70.

1.4 Temporary Utilities

A. General

1. Provide and pay all costs for all water, electricity and other utilities required for the performance of the work.

2. Pay all costs for temporary utilities until Project completion.

3. Costs for temporary utilities shall include all power, water and the like necessary for testing equipment as required by the Contract Documents.

B. Temporary Water:

1. Connect to public water system. Provide reduced pressure backflow prevention.

2. Provide all necessary temporary piping. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing, as necessary.

3. Upon completion of the Work, remove all such temporary piping.

4. Provide and remove water meters, as required by governing authority.

C. Temporary Electricity:

1. Provide all necessary wiring for the Contractor's use.

2. Provide main service disconnect and over-current protection at convenient location.

3. Furnish, locate and install area distribution boxes such that the individual trades may use their own construction type extension cords to obtain adequate power, and artificial lighting at all points where required by inspectors and for safety.

4. Existing receptacles may not be utilized during construction.

5. If existing site lighting is disabled during construction, provide and maintain temporary lighting to exterior work areas for routine plant operations.

D. Temporary Ventilation:

1. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases. Provide temperature or humidity control, if required to meet required installation conditions.

E. Temporary Heating:

1. Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed equipment.

2. Permanent heating systems shall not be utilized.

F. Temporary Sewer Facilities:

1. Prior to starting the work, the Contractor shall furnish, for use of Contractor's personnel on the job, all necessary toilet facilities which shall be secluded from public observation. These facilities shall be chemical toilets.

2. Existing sanitary facilities may not be used.

3. All facilities, regardless of type, shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the work is performed. Adequacy of these facilities will be subject to the Owner’s review and maintenance of same must be satisfactory to the Owner at all times.

G. Telephone Service:

1. Provide, maintain, and pay for telephone service in common-use facilities for use by all construction personnel, Owner, and Engineer. Telephone service shall be established at time of project mobilization.

2. Provide, maintain, and pay for telephone service to Engineer's Field Office. Telephone service shall be DSL or fiber-optic based to allow for data usage. Provide DSL/fiber optic modem and appropriate filters.

3. Provide a dedicated telephone line for each facsimile machine in each field office.

4. At each telephone, post a list of important telephone numbers.

5. Provide superintendent with cellular telephone for use when away from field office or where field office is not required.

1.5 First Aid Facilities

A. The Contractor shall provide a suitable first aid station, equipped with all facilities and medical supplies necessary to administer emergency first aid treatment. The Contractor shall have standing arrangements for the removal and hospital treatment of any injured person. All first aid facilities and emergency ambulance service shall be made available by the Contractor to the Owner and the Owner's personnel.

1.6 Potable Water

A. The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, engineers and the Owner who are associated with the work.

1.7 Enclosures and Construction Facilities

A. Furnish, install and maintain for the duration of construction, all required scaffolds, tarpaulins, canopies, steps, bridges, platforms and other temporary construction necessary for proper completion of the work in compliance with all pertinent safety and other regulations.

B. All temporary enclosures and sheds located within construction areas or within 30 feet of existing building lines shall be noncombustible, in accordance with ASTM E136. Comply with NFPA 241.

1.8 Parking Facilities

A. Arrange for temporary surface parking areas for the Contractor's and Contractor's subcontractors' personnel. Existing facilities provided by the Owner shall not be used for parking by the Contractor's or subcontractor's personnel.

1. Designate two parking spaces for Engineer.

B. When site space is not adequate, provide additional off-site parking.

C. Maintain all roads, both temporary and permanent, in passable condition for all traffic. Any road blockage shall be coordinated with Engineer, Owner, and governing authorities.

1.9 Field Offices

A. Contractor's Office: Weather-tight, with lighting, electrical outlets, heating and air conditioning equipment, sanitary facilities, and equipped with following items:

1. Desks, 30"x60" – minimum two (2)
2. Folding table, 30"x60"
3. Chairs, swivel – minimum two (2)
4. Chairs, folding – minimum two (2)
5. Drafting table
6. Drafting stool
7. Four drawer file cabinet(s)
8. Plan rack/hanger(s)
9. Photocopy machine
10. Waste Paper Receptacles – minimum two (2)
11. Telefax machine (plain paper)
12. Four shelf book case – minimum two (2)
13. Compact refrigerator – minimum 4.3 cubic feet.

B. Provide space for project meetings, with table and chairs to accommodate eight (8) persons.

C. Contractor shall maintain field offices in good repair and acceptable appearance and shall provide weekly cleaning service and constant maintenance and replenishment, as applicable, of paper towels, paper cups, soap, toilet paper, and potable water supply. Failure to comply with the requirements of this paragraph may be cause for withholding of progress payments.

1.10 Removal

A. Remove temporary above-ground or buried utilities, materials, equipment, services, and construction prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Section Includes

A. Temporary Barricades.

B. Temporary Fencing.

1.2 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 Owner.

C. Traffic control devices shall comply with the latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways.

1.3 Temporary Fencing

A. Provide fencing along the construction site at all open excavations and tunnels to control access by unauthorized people.

1. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10-foot centers, constructed at the approved location. Install fencing to be able to restrain a force of at least 250 pounds against it.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 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 Owner prior to being incorporated into the work.

1.2 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.

1.3 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. 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 USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 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.

1.2 Storage and Protection

A. Storage

1. Maintain ample way for foot traffic at all times, except as otherwise approved by the Owner.

2. All property damaged by reason of storing of material shall be properly replaced at no additional cost to the Owner.

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 manufacturer's recommendations.

B. Protection

1. Use all means necessary to protect the materials, equipment and products in accordance with manufacturer’s recommendations 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 weather-tight 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 Owner and at no additional cost to the Owner.

D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel and sheet construction products

shall be stored with one end elevated to facilitate drainage.

E. Unless otherwise permitted in writing by the Owner, building products and materials such as cement, grout, plaster, gypsum board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location. Building products such as rough lumber, plywood, concrete block and structural tile may be stored outdoors under a properly secured waterproof covering.

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.

1.3 Extended Storage

A. 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 Owner. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 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 benchmarks, 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 01 78 39 of these Specifications.

1.2 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.

1.3 Quality Assurance

A. The Contractor shall furnish documentation, prepared by a surveyor currently registered in the State in which the Project is located, confirming 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 Owner, 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.

C. Construction Surveying Cash Allowance

1. This cash allowance is solely for the use of the Engineer for verification of the Contractor's reference points, centerlines and work performed and is not to be used by the Contractor to provide cut sheets.

2. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary benchmarks, verifying that the work has been performed accurately, and all other work covered by this Section.

1.4 Site Work

A. Staking Precision: The precision of construction staking shall match the precision of a component’s 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.

1.5 Sewers and Accessories

A. Staking Precision: The precision of construction staking shall be no less than 1:10,000. Horizontal distances shall be measured with a precision no less than 0.01 feet, and horizontal angles measured with a precision of no less than 10 seconds.

B. Reference Points

1. The surveyor shall obtain the coordinates on each manhole and provide this information to the Engineer.

2. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right-of-way. The location of the reference

points shall be recorded in a log with a copy provided to the Engineer for use prior to his verifying reference point locations. Distances between reference points and the manhole centerlines shall be accurately measured to the nearest 0.01 foot.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Work Included

A. Section includes requirements for cleanup, re-stabilization, restoration, and disposal to maintain a safe and well-kept job site and properly repair disturbed areas.

1.2 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.

1.3 Cleaning Materials and Equipment

A. Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

B. Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Engineer.

1.4 Cleaning During Construction

A. Throughout all phases of construction, including suspension of work, and until the Final Acceptance, the Contractor shall keep the site clean and free from rubbish and debris. The Contractor shall also abate dust nuisance by cleaning, sweeping and sprinkling with water, or other means as necessary. The use of water resulting in mud on driveways, parking lots or streets will not be permitted as a substitute for sweeping or other methods.

1. The road(s) on the construction site shall be paved immediately after the installation of underground utilities and the construction and underground/final inspection of storm drainage, curbs, and gutters. The exit road on the construction site shall be paved first.

2. Vehicles exiting the construction site shall have all dirt clods and mud removed from their tires.

3. Materials and equipment shall be removed from the site as soon as they are no longer necessary. Before the final inspection, the site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory clean and neat appearance. All cleanup costs shall be included in the Contractor’s Bid.

4. Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned.

5. Excess excavated material from catch basins or similar structures shall be removed from the site immediately. Sufficient material may remain for use as backfill if permitted by the Specifications. Forms and form lumber shall be removed from the site as soon as practicable after stripping.

B. Failure of the Contractor to comply with the Engineer's cleanup orders may result in an order to suspend work until the condition is corrected. No additional compensation will be allowed as a result of such suspension.

1.5 Final Cleaning

A. Upon completion of the work, the Contractor shall remove from the site all materials, tools and equipment belonging to him, and leave the site with an appearance acceptable to the Owner.

B. Thoroughly clean all equipment and materials installed and deliver over such materials and equipment in a bright, clean, polished and new appearing condition.

C. Restore or replace all landscape features scarred or damaged by the Contractor's equipment or operations as nearly as possible to original condition, at the Contractor's expense. The Owner will approve the method of restoration to be used.

D. The Contractor shall remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction, as directed by the Owner. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The restored areas shall be filled, graded, and spread with sufficient topsoil to provide a minimum depth of four inches of suitable soil for the growth of grass, and the entire area shall be seeded or sodded with the original type of grass. Areas shall be restored to original contours as shown on the Plans. If the Plans do not cover the specific areas to be restored, the areas shall be graded to drain and give a smooth transition to the surroundings.

1.6 Measurement and Payment

A. No separate payment will be made for any items of work, materials, parts, equipment, supplies, or related items required to perform and complete the requirements of this section. The costs for all such items required shall be considered subsidiary to other items of this Contract and shall not be paid for separately.

1.7 Disposal of Waste

A. The definitions contained in Georgia Environmental Protection Division Rules 391-3-4-.01 shall be applicable to this Project. The term waste shall include excess and surplus materials, and shall include liquid and solid wastes.

B. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

C. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

D. Remove and transport waste in a manner that will prevent spillage on adjacent surfaces and areas.

E. Burning: Do not burn waste materials on site.

F. Waste removed from the Project site shall be disposed of in sites permitted by the Georgia Environmental Protection Division for the acceptance of type of waste being disposed. The acceptable types of permitted disposal facilities are as follows:

1. Inert Waste Landfills

2. Municipal Solid Waste Landfills

3. Municipal Solid Waste Landfills permitted to receive only construction and demolition wastes.

G. Exceptions to Paragraph F are as follows:

1. Hazardous waste shall be disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-11.

2. Asbestos-containing waste shall also be handled and disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-14.

3. Excess earth material and excess excavated rock material may be placed on sites for which the Contractor provides to the Owner a signed affidavit from the property owner that the placement of such material is acceptable to the property owner. The Contractor and property owner shall be responsible for all permitting of such disposal.

H. No waste shall be placed at a transfer station facility.

I. The Contractor shall maintain records related to all waste removed from the Project site so as to allow the Owner or the Engineer to readily determine the following:

1. Date waste removed from Project site.

2. Name of hauler (company and driver) transporting such waste.

3. General description of waste transported.

4. “Truck tickets” indicating the waste disposal site and amount of waste disposed therein.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Project Maintenance and Warranty

A. Maintain and keep in good repair the work covered by these Drawings and Specifications until acceptance by the Owner.

B. The Contractor shall warrant all work for a period of time as stated in the General Conditions. The Owner will give notice of observed defects with reasonable promptness.

C. The Contractor shall not be obligated to make replacements which become necessary because of ordinary wear and tear, or as a result of improper operation or maintenance, or as a result of improper work or damage by another Contractor or the Owner, or to perform any work which is normally performed by a maintenance crew during operation.

D. In the event of multiple failures of major consequences prior to the expiration of the Correction Period described in the General Conditions, the affected unit shall be disassembled, inspected and modified or replaced as necessary to prevent further occurrences. All related components which may have been damaged or rendered non-serviceable as a consequence of the failure shall be replaced. A new warranty and Correction Period, as described in the General Conditions, against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation. As used herein, multiple failure shall be interpreted to mean two or more successive failures of the same kind in the same item or failures of the same kind in two or more items. Major failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear or excessive leakage around seals. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over- or under-lubrication and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the one-year warranty. Should multiple failures occur in a given item, all products of the same size and type shall be disassembled, inspected, modified or replaced as necessary and rewarranted for one year from the date of reassembly.

E. The Contractor shall, at Contractor's own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the work performed by the Contractor. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.

F. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the Contract. Any and all damage to any facility not designated for removal, resulting from

the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the Owner.

G. The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of same for the duration of the Correction Period, as defined in the General Conditions. In the event the repairs and maintenance are not made immediately and it becomes necessary for the owner of the road to make such repairs, the Contractor shall reimburse the owner of the road for the cost of such repairs.

H. In the event the Contractor fails to proceed to remedy the defects upon notification within 15 days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on Contractor's bond liable for the cost and expense thereof.

I. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at Contractor's home office.

J. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability within the law of the place of construction.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 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.

C. The Contractor shall maintain on the Project site throughout the Contract Time an up-to-date set of Record Drawings.

1.2 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 at the site for the Owner one copy of all record documents.

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 of a certificate for payment.

1.3 Quality Assurance

A. Unless noted otherwise, Record Drawings shall provide dimensions, distances and coordinates to the nearest 0.1 foot.

B. Unless noted otherwise, Record Drawings shall provide elevations to the nearest 0.01 foot for all pertinent items constructed by the Contractor.

C. For sanitary sewer construction, the Contractor shall employ a currently registered surveyor to prepare the Record Drawings from a post-construction, field run survey. The Record Drawings shall provide elevations to the nearest 0.01 foot for all manhole inverts, manhole frames and other pertinent items constructed by the Contractor. The Record Drawings shall provide dimensions, distances, and coordinates to the nearest 0.01 foot and horizontal angles to the nearest 10 seconds.

1.4 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.

1.5 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.

B. Legibly mark drawings to record actual construction, including:

1. All Construction

a. Changes of dimension and detail.

b. Changes made by Requests for Information (RFI), field order, clarification memorandums or by change order.

c. Details not on original Drawings.

2. Site Improvements, Including Underground Utilities

a. Horizontal and vertical locations of all exposed and underground utilities and appurtenances, both new facilities constructed and those utilities encountered, referenced to permanent surface improvements.

b. Location of and dimensions of roadways and parking areas, providing dimensions to back of curb when present.

c. The locations shall be referenced to at least two easily identifiable, permanent landmarks (e.g., power poles, valve markers, etc.) or benchmarks.

3. Structures

a. Depths of various elements of foundation in relation to finish first floor datum or top of wall.

b. Location of internal and buried utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

1.6 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.

1.7 Submittal

A. At contract closeout, deliver Record Documents to the Engineer for the Owner.

B. Accompany submittal with 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

5. Signature of Contractor or Contractor's authorized representative

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Work Included

A. Demolition of designated structures and other existing facilities.

B. Unless otherwise noted, remove all demolition material from the project site and properly dispose of all demolition material at a location selected and provided by the Contractor.

C. Final grading and finishing of site.

1.2 Project Description

A. Demolition Plan

1. Prepare a Demolition Plan and submit proposed demolition, and removal procedures for approval before work is started. Include in the plan a detailed description of methods and equipment to be used for each operation. Plan shall be approved by Engineer prior to work beginning.

2. General Requirements: Do not begin demolition or deconstruction until authorization is received from the Engineer. Remove rubbish and debris from the project site; do not allow accumulations. Store materials that cannot be removed daily in areas specified by the Engineer.

1.3 Items To Remain in Place

A. Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Owner. Repair or replace damaged items as approved by the Engineer. Coordinate the work of this section with all other work indicated.

B. Do not overload pavements to remain.

C. Existing Construction Limits and Protection: Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction**.** Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1. Trees: Protect trees within the project site which might be damaged during demolition, and which are indicated to be left in place, in accordance with local ordinances. If no local ordinances govern tree protection, provide a minimum 4-foot-high fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Engineer.

2. Utility Service: Maintain existing utilities indicated to stay in service and

protect against damage during demolition and deconstruction operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off by the Owner and disconnected and sealed by the Contractor.

D. Facilities:

1. Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.

1.4 Burning

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

1.5 Availability of Work Areas

A. Areas in which the work is to be accomplished is shown in the drawings.

1.6 Submittals

A. Submit the following in accordance with Section 01 33 00 - Submittal Procedures:

1. Existing Conditions Survey

2. Demolition Plan

1.7 Quality Assurance

A. Comply with federal, state, and local hauling and disposal regulations.

B. Use of explosives will not be permitted.

C. Dust and Debris Control: Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

1.8 Protection

A. Traffic Control Signs

1. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Engineer prior to beginning such work.

1.9 Relocations

A. Perform the removal and reinstallation of relocated items as indicated with workmen

skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the Engineer.

1.10 Existing Conditions

A. Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Engineer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch by 6 inch or electronic photographs of equivalent resolution will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document.

B. Submit survey results.

Part 2 Products

2.1 Fill Material

A. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill voids, depressions or excavations resulting from demolition of structures.

B. Fill material shall conform to the definition of satisfactory soil material as defined in AASHTO M 145, Soil Classification Groups A-1, A-2-4, A-2-5 and A-3. In addition, fill material shall be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

Part 3 Execution

3.1 Existing Facilities to Be Removed

A. Remove sidewalks, curbs, gutters and streetlight bases as indicated.

B. Utilities and Related Equipment

1. General Requirements: Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Engineer. Do not begin demolition work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

2. Disconnecting Existing Utilities: Remove existing utilities uncovered by work and terminate in a manner conforming to the nationally recognized code

covering the specific utility and approved by the Engineer. When utility lines are encountered but are not indicated on the drawings, notify the Engineer prior to further work in that area. Remove meters and related equipment and deliver to Owner in accordance with instructions of the Engineer.

C. Paving and Slabs

1. Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated to a depth of 12 inches below existing adjacent grade. Provide neat sawcuts at limits of pavement removal as indicated.

2. Pavement and slabs designated to be recycled and utilized in this project shall be moved, ground and stored as directed by the Engineer. Pavement and slabs not to be used in this project shall be removed from the site at Contractor's expense.

D. Concrete

3.2 Saw concrete along straight lines to a depth of a minimum 2 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Concurrent Earth-moving Operations

A. Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished until all demolition in the area has been completed and debris removed. Fill holes and other hazardous openings.

3.3 Disposition of Material

A. Title to Materials: Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Owner’s property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Engineer of the Contractor's demolition and removal procedures, and authorization by the Engineer to begin demolition and deconstruction. The Owner will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

B. Unsalvageable and Non-Recyclable Material: Dispose of unsalvageable and non-recyclable non-combustible material off-site in accordance with appropriate regulations.

3.4 Cleanup

A. Remove debris and rubbish. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 Disposal of Removed Materials

A. Regulation of Removed Materials: Dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from removal operations in accordance with all applicable federal, state and local regulations. Storage of removed materials on the project site is prohibited.

B. Removal from Owner's Property: Transport waste materials removed from demolished and deconstructed structures, except waste soil, from Owner's property for legal disposal. Dispose of waste soil as directed.

END OF SECTION

Part 1 General

1.1 Extent of the Work

A. The extent of concrete work is shown on the Drawings.

1.2 Quality Assurance

A. Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. ACI 301, Specifications for Structural Concrete for Buildings.
2. ACI 302, Guide for Concrete Floor and Slab Placement.
3. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
4. ACI 305, Hot Weather Concreting.
5. ACI 306, Cold Weather Concreting.
6. ACI 308, Standard Practice for Curing Concrete.
7. ACI 315, Detailing Manual.
8. ACI 318, Building Code Requirements for Reinforced Concrete.
9. ACI 347, Recommended Practice for Concrete Formwork.
10. ACI 350, Code Requirements for Environmental Engineering Concrete Structures and Commentary.
11. CRSI Manual of Standard Practice.

B. The Contractor is responsible for correcting concrete work that does not conform to the specified requirements, including requirements for strength, tolerances, and finishes. Correct deficient concrete as directed by the Engineer.

C. Materials and installed work may require testing and retesting, as directed by the Engineer and paid for by the Soils and Concrete Testing Cash Allowance. Allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be done at the Owner's expense, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

1.3 Submittals

A. Comply with applicable requirements of Section 01 33 00.

B. Submit manufacturer/supplier certifications for aggregate and cement. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates, materials manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results.

C. Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing and sealing compounds, and others requested by the Engineer.

D. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315, Detailing Manual, showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Show on the shop drawings special reinforcement required and openings through concrete structures.

E. Submit mix design in accordance with ACI requirements. Provide for each mix design, the project name, city, general contractor, concrete strength, and it’s intended use.

F. Submit 2 copies of laboratory test reports with standard deviation analysis or trial batch data. All concrete materials shall be listed.

G. Submittals shall be approved by the Engineer prior to procurement or fabrication of materials.

Part 2 Product

2.1 Form Materials

A. Forms for Exposed Finish Concrete: Unless otherwise specified or shown on the Drawings, construct formwork for exposed concrete surfaces with plywood, metal, metal framed plywood, or other panel type materials acceptable to the Engineer in order to provide exposed surfaces that are continuous, straight, and smooth. To minimize the number of joints and to conform to the joint system shown on the Drawings, furnish panels in the largest practicable sizes. Provide form material that is thick enough to withstand pressure of newly placed concrete without bowing or deflection.

B. Forms for Unexposed Finish Concrete: For surfaces that will be unexposed in the finished structure, form concrete with plywood, lumber, metal, or other material acceptable to the Engineer. If lumber is used, it shall be dressed on at least two edges and one side for tight fit.

C. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain, or adversely affect concrete surface and that will not impair subsequent treatments of concrete surfaces to be cured with water or curing compound.

2.2 Reinforcing Materials

A. Reinforcing Bar: ASTM A615, Grade 60.

B. Supports for Reinforcement: Provide supports for reinforcement, including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Unless otherwise indicated on the Drawings, use wire type bar supports complying with CRSI recommendations. Wood, brick, and other devices will not be acceptable. Comply with the following:

1. For slabs on grade, where wetted base material will not support chair legs, use supports with sand plates or horizontal runners.

2. For concrete surfaces exposed to view, where leg supports are in contact with forms, provide supports with legs that are hot dip galvanized or protected by either plastic or stainless steel.

2.3 Concrete Materials

A. Portland Cement: ASTM C150, Type I or I/II. Use only one brand of cement throughout the project, unless otherwise acceptable to the Engineer.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: Clean, fresh, drinkable.

D. Admixtures

1. Water Reducing Admixture: Eucon WR 75, WR-91 or MR by the Euclid Chemical Company, Pozzolith 220-N by Master Builders, or WRDA 15 by W.R. Grace. The admixture shall conform to ASTM C494, Type A, and not contain more chloride ions than are present in municipal drinking water.

2. Water Reducing, Retarding Admixture: Eucon Retarder 75 by the Euclid Chemical Company or Pozzolith 100 XR by Master Builders. The admixture shall conform to ASTM C494, Type D, and not contain more chloride ions than are present in municipal drinking water.

3. Mid-range Water Reducing Admixture: Eucon MR or Plastol 341 by the Euclid Chemical Company, Polyheed 997 by Master Builders or Daracem SD by W.R. Grace. The admixture shall conform to ASTM C494 Type A.

4. Nonchloride Accelerator: Accelguard 80, Accelguard 90 or NCA by the Euclid Chemical Company or Darex Set Accelerator by W. R. Grace. The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water.

5. Air Entraining Admixture: AEA-92 by Euclid Chemical Corporation, MB AE-90 by Master Builders, or Darex AEA by W.R. Grace. The admixture shall conform to ASTM C260.

6. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.

7. Certification: Written conformance to the aforementioned requirements and the chloride ion content will be required from the admixture manufacturer prior to mix design review by the Engineer.

2.4 Related Materials

A. Contraction/Construction Joint Filler: The joint filler shall be a two (2) component 100% solids compound, with a minimum shore A hardness of 80. Products: Subject to compliance with requirements, provide “Euco 700 or QWIK Joint” by the Euclid Chemical Company, “Sikadur 51 SL” by Sika Chemical Corporation, or MM-80 by Metzer/McGuire.

B. Moisture Retaining Covering: One of the following, complying with ASTM C171:

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene coated burlap.

4. Waterborne, Membrane Forming Compound: ASTM C309, Type 1, Class B.

C. Curing and Sealing Compound: Kurez DR VOX or Kurez W VOX by the Euclid Chemical Company, Master Kure 200W by Master Builders or Kure-n-Seal by Sonneborn. The compound shall conform to FS TT C 800A, 30 percent solids content minimum, and have test data from an independent laboratory indicating a maximum moisture loss of 0.030 gram per square centimeter when applied at a coverage rate of 300 square feet per gallon. Manufacturer's certification is required.

D. Bonding Compound: Euco Weld by Euclid Chemical Company or Weldcrete by the Larsen Company. The compound shall be a polyvinyl acetate, rewettable type.

E. Epoxy Adhesive: Euco Epoxy No. 452 or No. 620 by Euclid Chemical Company, Sikadur Hi Mod by Sika Chemical Corporation, or Epcon Ceramic 6 by ITW Ramset. The compound shall conform to ASTM C881, be a 2 component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces.

F. Nonshrink Grout: Euco NS by the Euclid Chemical Company or Masterflow 713 by Master Builders. The grout shall conform to CRD C 621 80, "Corps of Engineers Specification for Nonshrink Grout."

2.5 Mix Design

A. Preparation

1. Prepare design mixes for each type and strength of concrete in accordance with applicable provisions of ACI-318 and ASTM C94. Use an independent testing facility acceptable to the Engineer for preparing and reporting

proposed mix designs. The testing facility shall not be the same one used for field quality control testing unless this is acceptable to the Engineer. Submit to the Engineer written reports of each proposed mix in accordance with Section 01 33 00.

2. The design mix shall provide normal weight concrete with compressive strength as indicated on the Drawings.

B. Water/Cementitious Ratio:

1. All concrete subject to freezing and thawing shall have a maximum water/cement ratio of 0.45 (4000 psi at 28 days or more). All trowel finished interior slabs, subjected to vehicular traffic, shall have a maximum water/cement ratio of 0.45.

C. Admixtures

1. All concrete slabs placed at air temperatures below 50 degrees F shall contain the specified nonchloride accelerator. All concrete required to be air entrained shall contain an approved air entraining admixture. All pumped concrete, fiber concrete, concrete for floor slabs, and concrete with a water/cement ratio below 0.50 shall contain the specified high range water reducing admixture (superplasticizer) or mid-range water reducing admixture.

a. Use an air entraining admixture in all concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:

1) 2.5 percent to 5.5 percent for maximum 2 inches aggregate.

2) 4.5 percent to 7.5 percent for maximum 3/4-inch aggregate.

3) 5.5 percent to 8.5 percent for maximum 1/2-inch aggregate.

2. Use the amounts of admixtures recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

D. Slump Limits

1. All concrete containing the high range water reducing admixture (superplasticizer) shall have a maximum slump of 8 inches unless otherwise approved by the Engineer. The concrete shall arrive at the job site at a slump of 2 inches to 3 inches and be verified; then the high range water reducing admixture shall be added to increase the slump to the approved level.

2. All other concrete shall have a maximum slump of 3 inches for slabs and 4 inches for other members.

2.6 Proportioning

A. Ready Mix Concrete

1. Comply with the requirements of ASTM C94 and of these specifications.

2. During hot weather or under conditions that contribute to rapid setting of concrete, a shorter mixing time than that specified in ASTM C94 may be required. When the air temperature is between 85 degrees and 90 degrees F, reduce the mixing and delivery time from 1 1/2 hours to 75 minutes; when the air temperature is above 90 degrees F, reduce the mixing time to 60 minutes.

3. Each load of concrete arriving at the job shall be accompanied by a delivery ticket that shall be collected by the Contractor and submitted to the Owner's representative and shall contain the following information:

    a. The design mix and strength of mix of concrete being delivered.

    b. The exact time the cement, aggregate, and water were discharged into the delivery truck.

Part 3 Execution

3.1 Forms

A. Design, erect, support, brace, and maintain formwork to support any vertical and lateral loads that may be applied until such loads can be supported by the concrete structure. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Design and construction of form work shall be the responsibility of the Contractor.

B. Design formwork so that it can be readily removed without impact, shock, or damage to cast in place concrete surfaces and adjacent materials.

C. Construct forms complying with ACI 347 and ACI SP-4 to the sizes, shapes, lines, and dimensions shown on the Drawings so that in the finished structures the work will be level and plumb and have accurate alignment, location, and grade within the tolerance limits of ACI 301. Provide for openings, offsets, linkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features that the work requires. Use selected materials to obtain the required finishes. Butt joints solidly and provide backup at joints to prevent leakage of cement paste.

D. Fabricate forms so that they can be easily removed without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep for the concrete to be placed with bottom forms only. To form keyways, reglets, recesses, and the like, kerf wood inserts to prevent swelling and to permit easy removal.

E. Where the interior area of formwork is not accessible for cleanout, provide temporary openings to permit concrete placement and inspection before the concrete is placed. Brace temporary openings securely and set them tightly to forms to prevent the loss of concrete mortar. Position temporary openings on forms at

inconspicuous locations.

F. Chamfer exposed corners and edges as shown on the Drawings, using wood, metal, PVC, or rubber chamfer strips fabricated to produce smooth, uniform lines and tight edge joints.

G. Use metal form ties that are factory made, adjustable in length, designed to prevent form deflection, and either removable or snap off and that will prevent the concrete surface's being spalled when the ties are removed. If snap off ties are used, the portion remaining within the concrete after removal must be at least 1 1/2 inches inside the concrete and be provided with a waterproofing washer unless the Drawings indicate otherwise.

H. Unless the Drawings indicate otherwise, provide form ties that will not leave holes larger than 1 1/2 inches in diameter in the concrete surface.

I. Provide openings in concrete formwork to accommodate the work of other trades. Determine the size and location of openings, recesses, and chases from the trades providing such work. Accurately place and securely support items built into forms.

J. Clean thoroughly forms and adjacent surfaces that are to receive concrete. Remove chips, wood, sawdust, dirt, sediment, and any other debris just before the concrete is placed. After concrete placement, retighten forms if necessary to eliminate mortar leaks.

3.2 Placing Reinforcement

A. For details and methods of placing reinforcement and supports, comply with the specified codes and standards, the recommended practice of the CRSI as outlined in "Placing Reinforcing Bars," and these specifications.

B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials that reduce or destroy the bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcement with metal chairs, runners, bolsters, spacers, and hangers as required for security.

D. Place reinforcement to obtain at least the minimum coverage for concrete protection as required by ACI 318 and ACI 350 as applicable. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so that ends are directed into the concrete, not toward exposed concrete surfaces.

E. Do not place reinforcing bars more than 2 inches beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment or similar construction loads.

F. Install welded wire fabric in lengths that are as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset end laps in adjacent

widths to prevent continuous laps in either direction.

3.3 Joints

A. Locate and install construction joints, as shown of the Drawings, or specified herein, so that the strength and appearance of the structure will not be impaired.

B. Provide keyways at least 1 1/2 inches deep in construction joints that are in walls and slabs or between walls and footings. Bulkheads designed for this purpose may be used if accepted by the Engineer. Omit keyway where steel waterstops are shown between walls and footings.

C. Construct isolation joints in slabs on the ground wherever there is contact between slabs on the ground and vertical surfaces and wherever else indicated on the Drawings.

D. Install joint filler and sealant materials as specified by the manufacturer.

E. Construct contraction (control) joints in slabs on ground to form panels of patterns as shown. The soff-cut saw system shall be used immediately after final finishing and to a depth of 1/3 slab thickness. A conventional saw shall be used as soon as possible without dislodging aggregate and to a depth of 1/3 slab thickness, if the initial soff-cut did not achieve the 1/3 depth.

F. Install semi-rigid joint filler or joint sealant in accordance with the direction of the manufacturer.

G. The maximum joint spacing (in feet) of slabs on grade shall be 30 times the slab thickness (in inches) unless otherwise shown on the Drawings.

3.4 Installation of Embedded Items

A. Set and build into the work anchoring devices and other embedded items required for other work that are to be attached to or supported by cast in place concrete. Use setting drawings, diagrams, instructions, and directions provided by the suppliers of the items to be attached thereto.

B. Set edge forms or bulkheads and intermediate screed strips for slabs in order to provide the elevations and contours in the finished slab surface required by the Drawings. Provide units strong enough to support the types of screed strips used, and secure with strike off templates or compacting screeds accepted by the Engineer.

3.5 Preparation of Form Surfaces

A. Before placing reinforcement, coat the contact surfaces of forms with a form coating compound.

B. Thin the form coating compound only with the amount and type of thinning agent and only under the conditions recommended by the compound manufacturer. Do

not allow excess form coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply the form coating compound in compliance with the manufacturer's instructions.

C. Coat steel forms with a nonstaining, rust preventive form oil, or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.6 Concrete Placement

A. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades that the formwork is complete so that they may then install their work; cooperate with other trades in setting such work. Wherever form coatings are not used, wet wood thoroughly just before placing concrete.

B. Coordinate the installation of joint materials and moisture barriers with the placement of forms and reinforcing steel.

C. Deposit concrete either continuously or in layers thick enough to prevent its being placed on concrete that has hardened enough to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as close to its final location as practicable in order to avoid segregation due to rehandling or flowing.

D. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner that avoids inclined construction joints. Where placement consists of several layers, avoid cold joints by placing each layer while the preceding one is still plastic.

E. Use mechanical vibrating equipment supplemented by hand spading, rodding, or tamping to consolidate placed concrete. The equipment and procedures used to consolidate the concrete shall comply with the recommended practices of ACI 309 and suit both the type of concrete and project conditions.

F. Do not use vibrators to transport concrete once it is inside the forms. Insert and withdraw vibrators vertically at uniformly spaced locations no further apart than the visible horizontal effectiveness of the machine. Limit layer heights so that the vibrator is effective into 6 inches of the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, 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. Lower frequency vibrators may be used with "flowing" concrete.

G. Until the placing of a panel or section is completed, deposit and consolidate concrete slabs in a continuous operation within construction joints.

H. Consolidate concrete during placing operations so that it is thoroughly worked around reinforcement and other embedded items and into corners.

I. Bring slab surfaces to the correct level with a straightedge and strike off. Use

highway bull floats or darbies to smooth the surface, leaving it free from humps and hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces before starting finishing operations.

J. Maintain reinforcement in the proper position during placement operations.

K. Cold Weather Placement

1. Comply with ACI 306 and the requirements herein specified to protect concrete work from physical damage or reduced strength due to frost, freezing, or low temperatures.

2. When the air temperature has fallen or is expected to fall below 40 degrees F, heat all water and aggregates uniformly before mixing so that the concrete, at point of placement, will have a temperature of not less than 50 degrees nor more than 80 degrees F.

3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

4. Use only the specified nonchloride accelerator. Do not use calcium chloride or admixtures containing more than 0.05 percent chloride ions.

L. Hot Weather Placement

1. When the weather is hot enough to impair the concrete's quality and strength, place the concrete as specified herein and in ACI 305.

2. Cool ingredients before mixing so that when the concrete is placed, its temperature is below 90 degrees F. Mixing water may be chilled, or else a portion of the water may be in the form of chopped ice.

3. If reinforcing steel becomes hotter than the ambient air temperature, cool it with water-soaked burlap so that its temperature will not exceed the ambient air temperature.

4. When high temperatures and/or placing or humidity conditions dictate, the mix may be initially retarded by use of the water reducing, retarding formulation (Type D) of the specified water reducing admixture (Type A).

3.7 Finish of Formed Surfaces

A. Rough Form Finishes: For formed concrete surfaces not exposed to view in the finished work or covered by other construction, use a rough form finish unless otherwise indicated by the Drawings. Repair and patch tie holes and defective areas, and rub down or chip off fins and other projections more than 1/4 inch high.

B. Smooth Form Finish: For formed concrete surfaces that are exposed to view or to be covered with a coating or covering material applied directly to the concrete or a covering material bonded to the concrete (e.g., waterproofing, damp proofing, painting, etc.), use a smooth form finish. This is the as cast finish obtained on the

concrete surface when the selected form facing material is regularly and symmetrically arranged with a minimum of seams. Repair and patch defective areas so that all fins and other projections are completely removed and smoothed.

C. Rubbed Finish: At all formed surfaces exposed inside and outside the structure, apply rubbed finish as follows:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Uniform Finishes:

1. At the tops of walls, horizontal offsets, and similar unformed surfaces that are next to formed surfaces, strike off smooth and finish with a texture that matches the adjacent formed surfaces. Unless otherwise shown on the Drawings, continue the final surface treatment of formed surfaces uniformly across adjacent unformed finishes.

E. Float Finish

1. Apply float finish to monolithic slab surfaces that are to receive a trowel finish or other finishes specified hereinafter; to slab surfaces that are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand bed terrazzo; and as otherwise indicated by the Drawings or schedules.

2. After screening, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened enough to permit the operation of power-driven floats or by hand floating if the area is small or inaccessible to power units. Check and level the surface plane so that the surface conforms to the specified FF/FL17 tolerance.

F. Trowel Finish

1. Apply a trowel finish to monolithic slab surfaces that are to be exposed to view, unless otherwise indicated by the Drawings, and to slab surfaces that are to be covered with resilient flooring, paint, or other thin film finish coating.

2. After the slab has received a floated finish, begin first trowel finish operation using a power-driven trowel. Begin final troweling when the surface produces a ringing sound as the trowel is moved over it. Surface shall be troweled until it is free of trowel marks, is uniform in texture and has a smooth dense appearance, and achieves an FF30/FL25 tolerance. Grind smooth any surface defects that would telegraph through the applied floor covering.

G. Nonslip Broom Finish

1. Apply nonslip broom finish to exterior concrete platforms, steps, and ramps and elsewhere as indicated by the Drawings or schedules.

2. Immediately after float finishing, roughen the concrete surface slightly by brooming perpendicular to the main traffic route with a fiber bristle broom. Texture shall be as approval by the Engineer from sample panels.

H. Nonslip Finish: Where the contract documents require a nonslip finish, give the surface a "dry shake" application of crushed ceramically bonded aluminum oxide or other specified selected abrasive particles. The rate of application of such material shall be not less the 25 pounds per 100 SF.

3.8 Curing

A. After placing and finishing the concrete, start initial curing of concrete as soon as free water has disappeared from concrete surface. Keep continuously moist for not less than 7 days.

B. Begin final curing immediately after final finishing. Continue final curing for at least 7 days in accordance with ACI 301 and ACI 308. Avoid rapid drying at the end of the final curing period.

C. Cure concrete by moist curing, moisture retaining cover curing, membrane curing, or combinations of these methods, as specified herein and ACI 308.

D. Provide moisture curing by one of the following methods:

1. Keep concrete surface continuously wet by covering with water.

2. Spray it continuously with a water fog.

3. Cover the concrete surface with the specified absorptive cover, thoroughly saturating the cover with water and keeping it wet; position the absorptive cover so that it covers the concrete surface and edges and laps adjacent absorptive covers by 4 inches.

E. Provide moisture cover curing by covering concrete surfaces with a moisture retaining cover designed for curing concrete. Place the cover in the widest practicable width of material with sides and ends of the material lapped at least 3 inches and sealed by waterproof tape or adhesive. Repair immediately any holes or tears that occur during the curing period with identical cover material and waterproof tape.

F. Provide membrane curing to slabs as follows: All interior slabs that have resilient tile or carpet or are left exposed and all exterior slabs, sidewalks, curbs, etc., shall be cured with the specified clear curing and sealing compound. The compound shall be applied immediately after final finishing operations are completed. Apply uniformly in a continuous operation by power spray or roller in accordance with the manufacturer's directions. Areas that are subjected to heavy rainfall within 3 hours after initial application shall be recoated. Maintain continuity of coating, and repair damage during the curing period.

G. Cure formed concrete surfaces (including undersides of beams, supported slabs, and other similar surfaces) by moist curing with forms in place for the full curing

period or until the forms are removed. If forms are removed, continue curing by the methods specified above, as applicable.

H. Cure unformed surfaces such as slabs, floor topping, and other flat surfaces by the application of the specified curing and sealing compound, strippable curing compound or by a moist curing method approved by the Engineer.

3.9 Removal and Reuse of Forms

A. Formwork not supporting weight of concrete (e.g., sides of beams, walls, columns, and similar parts of the work) may be removed after curing at a temperature of not less than 50 degrees F 24 hours after the concrete is placed, provided the concrete is hard enough not to be damaged by form removal operations and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete (e.g., beam soffits, joints, slabs, and other structural elements) may not be removed for at least 14 days nor until the concrete has attained a design minimum compressive strength of 28 days. Determine the potential compressive strength of in place concrete by testing the field cured specimens representative of the concrete location or members.

C. Form facing material may be removed 4 days after concrete placement only if shores and other vertical supports have been arranged to permit it to be removed without loosening or disturbing shores and supports.

D. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact form surfaces as specified above for new formwork.

E. When forms are extended for successive concrete placement, clean surfaces thoroughly, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces.

3.10 Miscellaneous Concrete Items

A. Filling In: Unless the Drawings show otherwise or the Engineer directs, fill in holes and openings left in concrete structures for the work of other trades once that work is in place. Mix, place, and cure concrete as specified herein to blend with in place construction. Provide other miscellaneous concrete filling shown on the Drawings or necessary to complete the work.

B. Nonshrink Grout: All column base plates, equipment bases, and other locations noted on the structural drawings shall be grouted with the specified nonshrink grout. All exposed grout shall be of the specified nonmetallic type.

C. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams where indicated on the Drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.11 Concrete Surface Repairs

A. Repair and patch defective areas with cement mortar immediately after removing forms.

B. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete, but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Before placing cement mortar, thoroughly clean, dampen with water, and apply the specified bonding compound. The cement mortar shall be placed after the bonding compound has dried.

C. Remove and replace concrete with defective surfaces if these effects cannot be repaired to the satisfaction of the Owner and Engineer. Such surface defects include irregularities of color and texture, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, and fill with dry pack mortar or with precast cement cone plugs secured in place with bonding agent.

D. Where possible, repair concealed formed surfaces that contain defects which adversely affect the durability of the concrete. If such defects cannot be repaired, remove and replace the concrete.

E. Test unformed surfaces such as monolithic slabs for smoothness and to verify that the surface plane meets the tolerances specified for each surface and finish. Correct low and high areas as specified herein. Test unformed surfaces sloped to provide drainage for both trueness of slope and smoothness with a template of the slope specified on the Drawings.

F. Repair finished unformed surfaces that contain defects which adversely affect durability of the concrete. Such surface defects include crazing, spalling, pop outs, honeycomb, rock pockets, cracks that are more than 0.01 inch wide or that, regardless of width, penetrate either to reinforcement or completely through unreinforced sections, and other objectionable conditions.

G. After the concrete has cured at least 14 days, correct high areas in unformed surfaces by grinding.

H. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting them out and refilling with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Engineer.

I. Repair defective areas (except for random cracks and single holes not more than 1 inch in diameter) by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete, and apply the specified bonding compound. Place patching concrete after the bonding compound has dried. Mix patching concrete of the same materials to provide concrete of the same type or class as the original

concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

J. Repair isolated random cracks and single holes not over 1 inch in diameter by the dry pack method. Groove top of cracks, cut out holes until sound concrete is reached, and clean to remove dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply the specified bonding compound. Place dry pack after the bonding compound has dried. Dry pack shall consist of 1-part portland cement to 2 1/2 parts fine aggregate passing a No. 16 mesh sieve. Mix with no more water than is necessary for handling and placing. Compact dry pack mixture in place, and finish to match adjacent concrete. Keep patched area continuously moist for no less than 72 hours.

K. All structural repairs shall be made, with prior approval of the Engineer as to the method and procedure, using the specified epoxy adhesive and/or epoxy mortar.

L. Repair methods not specified above may be used, subject to acceptance by the Engineer.

3.12 Quality Control Testing During Construction

A. The Contractor will employ a testing laboratory to perform any or all of the tests specified below and to submit reports on these tests. The testing laboratory shall be approved by the Owner and shall be paid for by the Soils and Concrete Testing Cash Allowance. Sampling and testing for quality control during the placement of concrete may include the following, as directed by the Engineer:

1. Sampling Fresh Concrete: ASTM C172, but modified for slump to comply with ASTM C94.

2. Slump: ASTM C143; one test for each concrete load at point of discharge and one test of each set of compressive strength test specimens.

3. Air Content: ASTM C173 volumetric method for lightweight concrete; ASTM C231 pressure method for normal weight concrete; one test for each set of compressive strength test specimens.

4. Water Content: The water content of freshly mixed concrete will be tested each time cylinders are made and as directed by the Engineer in accordance with AASHTO TP 23, Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.

5. Concrete Temperature: Test hourly when air temperature is 40 degrees F and below or when 80 degrees F and above and each time a set of compression test specimens is made.

6. Compression Test Specimen: ASTM C31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed by the Engineer. Mold and store cylinders of laboratory cured test specimens except when the Engineer requires field cured test specimens.

7. Compressive Strength Tests: ASTM C39; one set for each 100 cubic yards or fraction thereof of each concrete class placed in any one day or one set for each 5,000 square feet of surface area placed; 2 specimens tested at 7 days, 2 specimens tested at 28 days, and 1 specimen retained in reserve for later testing, if needed.

B. When the frequency of testing provides less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or, if fewer than 5 are used, from each batch.

C. The strength level shall be considered satisfactory as long as the averages of all sets of 3 consecutive strength test results equal or exceed the specified strength f'c, and no individual test result falls below the specified strength f'c by more than 500 psi.

D. When the strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in place concrete.

E. Test results will be reported to the Engineer and Contractor in writing on the same day that the test is made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, and compressive breaking strength and type of break for both 7-day tests and 28-day tests.

F. Non-Compliant Test Reports: All test reports indicating non-compliance should be provided immediately to all parties on the test report distribution list.

G. The testing service will make additional tests of in place concrete when the test results indicate that the required strength level has not been achieved and other characteristics have not been attained in the structure, as directed by the Engineer. The testing service may conduct tests to determine the adequacy of concrete by cored cylinders that comply with ASTM C42 or by such other methods as are directed by the Engineer. The Contractor shall pay for such tests and any additional testing that may be required when concrete is verified to be unacceptable.

END OF SECTION

Part 1 General

1.1 Work Included

A. Provide labor, materials, equipment and incidentals necessary to perform operations in connection with clearing, grubbing, and disposal of cleared and grubbed materials.

1.2 Definitions

A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.

B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.

C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2 inches caliper to a depth of 6 inches below subgrade.

D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.

E. Stripping: Removal of topsoil remaining after applicable scalping is completed.

F. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.3 Submittals

A. Submit work plan in accordance with Section 01 33 00.

B. The limits of clearing, grubbing and stripping are detailed on the project plans.

1.4 Quality Assurance

A. Obtain Owner's approval of staked clearing, grubbing, and stripping limits, prior to commencing clearing, grubbing, and stripping.

1.5 Scheduling and Sequencing

A. Prepare site only after adequate erosion and sediment controls are in place. Limit areas exposed uncontrolled to erosion during installation of temporary erosion and sediment controls.

Part 2 Products

(NOT USED)

Part 3 Execution

3.1 General

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

B. Clear, grub, and strip areas actually needed for staging area or site improvements within limits shown or specified. Do not injure or deface vegetation that is not designated for removal.

3.2 Preparation

A. Mark areas to be cleared and grubbed prior to commencing clearing operations. The Owner shall approve clearing and grubbing limits prior to commencement of clearing operations.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place. Excavate for, and remove, underground utilities indicated to be removed.

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

C. Trees and shrubs outside of the clearing limits, which are within 10' of the clearing limits, shall be clearly marked to avoid damage during clearing and grubbing operations.

D. Remove trees and brush outside the clearing limits, but within the immediate vicinity of the work, upon receipt of approval by the Owner, when the trees or brush interfere with the progress of construction operations.

E. Clearly mark trees and shrubs within the clearing limits, which are to remain, and protect the trees and shrubs from damage during the clearing and grubbing operations.

F. The clearing limits shall not extend beyond the project limits.

3.3 Limits

A. As follows, but not to extend beyond Project limits.

1. Excavation Including Trenches: 5 feet beyond top of cut slopes.

2. Fill:

a. Clearing and Grubbing: 5 feet beyond toe of permanent fill.

b. Stripping and Scalping: 5 feet beyond toe of permanent fill.

3. Staging Area:

    a. Clearing: 5 feet beyond perimeter.

    b. Scalping and Stripping: As shown.

    c. Grubbing: Around perimeter as necessary for neat, finished appearance.

4. Other Areas: As shown.

B. Remove rubbish, trash, and junk from entire area within project limits.

3.4 Clearing

A. Clear areas within limits of construction.

B. Fell trees so that they fall away from facilities and vegetation not designated for removal.

C. Cut stumps not designated for grubbing flush with ground surface.

D. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

3.5 Site Improvements

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

B. Remove aggregate base as indicated.

3.6 Grubbing

A. Grub areas within limits of construction.

3.7 Scalping

A. Do not remove sod until after clearing and grubbing is completed and resulting debris is removed.

B. Scalp areas within limits shown or specified.

3.8 Stripping

A. Do not remove topsoil until after scalping is completed.

B. Strip areas within limits to minimum depths shown or specified. Do not remove subsoil with topsoil.

C. Stockpile strippings, meeting requirements of Section 31 20 00 – Earth Moving for topsoil, separately from other excavated material.

3.9 Tree Removal Outside Clearing Limits

A. Remove Trees Within Project Limits:

1. Dead, dying, leaning, or otherwise unsound trees that may strike and damage Project facilities in falling.

2. Trees designated by Owner for removal.

B. Remove stumps and debris, and if disturbed, restore surrounding area to its original condition.

3.10 Pruning

A. Remove branches below the following heights: 20 feet above proposed ground level.

B. Prune as indicated in local ordinances and the tree protection plans.

3.11 Disposal

A. Clearing and Grubbing Debris:

1. Dispose of debris offsite.

2. Burning of debris onsite will not be allowed.

3. Woody debris may be chipped. Chips may be sold to Contractor’s benefit or used for landscaping onsite as mulch or uniformly mixed with topsoil, provided that resulting mix will be fertile and not support combustion. Maximum dimensions of chipped material used onsite shall be 1/4-inch by 2 inch. Dispose of chips that are unsaleable or unsuitable for landscaping or other uses with unchipped debris.

4. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.

B. Scalpings: As specified for clearing and grubbing debris.

C. Strippings:

1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil offsite.

2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

D. Completely remove timber, logs, roots, brush, rotten wood, and other refuse from the Owner's property. Disposal of materials in streams shall not be permitted and no materials shall be piled in stream channels or in areas where it might be washed away by floods. Timber within the area to be cleared shall become the property of the Contractor, and the Contractor may cut, trim, hew, saw, or otherwise dress felled timber within the limits of the Owner's property, provided timber and waste material is disposed of in a satisfactory manner. Materials shall be removed from the site daily, unless permission is granted by the Owner to store the materials for longer periods.

END OF SECTION

Part 1 General

1.1 Scope

A. This specification section includes earthwork and related operations, including, but not limited to, clearing and grubbing the construction site, dewatering, excavating all classes of material encountered, pumping, draining and handling of water encountered in the excavations, handling, storage, transportation, and disposal of all excavated and unsuitable material, construction of fills and embankments, backfilling around structures and pipe, backfilling all trenches and 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 a complete work as shown on the Drawings or specified in these Contract Documents.

1.2 General

A. The earthwork operations shall be performed in accordance with this specification and in accordance with the recommendations of the on-site Geotechnical Engineer of Owner's Representative.

B. The elevations shown on the Drawings as existing are taken from the best existing data and are intended to give reasonable, accurate information about the existing elevations. They are not precise, and the Contractor should satisfy himself as to 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 Owner. 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.

E. No subsurface investigation has been performed for the surcharge material. The Owner and Engineer give no guarantee, either expressed or implied, regarding the material to be encountered performing the excavation and earthwork on this project.

F. Earthwork within the rights-of-way of the State Department of Transportation, Muscogee County, and the City of Columbus shall be done in accordance with requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of

these Specifications.

G. 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 be uninterrupted in existing gutters, other surface rains, or temporary drains. Material for backfill or for protection of excavation in public roads from surface drainage shall be neatly placed and kept shaped so as to cause the least possible interference with public travel. Free access must be provided to all fire hydrants, water gates, meters, and private drives.

H. No classification of excavated materials will be made. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the contract work, regardless of the type, character, composition, or condition thereof. It is understood that any reference to rock, earth or other materials is not an indication of classified excavation.

I. Tests for compaction and density shall be conducted by the Geotechnical Engineer or by an independent testing laboratory selected by owner. Costs of compaction tests performed by an independent testing laboratory shall be paid for directly by the Owner and not as a part of this Contract. 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 to conform to the requirements of these Contract Documents shall be paid by the Contractor.

J. 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.

K. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and flood plains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. The Contractor shall be responsible for providing all services, labor, equipment, and materials necessary or convenient to him for completing the work within the time specified in these Contract Documents.

Part 2 Products

2.1 Backfilling Materials

A. Materials: Materials for backfilling shall conform to the following requirements:

1. Select Earth Backfill: Fine, sound, loose earth containing optimum moisture content for compaction to 90 percent of maximum density, free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete less than 2 inches in maximum

dimension except that the maximum particle size shall be 3/4 inch when used with PVC, other flexible thermoplastic pipe, or extremely brittle pipe.

2. Common Earth Backfill: Sound, loose earth containing optimum moisture content for compaction to 90 percent of maximum density, free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete and pavement less than 6 inches in maximum dimension. Such backfill shall be placed a minimum of one foot above top of pipe.

3. Sand: Natural or imported sand conforming to ASTM D1073.

Part 3 Execution

3.1 Initial Site Preparation

A. Preparatory to beginning of construction operations, the Contractor shall remove from the site all vegetative growth, trees, brush, stumps, roots, debris, and any of other objectionable matter, including fences, buildings, and other structures shown on the Drawings in the construction areas which are designated for removal or which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.

B. Stumps and roots shall be grubbed and removed to a depth not less than 5 feet below grade. All holes or cavities which extend below the subgrade elevation of the proposed work shall be filled with compacted layers of crushed rock or earth backfill conforming to the requirements specified here for backfill. Organic material from clearing operations shall not be incorporated in excavation backfill or embankment material.

C. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, buildings, and other structures which are located in the construction area but not within designated clearing limits as shown on the Drawings or within the limits of embankments, excavations, or proposed structures. The Contractor shall be responsible for the repair and/or replacement of any of the aforementioned items damaged by his operation or construction activities.

D. The Contractor shall remove and dispose of all excess material resulting from clearing or site preparation operations. The Contractor shall dispose of such materials in a manner acceptable to the Engineer and at an approved location where such materials can be lawfully disposed. Burning shall not be permitted.

3.2 Sheeting, Shoring, And Bracing

A. The sides of all excavations shall be sufficiently sheeted, shored, and braced as necessary to prevent slides, cave-ins, settlement or movement of the banks, to maintain the excavation clear of all obstructions, and to provide safe working

conditions. Wood or steel sheeting of approved design and type shall be used in wet, saturated or flowing ground. All sheeting, shoring, and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and to maintain shape and position under all circumstances.

B. The responsibility for correctly assessing the need for sheeting and analyzing the stresses induced shall be the total responsibility of the Contractor. Since the Engineer does not dictate or determine the Contractor's sequence or limits of excavation, the Engineer assumes no responsibility for sheeting and shoring. The Contractor must employ or otherwise provide for adequate professional structural and geotechnical engineering supervision to assess the need for sheeting and shoring and design same. Results of sheeting and shoring analysis and design shall be submitted to the Engineer on request.

C. Excavations adjacent to existing or proposed buildings and structures or in paved streets or alleys shall be sheeted, shored, and braced adequately to prevent undermining beneath or subsequent settlement of such structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in safe condition. Any damage to structures or pavements occurring through settlements, water or earth pressures, slides, caves, or other causes; due to failure or lack of sheeting or bracing, or due to improper bracing; or occurring through negligence or fault of the Contractor in any other manner shall be repaired by the Contractor at his own expense.

D. Sheeting, shoring, or bracing materials shall not be left in place unless otherwise specified or shown on the Drawings or ordered by the Engineer in writing. Such materials shall be removed in such manner that no danger or damage will occur to new or existing structures or property, public or private, and so that cave-ins or slides will not take place. Trench sheeting shall be left in place until backfill has been brought to a level 12 inches above the top of the pipe. It shall then be cut off and the upper portion removed. Sheeting for structures shall be left in place until backfill has been brought to a level of 12 inches above the top of the bottom footing. It shall then be cut off and the upper portion removed.

E. All holes and voids left in the work by the removal of sheeting, shoring, or bracing shall be filled and thoroughly compacted.

3.3 Excavation

A. General

1. Excavation shall include the removal of all material from an area necessary for the construction of a pipeline, structure, basin, flume, or building. Excavations shall provide adequate working space and clearances for the work to be performed therein.

2. Where quicksand, soft clay, spongy, swampy, or other materials unsuitable or subgrade or foundation purposes are encountered below the excavation limits, they shall be removed and disposed of to the level of suitable material. Areas

so excavated shall be backfilled with Class B Concrete or with compacted layers of crushed rock, sand, or other approved material conforming to the requirements specified herein for backfill to the lines and grades shown on the Drawings.

3. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations. Lights shall also be placed along excavations from sunset each day to sunrise of the next day until the excavations are backfilled. All excavations shall be barricaded in such a manner to prevent persons from falling or walking into any excavation.

B. Rock Excavation

1. Where rock is encountered remove it to a depth of one foot below final sub-grade with no points extending above this elevation. Leave rock surface so no water will be pocketed. On-site blasting will not be permitted

2. Rock and large boulders in trenches shall be excavated over the horizontal limits of excavation and to depths as shown on the Drawings.

3. The space below grade for pipe lines shall then be backfilled to the proper grade with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill. Where pipe sewers are constructed on concrete cradles, rock shall be excavated to the bottom of the cradle as shown on the Drawings.

4. Rock under structures shall be excavated to lines and grades shown on the Drawings. Unless specified otherwise, where rock excavation has been carried below grade, the contractor shall backfill to grade with compacted layers of crushed rock.

5. Where rock foundation is obtained at grade for any one structure, the rock shall be removed for a depth of 12 inches below grade and the space below grade shall be backfilled to the proper grade with compacted layers of crushed rock conforming to the requirements specified herein for backfill.

6. Rock excavation for all structures and adjacent trenches under this Contract and any other rock excavation directed by the Engineer shall be completed before the construction of any structure is started in the vicinity.

C. Borrow Excavation

1. Wherever the backfill of excavated areas or the placement of embankments or other fills requires specified material not available at the site or material in excess of suitable material available from the authorized excavations, such material shall be obtained from other sources..

D. Roadway Excavation

1. Roadway excavation shall consist of excavation for roadways and parking areas in conformity with lines, grades, cross sections, and dimensions shown on the Drawings. After shaping to line, grade, and cross section, the subgrade shall be rolled until compacted to a depth of at least 6 inches to 95 percent of the maximum density at optimum water content as determined by ASTM D 698, Method A. This operation shall include any reshaping and wetting required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

E. Trench Excavation

1. Trench excavation shall consist of the removal of materials necessary for the construction of water, sewer, and other pipelines and all appurtenant facilities including manholes, inlets, outlets, headwalls, collars, concrete saddles, piers and pipe protection called for on the Drawings.

2. Excavation for pipelines shall be made in open cut unless shown otherwise on the drawings. Trenches shall be cut true to the lines and grades shown on the Drawings or established by the Engineer on the ground. The banks of trenches shall be cut in vertical, parallel planes equidistant from the pipe centerline. From an elevation 12 inches above the top of the pipe to the bottom of the trench, the horizontal distance between vertical planes for different sizes of pipe shall not exceed those shown on the Drawings. When sheeting is used, the width of the trench shall be considered as the distance between the inside faces of the sheeting. The bottom of the trench shall be cut carefully to the required grade of the pipe except where bedding materials or cradles are shown, in which case the excavation shall extend to the bottom of the bedding or cradles as shown on the Drawings. Minimum pipe cover shall be as shown on the Drawings or specified in these Contract Documents.

3. The use of a motor-powered trenching machine will be permitted but full responsibility for the preservation, replacement, and/or repair of damage to any existing utility services and private property shall rest with the Contractor.

4. Bell holes for bell and spigot pipe and/or mechanical joint pipe shall be excavated at proper intervals so the barrel of the pipe will rest for its entire length upon the bottom of the trench. Bell holes shall be large enough to permit proper installation of all joints in the pipe. Bell holes shall not be excavated more than 10 joints ahead of pipe laying. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

5. Excavation for manholes, outlets, collars, saddles, piers, and other pipeline structures shall conform to the additional requirements specified herein for structural excavation.

6. Pipe trenches shall not be excavated more than 200 feet in advance of pipe laying and all work shall be performed to cause the least possible

inconvenience to the public. Adequate temporary bridges or crossings shall be constructed and maintained where required to permit uninterrupted vehicular and pedestrian traffic.

7. Unless otherwise specified herein or shown on the Drawings, wherever pipe trenches are excavated below the elevation shown on the Drawings, the Contractor, at his own expense, shall fill the void thus made to the proper grade with Class B Concrete or with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill.

8. In all cases where materials are deposited along open trenches they shall be placed so that no damage will result to the work and/or adjacent property in case of rain or other surface wash.

3.4 Backfilling

A. General

1. Unless otherwise specified herein, earth backfill shall be compacted to not less than 90 percent of the maximum density at optimum water content as determined by ASTM D 698. Crushed stone and sand shall be compacted or consolidated to not less than 90 percent of the solid volume density as determined from the bulk specific gravity by ASTM D 698.

2. Material that is too dry for adequate compaction shall receive a prior admix of sufficient water to secure optimum moisture content. Material having excessive water content shall not be placed at any time.

3. Unless otherwise specified herein backfill material required to be compacted shall be placed in horizontal layers not to exceed 6 inches in thickness (before compaction) and compacted in place by ramming, tamping, or rolling. Compaction shall be accomplished by power driven tools and machinery wherever possible. Compaction and consolidation of sand and crushed rock backfill shall be accomplished using vibrating equipment in a manner acceptable to the Engineer.

B. Backfilling Trenches

1. The backfilling of sewer, water, and other pipeline trenches shall be started immediately after the construction of same has been inspected and approved by the Engineer. Select backfill or bedding material if specified shall be placed in the trench under and on each side of the pipe in 6-inch layers for the full width of the trench and thoroughly and uniformly compacted by ramming and/or tamping to a minimum of 90% of the maximum density determined as specified herein. Select earth backfilling shall start above the class of pipe bedding as specified or shown the Drawings. Sufficient select earth backfill shall be placed around the pipe and compacted to provide a cover of not less than 12 inches over the top of the pipe. Mechanical compactors or tampers

shall not be used within 12 inches of pipe. Compaction in this area shall be accomplished by hand methods. Sand or specified crushed stone bedding material shall be substituted for select earth backfill when the pipe is bituminous coated steel pipe or wrapped steel pipe or when crushed stone trench backfill is required. Backfilling shall proceed simultaneously on both sides of the pipe to prevent lateral displacement. From a point 12 inches above the pipe, the trench backfill shall be placed in loose lifts of 3-4 inches and compacted with portable compaction equipment to achieve the specified degree of compaction.

2. Caution shall be used during backfill operations for PVC or other flexible thermoplastic pipe (non-pressure or sewer pipe) to prevent pipe deformation. PVC or other flexible thermoplastic pipe (sewer pipe) shall not be subjected to roller or wheel loads until a minimum of 36 inches of backfill has been placed over the top of the pipe and a hydro hammer shall NOT be used until a minimum depth of 48 inches backfill has been placed over the top of the pipe.

3. Backfilling of PVC pressure pipe or other flexible thermoplastic pipe (water pipe) shall be as described in Paragraph 1 above.

4. In streets, alleys, across sidewalks and driveways, paved areas, and at any other places subject to vehicular traffic or other superimposed loads, washed stone backfill shall be placed and compacted from the level of 12 inches above the top of the pipe upward for the full depth of the trench, except for the top 48 inches of backfill, which shall be compacted pugmill mix. Crushed rock shall be clean, uniform-sized stone placed in lifts of 12 inches maximum and compacted by use of a hydro-hammer or approved vibratory compactor for the full depth of the trench, except for the top 48 inches of crushed rock backfill, which shall be compacted pugmill mix.

5. In all other areas not affected by superimposed loads, common earth backfill may be placed from a level of 12 inches above the top of pipe upward for the full depth of the trench without compaction. At these places, backfill shall be neatly rounded over the trench to sufficient height to allow for settlement to grade after consolidation. In no event, however, will storm water be allowed to pond due to the backfilled trench.

6. All backfilling shall be done in such a manner that the pipe or structure over or against which it is being placed will not be disturbed or injured. Any pipe or structure injured, damaged, or moved from its proper line or grade during backfilling operations shall be removed and repaired to the satisfaction of the Engineer and then re-backfilled.

C. Backfilling Around Structures

1. Backfilling around structures shall consist of common earth backfill placed in 6-inch layers and compacted by tamping to a minimum of 90% of the maximum density determined as specified herein for the full depth of the excavation from the bottom to the finished grade. No backfill shall be placed against concrete structures until the concrete has reached its specified 28-day

compressive strength. Where practical, compaction of structural backfill shall be accomplished by power-driven tamping equipment.

3.5 Fills And Embankments

A. Fills and embankments shall consist of all earth fills except backfills in trenches or around structures. Unless special material is specified or shown on the Drawings, material for fills and embankments shall consist of excavated material from structures or of a mixture of such excavated materials and materials borrowed from other sources by the Contractor. All material used for fills and embankments shall be free from wood, vegetable matter, debris, soft or spongy earth or clay, large rock, or other objectionable material and shall be acceptable to the Engineer. The fill shall contain no rock fragments larger than 4 inches in any dimension. It is feasible to use weathered rock in structural fills if the placement and compaction is monitored on a full time basis by a technician experienced with the placement of weathered rock. Any soil/rock fill should be capped with a minimum of 3 feet of clean compacted soil fill to facilitate foundation and utility construction.

B. Material shall be placed in the fill or embankment in successive loose layers of 8 inches or less in thickness before compaction, each layer being approximately horizontal and extending to the full limit of the required cross section and shall be compacted within 3% of the optimum water content over the entire surface to not less than 95% of the maximum density as determined by ASTM D 698. The process shall be repeated for each layer of material until the fill or embankment conforms to the plan lines, grades, and cross-sections. The degree of compaction and moisture content required, the method of tamping, and the equipment used shall be approved by the Engineer.

C. The area over which the fill or embankment is to be constructed shall first be cleared of all vegetation, debris, and other objectionable material and, if the ground is in a loose, un-compacted condition, it shall be compacted to a maximum density determined as specified herein.

D. No material shall be placed beyond the sloping lines of embankment unless so ordered by the Engineer. Material allowed to be placed beyond the lines of embankment shown on the Drawings will be compacted as required above unless otherwise authorized by the Engineer.

E. Material for embankments or roadway fills shall be placed in 8-inch maximum lifts and shall be compacted by rolling with power rollers weighing not less than 10 tons, with sheeps foot rollers, with vibrating rollers, or with pneumatic tire rollers, as required to accomplish the work. While and as each layer is deposited, water shall be applied in sufficient amount to ensure optimum moisture to secure the compaction specified.

F. The use of truck, carryalls, scrapers, tractors, or other heavy hauling equipment shall not be considered as rolling in lieu of rollers, but the traffic of such hauling equipment shall be distributed over the fill in such a manner as to make the use of the compaction afforded thereby as an addition to compaction by the use of rollers.

G. Wherever a pipe passes through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation 12 inches above the top of the pipe before the excavation of the trench begins.

H. On subgrades for all structures, parking area, and roadbeds, the density for the top 2 feet of the finished subgrade shall be equal to not less than 95% of the maximum density as determine by ASTM D 698. The edge of compacted fill should extend at least 10 feet beyond the outside building edge and at least 5 feet beyond the outside edge of pavements before sloping. When field tests show failure to meet the density requirement, the subgrade shall be loosened by disking, harrowing or other approved methods to a depth of not less than 6 inches, then reshaped and re-compacted as indicated in this paragraph.

3.6 Disposal Of Waste And Unsuitable Materials

A. All materials removed by excavation, which are suitable for the purpose shall be used to the extent possible for backfilling pipe trenches, foundation, and footings and for making embankment fills or for such other purposes as may be shown on the Drawings. All materials not used for such purposes including excess excavated materials, shall be considered as waste materials and the disposal thereof shall be made by the Contractor on site or offsite as authorized by the Owner at no additional cost to the Owner in a manner and at locations subject to the approval of the Engineer.

B. Waste materials shall be spread in uniform layers and neatly leveled and shaped. Spoil banks shall be provided with sufficient and adequate openings to permit surface drainage of adjacent lands.

C. Unsuitable materials, consisting of wood, vegetable matter, debris, soft or spongy clay, peat, and other objectionable material so designated by the Engineer shall be removed from the work site and disposed of by the Contractor in a manner and at a location approved by the Engineer.

D. No unsuitable or waste material shall be dumped on private property unless written permission is furnished by the Owner of the property and unless a dumping permit is issued from the local jurisdiction.

3.7 Final Grading

A. After other earthwork operations have been completed, the sites of all structures, roads, and embankments shall be graded within the limits and to the elevations shown on the Drawings. Grading operations shall be so conducted that materials shall not be removed or loosened beyond the required limits. The finished surfaces shall be left in smooth and uniform planes such as are normally obtainable from the use of hand tools. If the Contractor is able to obtain the required degree of evenness by means of mechanical equipment he will not be required to use hand labor methods. Slopes and ditches shall be neatly trimmed and finished to slopes shown on the Drawings unless otherwise approved by the Engineer.

B. Unless otherwise specified or shown on the Drawings, all finished ground surfaces shall be graded and dressed to present a surface varying not more than plus or minus 0.10 foot as regards local humps or depressions and shall be acceptable to the Engineer.

3.8 Topsoil

A. All areas to be sprigged or planted with trees, shrubs, or grass as shown on the plans shall be prepared by grading to a smooth, even surface to a level 4 inches or other specified depth below the elevation of the finished grade shown on the Drawings. It shall then be brought to a neat and finished grade by the addition of 4 inches or other specified depth of approved topsoil.

B. Topsoil removed from the construction area may be stockpiled and reused or topsoil may be obtained from approved borrow areas. If obtained from borrow areas, the Contractor shall make suitable arrangements with the property owner and shall pay all costs incident to the borrowed material including royalties.

3.9 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 Owner.

B. The Contractor shall make, or cause to be made, all repairs or replacement made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

END OF SECTION

Part 1 General

1.1 Section Includes

A. Furnishing and placing riprap slope protection in accordance with the Drawings and Specifications.

1.2 Submittals

A. Submit in accordance with Section 01 33 00.

Part 2 Products

2.1 Material for Riprap

A. Provide Bedding material, Filter fabric and rock conforming to Georgia Department of Transportation Standards for construction indicated.

B. Bedding Material: Provide bedding material consisting of sand, gravel, or crushed rock, well graded, with a maximum particle size of 2 inches. Compose material of tough, durable particles. Allow fines passing the No. 200 standard sieve with a plasticity index less than six.

C. Rock Riprap:

1. Machined riprap shall be clean shot rock containing no sand, dust or organic materials and be the size designated for the class specified. The stone shall be uniformly distributed throughout the size range. The thickness of the stone layer shall be that designated for the specified class below unless otherwise noted on the Drawings. All materials considered for use as riprap shall be approved by the A/E. Shot rock is acceptable provided the size from the site excavation is acceptable provided the size requirements are met.

2. Machine Riprap (Class A-1) shall vary in size from 2 inches to 1.25 feet with no more than 20 percent by weight being less than 4 inches. The thickness of the stone layer shall be 1.5 feet with a tolerance of 3 inches.

3. Machined Riprap (Class B) shall vary in size from 3 inches to 2.25 feet with no more than 20 percent by weight being less than 6 inches. The thickness of the layer shall be 2.5 feet with a tolerance of 4 inches.

Part 3 Execution

3.1 Riprap Construction

A. Construct riprap on filter fabric in accordance with Georgia Department of Transportation Standards in the areas indicated. Trim and dress indicated areas to

conform to cross sections, lines and grades shown within a tolerance of 0.1 foot so as to provide for the thickness of riprap shown on the Drawings. Surfaces that are below grade shall be brought to grade by filling with well compacted materials similar to the adjacent materials. Prior to placement of riprap, the prepared earth foundation will be inspected and no materials shall be placed thereon until approved by the A/E.

B. Bedding Placement: Spread bedding material uniformly to a thickness of at least 3 inches on prepared subgrade as indicated.

C. Place riprap to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials. Deliver and spread the material so that the mass of pieces in place shall be reasonably well graded, with the large pieces uniformly distributed and the smaller pieces and spalls filling the voids between the larger pieces. Rearrange individual pieces by mechanical equipment or by hand as necessary to obtain the distribution of fragment sizes specified above. For grouted riprap, hand-place surface rock with open joints to facilitate grouting and do not fill smaller spaces between surface rock with finer material. Provide at least one "weep hole" through grouted riprap for every 50 square feet of finished surface. Provide weep holes with columns of bedding material, 4 inches in diameter, extending up to the riprap surface without grout. The finished riprap shall be free from objectionable concentration of large or small pieces.

END OF SECTION

Part 1 General

1.1 Work Included

A. Aggregate base courses for roadway construction, including materials, placement, and quality control

1.2 Related Sections

A. Related sections include the following:

1. Section 31 20 00 – Earth Moving.

1.3 References

A. Georgia Department of Transportation (GDT) Standard Specifications for Construction of Transportation Systems.

1.4 Definitions

A. Completed Course: Compacted, unyielding, free from irregularities, with smooth, tight, even surface, true to grade, line, and cross-section.

B. Completed Lift: Compacted with uniform cross-section thickness.

1.5 Submittals

A. Informational Submittals:

1. Certified Test Results on Source Materials: Submit copies from commercial testing laboratory 14 days prior to delivery of materials to Project showing materials meeting the physical qualities specified.

2. Certified results of in-place density tests from independent testing agency.

Part 2 Products

2.1 Base Course

A. Group Graded Aggregate as specified in Section 310 of the Georgia Department of Transportation Standard Specifications for Construction of Transportation Systems.

2.2 Source Quality Control

A. Perform tests necessary to locate acceptable source of materials meeting specified requirements.

B. Final approval of aggregate material will be based on test results of installed materials.

C. Should separation of coarse from fine materials occur during processing or stockpiling, immediately change methods of handling materials to correct uniformity in grading.

Part 3 Execution

3.1 Subgrade Preparation

A. As Specified In Section 31 20 00 – Earthwork

B. Obtain Engineer's acceptance of subgrade before placing base course or surfacing material.

C. Do not place base course or surfacing materials on soft, muddy, or frozen subgrade.

3.2 Equipment

A. Compaction Equipment: Adequate in design and number to provide compaction and to obtain specified density for each layer.

3.3 Hauling and Spreading

A. Hauling Materials:

1. Do not haul over surfacing in process of construction.

2. Loads: Of uniform capacity.

3. Maintain consistent gradation of material delivered; loads of widely varying gradations will be cause for rejection.

B. Spreading Materials:

1. Distribute material to provide required density, depth, grade, and dimensions with allowance for subsequent lifts.

2. Produce even distribution of material upon roadway or prepared surface without segregation.

3. Should segregation of coarse from fine materials occur during placing, immediately change methods of handling materials to correct uniformity in grading.

3.4 Construction of Courses

A. Untreated Aggregate Base Course:

1. Maximum Completed Lift Thickness: 6 inches.

2. Completed Course Total Thickness: As shown in the design Drawings.

3. Spread lift on preceding course to required cross-section.

4. Lightly blade and roll surface until thoroughly compacted.

5. Add keystone to achieve compaction and as required when aggregate does not compact readily due to lack of fines or natural cementing properties, as follows:

a. Spread evenly on top of base course, using spreader boxes or chip spreaders.

b. Roll surface until keystone is worked into interstices of base course without excessive displacement.

c. Continue operation until course has become thoroughly keyed, compacted, and will not creep or move under roller.

6. Blade or broom surface to maintain true line, grade, and cross-section.

3.5 Rolling and Compaction

A. Commence compaction of each layer of base after spreading operations and continue until density of 98 percent of maximum density has been achieved as determined by ASTM D 698.

B. Roll each layer of material until material does not creep under roller before succeeding layer is applied.

C. Commence rolling at outer edges and continue toward center; do not roll center of road first.

D. Apply water as needed to obtain specified densities.

E. Place and compact each lift to required density before succeeding lift is placed.

F. Remove floating or loose stone from surface of preceding course before placing leveling course.

G. Surface Defects: Remedy by loosening and rerolling. Reroll entire area, including surrounding surface, until thoroughly compacted.

H. Finished surface shall be true to grade and crown before proceeding with surfacing.

3.6 Surface Tolerances

A. Blade or otherwise work surfacing as necessary to maintain grade and cross-section at all times, and to keep surface smooth and thoroughly compacted.

B. Finished Surface of Untreated Aggregate Base Course: Within plus or minus 0.04 foot of grade shown at any individual point.

C. Overall Average: Within plus or minus 0.02 foot from crown and grade specified.

3.7 Field Quality Control

A. In-Place Density Tests:

1. Provide Engineer and testing laboratory at least 24 hours advance notification prior to testing.

2. Show proof that areas meet specified requirements before requesting that Engineer identify density test locations.

3. Refer to Table 1 for minimum sampling and testing requirements for aggregate base course and surfacing.

Table 1

Minimum Sampling and Testing Requirements

Property	Test Method	Frequency	Sampling Point
Gradation		One Sample every 500 tons but at least every 4 hours of production	Roadbed after processing
Moisture Density (Maximum Density)		One test for every aggregate grading produced	Production output or stockpile
In-place Density and Moisture Content		One for each 500 ton but at least every 10,000 sq ft of area	In-place completed, compacted area

3.8 Cleaning

A. Remove excess material from the Work area. Clean stockpile and staging areas of all excess aggregate.

END OF SECTION

Part 1 General

1.1 Section Includes

A. The Work of this Section includes providing prime coats, tack coats, asphaltic concrete pavement, and associated materials.

1.2 Related Sections

A. Related sections include the following:

1. Section 01 50 00 – Temporary Facilities and Controls.

2. Section 31 20 00 – Earthwork.

OR

3. Section 32 11 23 – Aggregate Base Courses

1.3 Definitions

A. Combined Aggregate: All mineral constituents of asphalt concrete mix, including mineral filler and separately sized aggregates.

B. RAP: Reclaimed asphalt pavement.

1.4 Design Requirements

A. Prepare asphalt concrete mix design, meeting Georgia Department of Transportation (GDOT) Standard Specifications for Construction of Transportation Systems, 12.5 mm and 19.5 mm Superpave, Section 828.

1.5 Submittals

A. Informational Submittals:

1. Asphalt Concrete Mix Formula:

a. Submit minimum of 10 days prior to start of production.

b. Submittal to include the following information:

1) Gradation and portion for each aggregate constituent used in mixture to produce a single gradation of aggregate within specified limits.

2) Bulk specific gravity for each aggregate constituent.

3) Measured maximum specific gravity of mix at optimum asphalt content determined in accordance with ASTM D2041.

4) Asphalt Content. Asphaltic material (PG-76) shall form from 5.0 to 8.0 percent of the mixture by weight.

5) Percent of asphalt lost due to absorption by aggregate.

6) Index of Retained Strength (TSR) at optimum asphalt content as determined by AASHTO T283.

7) Percentage of asphalt cement, to nearest 0.1 percent, to be added to mixture.

8) Optimum mixing temperature.

9) Optimum compaction temperature.

2. Test Report for Asphalt Cement:

a. Submit minimum 10 days prior to start of production.

b. Show appropriate test method(s) for each material and the test results.

3. Manufacturer's Certificate of Compliance, in accordance with Section 01 33 00, for the following materials:

a. Aggregate: Gradation, source test results as defined in this Section.

b. Asphalt for Binder: Type, grade, and viscosity-temperature curve.

c. Prime Coat: Type and grade of asphalt.

d. Tack Coat: Type and grade of asphalt.

e. Additives.

f. Mix: Conforms to job-mix formula.

4. Statement of qualification for independent testing laboratory.

5. Test Results:

a. Mix design.

b. Asphalt concrete core.

c. Gradation and asphalt content of uncompacted mix.

1.6 Quality Assurance

A. Perform all work in accordance with State Standard Specification requirements.

B. Qualifications:

1. Independent Testing Laboratory: In accordance with ASTM E329.

2. Asphalt concrete mix formula shall be prepared by approved certified independent laboratory under the supervision of a certified asphalt technician.

C. The Engineer, at their discretion, may initiate some or all of the following procedures relative to materials testing for the various construction stages of the project. Frequency and locations of tests will be determined by the Engineer.

1. California Bearing Ratio (CBR) tests for adequate value of subgrade.

2. Densities of subgrade and aggregate base.

3. Stability of asphalt mix by Marshall Test method.

4. Extraction and sieve analysis of asphaltic concrete mixes.

5. Core borings for thickness of stabilized subgrade, base course and surface course. The core borings will be done in accordance with the requirements of the State Standard Specifications in the presence of the Engineer.

1.7 Environmental Requirements

A. Temperature: Do not apply asphalt materials or place asphalt mixes when ground temperature is lower than 60 degrees F or air temperature is lower than 40 degrees F. Measure ground and air temperature in shaded areas away from heat sources or wet surfaces.

B. Moisture: Do not apply asphalt materials or place asphalt mixes when application surface is wet.

1.8 Warranty

A. The Contractor shall provide Owner with a two-year unconditional maintenance free warranty on the asphaltic concrete pavement. The warranty time shall begin on the date of final acceptance of the pavement by the Owner. The warranty shall be executed by the paving contractor and co-signed by the General Contractor.

Part 2 Products

2.1 Materials

A. Prime Coat: Cutback Asphalt, RC-250 conforming to GDOT Standard Specifications for Construction of Transportation Systems, Section 412.

B. Tack Coat: Asphalt Cement, PG 58-22, PG 64-22, or PG 67-22 conforming to GDOT Standard Specifications for Construction of Transportation Systems, Section 413.

C. Approval Required: All fill material shall be subject to the approval of the Engineer.

1. Notification: For approval of imported fill material, notify the Engineer and testing laboratory at least one week in advance of intention to import material, designate the proposed borrow area, and permit testing as necessary to prove the quality of the material.

2.2 Asphalt Concrete Mix

A. General:

1. Meeting GDOT Standard Specifications for Construction of Transportation Systems, Section 400 and 828, 12.5 mm and 19.5 mm Superpave.

2. Mix formula shall not be modified except with written approval of Engineer.

3. Source Changes:

a. Should material source(s) change, establish new asphalt concrete mix formula 5 days before new material(s) is used.

b. Perform check tests of properties of plant-mix bituminous materials on first day of production and as requested by Engineer to confirm that properties are in compliance with design criteria.

c. Make adjustments in gradation or asphalt content as necessary to meet design criteria.

B. Composition: Hot-plant mix of aggregate, mineral filler if required, and paving grade asphalt cement. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that resulting mixture meets grading requirements of mix formula.

Part 3 Execution

3.1 General

A. Traffic Control: In accordance with Section 01 50 00 – Temporary Facilities and Controls.

3.2 Line and Grade

A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness.

B. Shoulders: Construct to line, grade, and cross-section shown.

3.3 Preparation

A. Prepare subgrade as specified in Section 31 20 00 – Earthwork.

B. Existing Paved Areas:

1. Modify profile by grinding, milling, or overlay methods as approved, to provide meet lines and surfaces and to produce smooth riding connection to existing facility.

2. Remove existing material to a minimum depth of 1 inch.

3. Paint edges of meet line with tack coat prior to placing new pavement.

C. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.4 Pavement Application

A. General: Place asphalt concrete mixture on approved, prepared base in conformance with this Section.

B. Prime Coat:

1. Apply uniformly to clean, dry surfaces avoiding overlapping of applications.

2. Do not apply when moisture content of upper 3 inches of base exceeds optimum moisture content of base, or if free moisture is present.

3. Application Rate: Minimum 0.2 gallon per square yard.

4. Remove or redistribute excess material.

5. Allow a minimum of 24 hours for curing of primed surface before placing asphalt concrete.

C. Tack Coat:

1. Apply uniformly to clean, dry surfaces avoiding overlapping of applications.

2. Do not apply more tack coat than necessary for the day's paving operation.

3. Touch up missed or lightly coated surfaces and remove excess material.

4. Application Rate: Minimum 0.05 to 0.15 gallon of asphalt (residual if diluted emulsified asphalt) per square yard of surface area.

D. Pavement Mix:

1. Prior to Paving:

a. Sweep primed surface free of dirt, dust, or other foreign matter.

b. Patch holes in primed surface with asphalt concrete pavement mix.

c. Blot excess prime material with sand.

2. Place asphalt concrete pavement mix in one single lift.

3. Compacted Lift Thickness:

a. Minimum: Twice maximum aggregate size, but in no case less than 1 inch.

b. Maximum: 2.5 inches.

4. Total Compacted Thickness: 2 inches.

5. Apply such that meet lines are straight and edges are vertical.

6. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.

7. Joints:

    a. Offset edge of each layer a minimum of 6 inches so joints are not directly over those in underlying layer.

    b. Offset longitudinal joints in roadway pavements so longitudinal joints in wearing layer coincide with pavement centerlines and lane divider lines.

    c. Form transverse joints by cutting back on previous day's run to expose full vertical depth of layer.

8. Succeeding Lifts: Apply tack coat to pavement surface between each lift.

9. After placement of pavement, seal meet line by painting a minimum of 6 inches on each side of joint with cut-back or emulsified asphalt. Cover immediately with sand.

E. Compaction:

1. Uniformly compact each course to target density arrived at in compaction control strip.

2. Uniformly compact each course until there is no further evidence of consolidation and roller marks are eliminated. When placement rate exceeds 100 tons per hour, operate minimum of two rollers for compaction.

3. Roll until roller marks are eliminated and density of 92 percent of measured maximum density determined in accordance with ASTM D2041 is obtained.

4. Joint Compaction:

    a. Place top or wearing layer as continuously as possible.

    b. Cut back previously compacted mixture when Work is resumed to produce slightly beveled edge for full thickness of layer.

    c. Cut away waste material and lay new mix against fresh cut.

F. Tolerances:

1. General: Conduct measurements for conformity with crown and grade immediately after initial compression. Correct variations immediately by removal or addition of materials and by continuous rolling.

2. Completed Surface or Wearing Layer Smoothness:

    a. Uniform texture, smooth, and uniform to crown and grade.

b. Maximum Deviation: 1/8 inch from lower edge of a 10-foot straightedge, measured continuously parallel and at right angle to centerline.

c. If surface of completed pavement deviates by more than twice specified tolerances, remove and replace wearing surface.

3. Transverse Slope Maximum Deviation: ¼ inch in 10feet from rate of slope shown.

4. Finished Grade:

a. Perform field differential level survey on maximum 50-foot grid and along grade breaks.

b. Maximum Deviation: 0.02 foot from grade shown.

3.5 Patching

A. Preparation:

1. Remove damaged, broken, or unsound asphalt concrete adjacent to patches. Trim to straight lines exposing smooth, sound, vertical edges.

2. Prepare patch subgrade as specified in Section 31 20 00 – Earthwork.

B. Application:

1. Patch Thickness: 2 inches or thickness of adjacent asphalt concrete, whichever is greater.

2. Place asphalt concrete mix across full width of patch in layers of equal thickness.

3. Spread and grade asphalt concrete with hand tools or mechanical spreader, depending on size of area to be patched.

C. Compaction:

1. Roll patches with power rollers capable of providing compression of 200 to 300 pounds per linear inch. Use hand tampers where rolling is impractical.

2. Begin rolling top course at edges of patches, lapping adjacent asphalt surface at least ½ the roller width. Progress toward center of patch overlapping each preceding track by at least 1/2 width of roller.

3. Make sufficient passes over entire area to remove roller marks and to produce desired finished surface.

D. Tolerances:

1. Finished surface shall be flush with and match grade, slope, and crown of adjacent surface.

2. Tolerance: Surface smoothness shall not deviate more than ¼ inch when ten-foot long straightedge is laid across patched area between edges of new pavement and surface of old surfacing.

3.6 Testing

A. Field Density Tests:

1. Perform tests from cores or sawed samples in accordance with AASHTO T230 and AASHTO T166.

2. Measure with properly operating and calibrated nuclear density gauge in accordance with ASTM D2950.

3. Maximum Density: In accordance with ASTM D2041, using sample of mix taken prior to compaction from same location as density test sample.

B. Testing Frequency:

1. Quality Control Tests:

a. Asphalt Content, Aggregate Gradation: Once per every 500 tons of mix or once every 4 hours, whichever is greater.

b. Mix Design Properties, Measured Maximum (Rice's) Specific Gravity: Once every 1,000 tons or once every 8 hours, whichever is greater.

2. Density Tests: Once every 500 tons of mix or once every 4 hours, whichever is greater.

END OF SECTION

Part 1 General

1.1 Summary

A. Section Includes:

1. Work consists of furnishing and installing a Permeable Interlocking Concrete Pavement (PICP) System in accordance with these specifications and in general conformance with the lines, grades, design, and dimensions shown on the plans.

2. Installation work includes:

   a. Verifying subgrade elevations and slope generally conform to the lines, grades, infiltration rate, density, and site conditions depicted in the construction documents;

   b. Furnishing and installing geotextile and/or geomembrane liner (where required), horizontal drainage piping (where required), subbase course, base course, bedding course, edge restraint, concrete pavers and permeable joint material in general conformance to the lines and grades shown on the construction documents.

1.2 References

A. American Society for Testing and Materials (ASTM):

1. ASTM C33 Standard Specification for Concrete Aggregates

2. ASTM C94 Standard Specification for Ready-Mixed Concrete

3. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Sized Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

4. ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse-Grained Aggregates

5. ASTM C140 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

6. ASTM C936 Standard Specification for Solid Concrete Interlocking Paving Units

7. ASTM C979 Standard Specification for Pigments for Integrally Colored Concrete

8. ASTM C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Interlocking Paving Units

9. ASTM C1781 Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement Systems

10. ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

11. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

12. ASTM D3034 Standard Specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings

13. ASTM D3350 Standard Specification for Polyethylene Plastic Pipe and Fittings Materials

14. ASTM D4873 Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples

15. ASTM E2835 Standard Test Method for Measuring Deflections using a Portable Impulse Plate Load Test Device

B. Interlocking Concrete Pavement Institute (ICPI)

1. Permeable Interlocking Concrete Pavement manual (latest edition)

2. Permeable Design Pro software for hydrologic and structural design

3. Tech Specs and Technical Bulletins

1.3 Submittals

A. Contractor shall submit to the owner for approval a minimum of four full-size samples of each concrete paver type/size/thickness/color/finish specified. The samples shall represent the range of shape, texture, and color permitted for the respective type. Color(s) will be selected by Architect/Engineer/Landscape Architect/Owner from Manufacturer’s standard colors.

B. Prior to delivery of the associated material to the site, the Contractor shall submit the following product-specific documentation for approval:

1. Aggregates

a. Sieve analysis per ASTM C136 for subbase, base, bedding and joint aggregate materials

b. Minimum 3 lb. sample of each material for independent testing.

2. Concrete Pavers:

    a. Test results from an independent testing laboratory for compliance to ASTM C936.

    b. For machine installation projects, stitching details to be used during product placement.

    c. Safety Data Sheets (SDS).

3. Geosynthetics

    a. One 18-inch x 18-inch panel of each type of geosynthetic (geotextile or geomembrane Liner) to be used for inspection and testing. The sample panels shall be uniformly rolled and shall be wrapped in plastic to protect the material from moisture and damage during shipment. Samples shall be externally tagged for easy identification. External identification shall include the name of the manufacturer; product type; product grade; lot number; and physical dimensions.

    b. Current National Transportation Product Evaluation Program (NTPEP) evaluation report.

    c. Safety Data Sheets (SDS).

1.4 Quality Assurance

A. Contractor Qualifications:

1. Contractor shall submit a list of five (5) previously constructed projects of similar size and magnitude prior to the bid date to be qualified. Contact names, telephone numbers, and date of completion shall be listed for each project.

2. The Contractor’s site foreman shall hold a PICP Specialist Designation from the Interlocking Concrete Pavement Institute (ICPI). The site foreman shall be onsite for the entire installation.

3. Contractor shall conform to all local, state/provincial licensing and bonding requirements.

B. Mockups: Build mockups to verify selections made under submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Install a 10 ft x 10 ft paver area following the installation practices described in Article 3.2 to 3.4. This area shall be used to verify joint sizes; lines; laying pattern(s); stitching details (for mechanical installation); color(s); and, texture of the job.

2. To provide a proper representation of color blend, blending during installation of sample mock-up will be pulled from a minimum of 3 cubes.

3. This area shall be the standard from which the work will be judged.

4. Subject to approval by the Owner, the mock-up may be retained as part of the finished work. If mock-up is not retained, remove and dispose of mock-up at the completion of the project.

1.5 Delivery, Storage, And Handling

A. Contractor shall coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

B. Contractor shall check all materials upon delivery to assure that the proper materials have been received and are in good condition before signing off on the manufacturer’s packing slip.

C. Contractor shall protect all materials from damage or contamination due to job site conditions and in accordance with manufacturer's recommendations. Damaged or contaminated materials shall not be incorporated into the work.

D. Concrete pavers shall be delivered to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift. Unload and store concrete pavers at the job site in such a manner that no damage occurs to the product.

E. Contractor shall handle and transport aggregates to avoid segregation, contamination, and degradation and keep different materials sufficiently separated as to prevent mixing. The material shall not be dumped or stored one material on top of another unless it is part of the installation process. Materials shall be covered to prevent removal by wind.

F. Geosynthetics shall be delivered, stored and handled in accordance with ASTM D4873.

1.6 Environmental Conditions

A. Pavers shall not be installed during heavy rain, freezing conditions or snowfall.

B. Pavers shall not be installed on frozen soil subgrade or aggregates.

1.7 Maintenance Materials

A. Provide 50 square feet additional paver material for use by Owner for maintenance and repair.

B. Store extra paver materials in Owner-designated location.

Part 2 Products

2.1 Permeable Interlocking Concrete Pavers

A. Permeable Interlocking Concrete Pavers Basis-of-Design:

1. Paver Name: Aqualine 3-piece system

a. Thickness: 3-1/8 inches (80 mm)

b. Color: Selected by Owner from samples submitted by contractor

c. Finish: Standard (Smooth)

d. Supplier:
Supplier: Local Belgard Supplier and Old Castle Company

e. Brent Davis, PLA, GSWCC Level II, Design Consultant Engineered Solutions - Belgard

f. Substitutions: No substitutions permitted.

B. Pavers shall meet the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units.

1. Measured length or width of test specimens shall not differ by more than +/- 0.063 in, while measured thickness shall not differ by more than +/- 0.125 in.

2. Average compressive strength of 8,000 psi (55 MPa) with no individual unit under 7,200 psi (50 MPa) when tested in accordance with ASTM C140.

3. Average absorption of 5% or less with no unit greater than 7% when tested in accordance with ASTM C140.

4. Efflorescence shall not be a cause for rejection.

5. Pigment in Concrete Pavers shall conform to ASTM C979.

2.2 Aggregate Materials

A. General Requirements:

1. Clean, non-plastic aggregate, free from deleterious or foreign matter, manufactured from crushed rock. Recycled aggregates shall not be used.

2. Percent of angular and sub-angular particles greater than 90%. Rounded river gravel shall not be used.

3. LA Abrasion of the aggregate used shall be less than 40 as per ASTM C131.

4. All aggregates shall be washed and have less than 2% passing the No. 200 (0.075 mm) sieve.

5. All aggregate material gradations shall be tested in accordance with ASTM C136.

B. Bedding Course/Joint Fill Material – open-graded aggregate conforming to the following gradation:

Note: No. 89 or No. 9 stone may be used as joint fill material. If No. 8 stone material is not available locally, No. 89 can be used as a bedding course if choke criteria is met with underlying base aggregate.

ASTM C33 size No. 8

Sieve Size	Percent Passing
1/2 in. (12.5 mm)	100
3/8 in. (9.5 mm)	85 to 100
No. 4 (4.75 mm)	10 to 30
No. 8 (2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5
No. 200 (0.075 mm)	0 – 2

C. Base Course Material - open graded aggregate conforming to the following gradation:

ASTM C33 size No. 57

Sieve Size	Percent Passing
1-½ in. (37.5 mm)	100
1 in. (25 mm)	95 to 100
1/2 in. (12.5 mm)	25 to 60
3/8 in. (9.5 mm)	0 to 10
No. 4 (4.75 mm)	0 to 5
No. 200 (0.075 mm)	0 - 2

D. Subbase Course Material – open-graded aggregate conforming to the following gradation:

Note: ASTM No. 3 or No. 4 may be used as subbase material if No. 2 stone in unavailable locally.

ASTM C33 size No. 2

Sieve Size	Percent Passing
3 in. (75 mm)	100
2- ½ in. (63 mm)	90 to 100
2 in. (50 mm)	35 to 70
1-½ in. (37.5 mm)	0 to 15
¾ in. (19 mm)	0 to 5
No. 200 (0.075 mm)	0 – 2

2.3 Edge Restraints

A. Edge restraints shall be cast in place concrete curbs in general conformance with the specifications and dimensions in the construction documents

2.4 Pipe Underdrains

A. Where shown on the plans, pipe underdrains shall be perforated or slotted PVC pipe manufactured in accordance with ASTM D3034 or corrugated HDPE pipe manufactured in accordance with ASTM D3350 and comply with the requirements of Section 33 46 14.19 - Pipe Underdrains.

Part 3 Execution

3.1 Preparation

A. Prior to commencement of any work, the Contractor shall conduct a pre-construction meeting with the Owner, Designer, and affected sub-trades. The pre-construction meeting should establish contractor responsibilities and at a minimum verify:

1. The location of the mock-up, and whether it will be part of the final construction or need to be removed.

2. The site layout is in general conformance to the construction documents. In particular, the location and elevation of discharge points (if any) of the pipe underdrains.

3. The subgrade lines and elevations are in general conformance with the construction documents. The subgrade elevations shall be within +/- 0.1 ft of the specified grades.

4. The minimum slope of subgrade shall be at least 0.5% or as specified in the design.

5. Subgrade soil conditions and grades meet the requirements in the construction documents.

6. The details of the site’s erosion and sediment control plan.

B. Proof-roll prepared subgrade according to requirements in Section 31 20 00 Earth Moving to identify soft pockets and areas of excess yielding. Proceed with subbase installation only after deficient subgrades have been corrected. Scarify subgrade surface following any stabilization efforts before installing subbase course.

C. If compaction is required in the construction documents, Contractor shall verify compaction of the subgrade is in general conformance with the construction documents prior to placing subbase materials.

D. Once the Contractor has confirmed the subgrade conditions are in general conformance with the requirements in the construction documents, the Contractor shall begin installing the subbase material. By initiating installation of the subbase material, the Contractor acknowledges acceptance of the subgrade.

3.2 Installation Of Subbase And Base Courses

A. Keep the area where the pavement is to be constructed free from sediment during the entire job. Any materials contaminated with sediment shall be removed and replaced with clean material.

B. Install membrane liner and any associated cushion geotextile in accordance with the manufacturer's recommendations. The membrane liner is applied to the bottom and sides of the excavation for non-infiltration purposes and must include a drainage pipe. Allow for enough membrane liner to exceed the final elevation of the surface. After completion of the surface, the excess liner should be cut flush with the finished grade. Membrane lines shall be welded together and boots installed around all protrusions.

C. Install geotextiles as required in accordance with the specifications and drawings. The geotextile is applied to the bottom and sides of the excavation with overlapping joints a minimum of 24 inches. Overlaps to be constructed to "shingle" moisture from upstream panel to downstream panel. Allow for enough geotextile to exceed the final elevation of the surface. After completion of the surface, the excess geotextile should be cut flush with the finished grade.

D. Install the subbase course and base course at the thicknesses, compaction rates, surface tolerances, and elevations outlined below.

1. Place and spread the first layer of subbase without displacing or damaging the geosynthetics (if used). To prevent damage, tracked vehicles shall not be allowed directly on the geotextiles or geomembranes during the initial spreading process of the subbase layer.

2. The aggregate should be spread and compacted in uniform layers not exceeding 6-inch loose thickness. Compaction is performed using either a 10 T (10 ton) vibratory roller or a minimum 13,500 lb-f centrifugal force reversible vibratory plate compactor. For each lift, make at least two passes in the vibratory mode and at least two passes in the static mode

and continue compaction until there is no visible movement in the materials.

3. At the specified elevation(s), install the pipe underdrains in accordance with the manufacturer's recommendations. Ensure the pipes are sloped to provide proper drainage to the outlets. Pipes shall be surrounded by a minimum of 4 inches of base course material to prevent damage during compaction. Care must be taken not to damage pipe underdrains during subsequent aggregate installation.

4. Final subbase surface tolerance shall be plus or minus 0.1 ft over a 10-foot straight edge laid in any direction.

5. Final base surface tolerance shall be plus or minus 3/4 inch over a 10-foot straight edge laid in any direction.

6. Provide proper compaction near curbs, grade beams, concrete collars around utility structures, lights standards, tree wells, building edges and other protrusions as applicable to the project.

E. Before starting to place the bedding course, the base shall be inspected and approved by the Owner or the Designer.

F. Light Weight Deflectometer (LWD) for Compacted Base Aggregate Deflection Testing:

1. After three preloading drops, the maximum average deflection from three additional drops shall be no greater than 0.5 mm.

2. Conduct LWD tests on every (800 tons) of remaining area of compacted base aggregates.

G. LWD Test Report shall include the following:

1. Project description.

2. Sketch of the test area and numbered test locations.

3. Aggregate type and layer thicknesses.

4. Aggregate characteristic properties: gradation, porosity, bulk density.

5. Compaction equipment type and weight.

6. Static and/or vibratory compaction.

7. Number of passes of the compaction equipment.

8. Average of three deflections for each location.

3.3 Installation Of Edge Restraints

A. All concrete edge restraints shall be constructed to dimensions and grades in general conformance with the construction documents and shall be supported on a compacted base not less than 6-inch thick and meet local requirements or the requirements of Section 32 16 13 Curbs and Gutters whichever are more restrictive. All concrete shall be in accordance with ASTM C94 requirements.

3.4 Installation Of Bedding Course, Pavers, And Joint Material

A. Spread the bedding course evenly over the base course and screed to a nominal 2 in. thickness utilizing an approved mechanical spreader or by screed rails and boards. Do not use the bedding material to fill depressions in the base course surface. Surface tolerances shall be +/- 3/8 inch over a 10-foot straight edge.

B. Ensure that concrete pavers are free of foreign material before installation. Concrete pavers shall be inspected for color distribution and all chipped, damaged, or discolored concrete pavers shall be replaced. Initiation of concrete paver placement shall be deemed to represent acceptance of the pavers.

C. Lay the concrete pavers in the pattern(s) shown on the drawings. Maintain straight pattern lines. For mechanical installations, follow the stitching details as submitted and verified during the mock-up.

D. Paving units shall be installed simultaneously from a minimum of 3 bundles for hand installations, and 6 bundles for mechanical installations to provide proper color blending.

E. Joints between the individual concrete pavers shall be uniformly maintained and installed in accordance with the in-place dimensions

F. Fill gaps at the edges of the paved area with cut pavers or edge units. Do not install cut pavers smaller than one-third of a whole paver along edges subject to vehicular traffic – trim two pavers to fit.

G. Cut pavers using a masonry saw or splitting device. Upon completion of cutting, the area must be swept clean of all debris.

H. Using a low amplitude plate compactor capable of at least 5,000 lbs. (22 kN) compaction at a frequency of 75 Hz –100 Hz, compact and seat the concrete pavers into the bedding course.

I. The pavers shall be compacted to achieve consolidation of the bedding course and brought to level and profile by not less than three passes. Initial compaction should proceed as closely as possible following the installation of the paving units and prior to the acceptance of any traffic.

J. Any units that are structurally damaged during compaction shall be immediately removed and replaced.

K. Apply the joint material to the surface and sweep into the joints and voids. Fill joints and voids then sweep off excess material before vibrating the material down into the joints using a plate compactor. This will typically require two to three passes with the plate compactor.

L. Do not compact within 6 feet of unrestrained edges of the paving units.

M. All work to within 6 feet (1 m) of the laying face must be left fully compacted at the end of each day.

N. Sweep off excess aggregate when the job is complete.

3.5 As-Built Construction Tolerances

A. Final inspection shall be conducted to verify conformance to the drawings after removal of excess aggregate. All pavements shall be finished to lines and levels to ensure positive drainage at all drainage outlets and channels.

B. The final surface elevations shall not deviate more than +/- 3/8 inch under a 10 ft long straight edge.

C. Lippage shall be no greater than 1/8-inch difference in height between adjacent pavers.

D. Bond lines for the pavers shall be +/- 1/2-inch over a 50-foot string ling.

E. Verify the in-situ surface infiltration rate of the permeable pavement is a minimum of 100 in/hour using ASTM C1781.

3.6 Maintenance And Protection

A. At the completion of the work, the Contractor shall provide the Owner with the manufacturer’s PICP System Operation and Maintenance Guidelines.

B. Once the work is complete, the Owner shall be responsible for protecting the work from sediment deposition and damage due to subsequent construction activity on the site.

C. The Contractor shall return to the site after 6 months from the completion of the work and conduct an inspection of the PICP System with the Owner, Designer, and Contractor in accordance with the PICP System Operation and Maintenance Guidelines.

END OF SECTION

Part 1 General

1.1 Work Included

A. Concrete combination curb and gutter.

1.2 System Description

A. General Requirements

1. Provide plant, equipment, machines, and tools used in the work subject to approval and maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified.

2. Use of the equipment shall be discontinued if it produces unsatisfactory results.

3. The Engineer shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

B. Slip Form Equipment: Slip form paver or curb forming machine, will be approved based on trial use on the job and shall be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in one pass.

1.3 Submittals

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

B. Submit manufacturer/supplier certifications for aggregate and cement. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates, materials manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results.

C. Submit mix design in accordance with ACI requirements. Provide for each mix design, the project name, city, general contractor, concrete strength, and its intended use.

D. Submit 2 copies of laboratory test reports with standard deviation analysis or trial batch data. All concrete materials shall be listed.

1.4 Environmental Requirements

A. Placing During Cold Weather

1. Do not place concrete when the air temperature reaches 40 degrees F and is falling or is already below that point.

2. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Make provisions to protect the concrete from freezing during the specified curing period.

3. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions.

4. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited.

5. Mixing water shall be heated as necessary to result in the temperature of the in-place concrete being between 50- and 85-degrees F. Methods and equipment for heating shall be approved.

6. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer.

7. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

B. Placing During Warm Weather

1. The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

Part 2 Products

2.1 Concrete

A. Concrete shall have a minimum compressive strength of 3000 psi at 28 days. Maximum size of aggregate shall be one inch. Submit copies of certified delivery tickets for all concrete used in the construction.

B. Air Content

1. Mixtures shall have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.

C. Slump

1. The concrete slump shall be 2 inches plus or minus 1 inch where determined in accordance with ASTM C143.

D. Reinforcement Steel

1. Reinforcement bars shall conform to ASTM A615. Wire mesh reinforcement shall conform to ASTM A1064.

2.2 Concrete Curing Materials

A. Impervious Sheet Materials: Impervious sheet materials shall conform to ASTM C171, type optional, except that polyethylene film, if used, shall be white opaque.

B. Burlap: Burlap shall conform to AASHTO M 182.

C. White Pigmented Membrane-Forming Curing Compound: White pigmented membrane-forming curing compound shall conform to ASTM C309, Type 2.

2.3 Concrete Protection Materials

A. Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the Contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 Joint Filler Strips

A. Contraction Joint Filler for Curb and Gutter: Contraction joint filler for curb and gutter shall consist of hard-pressed fiberboard.

B. Expansion Joint Filler, Pre-molded

1. Expansion joint filler, pre-molded, shall conform to ASTM D1751 or ASTM D1752, 1/2 inch thick, unless otherwise indicated.

2.5 Joint Sealants

A. Joint sealant, cold-applied shall conform to ASTM C920 or ASTM D5893.

2.6 Form Work

A. Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified.

B. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete.

1. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects.

a. Wood forms shall have a nominal length of 10 feet.

b. Radius bends may be formed with 3/4-inch boards, laminated to the required thickness.

2. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points.

a. Ends of steel forms shall be interlocking and self-aligning.

b. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers.

c. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

C. Sidewalk Forms: Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

D. Curb and Gutter Forms: Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form.

1. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used.

2. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together.

3. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

E. Detectable Warning System: Detectable Warning Systems shown on the contract plans are to meet requirements of ICC A117.1 - Section 705.

Part 3 Execution

3.1 Subgrade Preparation

A. The subgrade shall be constructed to the specified grade and cross section prior to concrete placement.

B. Subgrade shall be placed and compacted as directed in conformance with Section 31 20 00 Earthwork.

C. Sidewalk Subgrade: The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

D. Curb and Gutter Subgrade: The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

E. Maintenance of Subgrade: The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 Form Setting

A. Set forms to the indicated alignment, grade and dimensions.

B. Hold forms rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet.

1. Corners, deep sections, and radius bends shall have additional stakes and braces, as required.

2. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms.

C. Forms shall be removed without injuring the concrete.

1. Bars or heavy tools shall not be used against the concrete in removing the forms.

D. Any concrete found defective after form removal shall be promptly and satisfactorily repaired.

E. Forms shall be cleaned and coated with form oil each time before concrete is placed.

1. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

F. Sidewalks

1. Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 1/4 inch in any 10 foot long section.

2. After forms are set, grade and alignment shall be checked with a 10-foot straightedge.

3. Forms shall have a transverse slope as indicated with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

G. Curbs and Gutters

1. The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed.

2. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing.

3. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction.

3.3 Sidewalk Concrete Placement and Finishing

A. Formed Sidewalks

1. Place concrete in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated.

2. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted.

3. The concrete shall be consolidated by tamping and spading or with an approved vibrator, and the surface shall be finished to grade with a strike off.

B. Concrete Finishing

1. After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, finish the surface with a wood or magnesium float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

2. Edge and Joint Finishing:

   a. All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch.

   b. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger.

   c. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

C. Surface and Thickness Tolerances: Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 Curb and Gutter Concrete Placement and Finishing

A. Formed Curb and Gutter: Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".

B. Curb and Gutter Finishing: Approved slip-formed curb and gutter machines may be used in lieu of hand placement.

C. Concrete Finishing

1. Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes.

2. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch.

3. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top.

4. The top surface of gutter and entrance shall be finished to grade with a wood float.

5. Joint Finishing: Curb edges at formed joints shall be finished as indicated.

D. Surface and Thickness Tolerances: Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 Sidewalk Joints

A. Sidewalk joints shall be constructed to divide the surface into rectangular areas.

1. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab.

2. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width.

3. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs.

4. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated.

B. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated.

1. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

C. Sidewalk Contraction Joints: The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved.

1. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8-inch blade to the depth indicated.

2. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

D. Sidewalk Expansion Joints

1. Expansion joints shall be formed with 1/2-inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D1752 or building paper.

2. Joint filler shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing.

3. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed.

4. At the end of the curing period, expansion joints shall be cleaned and filled with cold-applied joint sealant.

5. Joint sealant shall be gray or stone in color.

6. The joint opening shall be thoroughly cleaned before the sealing material is placed.

7. Sealing material shall not be spilled on exposed surfaces of the concrete.

8. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material.

9. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

E. Reinforcement Steel Placement

1. Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 Curb and Gutter Joints

A. Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

B. Contraction Joints

1. Contraction joints shall be constructed directly opposite contraction joints in abutting Portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.

2. Contraction joints (except for slip forming) shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

3. When slip forming is used, the contraction joints shall be cut in the top portion of the gutter/curb hardened concrete in a continuous cut across the curb and gutter, using a power-driven saw. The depth of cut shall be at least one-fourth of the gutter/curb depth and 1/8 inch in width.

C. Expansion Joints

1. Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of

abutting Portland cement concrete pavement and shall be of the same type and thickness as joints in the pavement.

2. Where curb and gutter do not abut Portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not less than 30 feet nor greater than 120 feet.

3. Expansion joints shall be provided in nonreinforced concrete gutter at locations indicated.

4. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit.

5. Expansion joints and the top 1-inch depth of curb and gutter contraction-joints shall be sealed with joint sealant.

6. The joint opening shall be thoroughly cleaned before the sealing material is placed.

7. Sealing material shall not be spilled on exposed surfaces of the concrete.

8. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material.

9. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.7 Curing and Protection

A. General Requirements

1. Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation.

2. Protect unhardened concrete from rain and flowing water.

3. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins.

4. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

B. Mat Method

1. The entire exposed surface shall be covered with 2 or more layers of burlap.

2. Mats shall overlap each other at least 12 inches.

3. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 72 hours.

C. Impervious Sheeting Method

1. The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material.

2. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used.

3. The curing medium shall not be less than 18-inches wider than the concrete surface to be cured and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets.

4. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing.

5. The curing medium shall remain on the concrete surface to be cured for not less than 72 hours.

D. Membrane Curing Method

1. A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms.

2. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears.

3. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage rate of approximately 200 square feet/gallon for the total of both coats.

4. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat.

5. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes.

6. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above.

7. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed.

8. Necessary precautions shall be taken to ensure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints.

9. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is resprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period.

10. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time.

11. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.8 Backfilling

A. After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.9 Protection

A. Completed concrete shall be protected from damage until accepted.

B. Repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.10 Field Quality Control

A. Submit copies of all test reports within 24 hours of completion of the test.

B. General Requirements

1. Perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing.

2. Based upon the results of these inspections and tests, take the action and submit reports as required below, and any additional tests to ensure that the requirements of these specifications are met.

C. Concrete Testing

1. Strength Testing: Provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 250 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C172. Cylinders for acceptance shall be molded in conformance with ASTM C31 by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

2. Air Content: Determine air content in accordance with ASTM C173 or ASTM C231. ASTM C231 shall be used with concretes and mortars made with relatively dense natural aggregates. Two tests for air content shall be made on randomly selected batches of each class of concrete placed during each shift. Additional tests shall be made when excessive variation in concrete workability is reported by the placing foreman or the Owner's inspector. If results are out of tolerance, the placing foreman shall be notified, and he shall take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each truckload of material until such time as the air content is within the tolerance specified.

3. Slump Test: Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

4. Thickness Evaluation: The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, the subgrade shall be true to grade prior to concrete placement and the thickness will be determined by measuring each edge of the completed slab.

5. Surface Evaluation: The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.11 Surface Deficiencies and Corrections

A. Thickness Deficiency: When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

B. High Areas: In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished

concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

C. Appearance: Exposed surfaces of the finished work will be inspected by the Owner and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

3.12 Detectable Warning System

A. Install Detectable Warning Systems required by contract plans per ICC A117.1, Section 705, and by manufacturers' installation instructions.

END OF SECTION

Part 1 General

1.1 Work Included

A. Furnish and install concrete wheel bumpers (wheel stops) as indicated on the drawings and specified.

1.2 Submittals

A. Submit in accordance with Section 01 33 00.

B. Product Data: Submit information describing the materials used in the manufacture of the wheel bumpers.

Part 2 Products

2.1 Materials

A. Concrete shall conform to the following:

1. Minimum compressive strength: 4,000 pounds per square inch (psi) minimum at 28 days.

2. Air content: 5 to 8 percent.

3. Size of bumpers shall be as indicated on the drawings.

B. Reinforcing bars shall be deformed billet steel conforming to ASTM A615, Grade 60.

C. Anchor stakes for driving into the ground shall be No. 4 reinforcing bars or steel pipe conforming to ASTM A53.

D. Adhesive for Securing of Concrete Wheel Bumpers: An epoxy two-component type, long curing, manufactured by Edeco, Furance, Andrew Brown, Adhesive Engineering Company, or equal.

Part 3 Execution

3.1 Installation On Asphalt Pavements

A. Secure bumpers in place with steel stakes, two per bumper, driven to at least 1/4-inch below top surface of the bumper, through the pavement and not less than 12 inches into the subgrade.

3.2 Installation On Portland Cement Concrete Pavements

A. Secure bumpers in place with 2-component epoxy adhesive. Surfaces to receive adhesive to be free of laitance, dirt, loose particles or other foreign matter and shall be completely cured and dry.

B. Slightly roughen the smooth surfaces as recommended by the adhesive manufacturer to provide for proper bond. Properly cure the adhesive after placing of bumper unit.

END OF SECTION

Part 1 General

1.1 Work Includes

A. Submit Complete Specifications And Shop Drawings For The A/E's Approval.

B. Furnish And Install Materials As Noted On Contract Documents.

C. Fencing And All Accessories Shall Be Provided By A Single Distributor.

D. Refer To Other Sections For Work Related To That Specified Under This Heading.

E. Height Of All Chain Link Fences Shall Be As Indicated On The Drawings.

F. Fencing Shall Be Provided For Each Area As Specified Under Section Fencing Schedule.

G. Contractor Is To Supply And Install PVC Coated Fencing Fabric, Posts, Rails, Etc. Class 2B Thermally Fused Per ASTM F668 Class 2b.

1.2 Submittals

A. SHOP DRAWINGS: Submit Layout Of Fences And Gates, With Dimensions, Details, And Finishes Of Components, Accessories, And Post Foundations.

B. SAMPLES: Submit Color Selection For PVC Finishes And Fabric To A/E.

C. Submittals To Be Per Document 01 33 00 – Submittals Procedures Requirements.

Part 2 Products

2.1 Materials

A. Products From Qualified Manufacturers Having A Minimum Of Five Years' Experience Manufacturing Thermally Fused Chain Link Fencing.

2.2 Posts, Rails, And Braces

A. All structural and roll formed shapes shall conform to the provisions of ASTM A123 for galvanized coating.

B. All tubular members shall comply with SS40 for weight and coating or be high strength triple coated steel in accordance with ASTM A569.

1. End, Corner, and Pull Post: For fence up to and including 12' 0" in height, 3" diameter SS-40. For 24'-0" in height fencing, 6-5/8" diameter SS049 tubular posts. A minimum of 15 micrograms of zinc chromate per square inch, and a

minimum of 10 mils of lifecoat fuse bonded polyester powder exterior coating, on pipe size normally not available with class 2B thermally fused.

2. Line Posts General (10' 0" Maximum Spacing):

   a. Fabric Up To 6'-0" in Height: Manufacturers standard type SS40 tubular steel posts 2" nominal diameter.

   b. Fabric 8'-0" in Height and Over: Manufacturer's standard type 2 ½" SS40 tubular steel posts.

   c. 24' height fencing - Type 5540 4" diameter.

3. Gate Posts:

   a. Gate Leaves Up To and including 6'-0" Wide: 3½" diameter SS-40.

   b. Gate Leaves Over 13'-0" and Up To and Including 18'-0" Wide: 6-5/8" outside diameter, Schedule 40 pipe or higher strength steel pipe.

4. Top Rail and Bottom Rail:

   a. The top rail shall be a type SS20 tubular steel as specified in the Fencing Schedule.

   b. Furnish in the manufacturer's standard lengths of approximately 21'-0", with each piece having swedged ends approximately 6" long for each joint. Provide means for attaching top rails securely to each gate, corner, pull, and end posts. The top rail shall form a continuous brace from end to end to each run of fence.

   c. Tension Wire: 7 gauge galvanized or aluminum coated coil spring wire

5. Post Bracing Assembly: To match top rail. Brace rail assembly shall be complete with a 3/8" diameter rod and adjustable take-up. Provide brace rails for fencing over 6' in height.

6. PVC Coated Finish: In accordance with ASTM F1043, apply supplemental color coating of 10 to 15 mils of thermally fused PVC in black color to match fabric.

2.3 Chain Link Fabric General

A. The fabric shall consist of one piece fabric widths for fences up to 12'-0". The fabric shall be 2" mesh, 6 or 9 gauge, or as specified on drawings, with heights as indicated on the drawings. All fabric shall be PVC coated thermally fused to zinc-coated or zinc -5% aluminum-misch metal alloy coated steel core wire: ASTM F668 Class 2b, 7 mil thickness thermally fused. Core wire tensile strength 75,000 PSI. Refer to drawing.

B. Selvage Edges: Fence fabric shall be knuckled at both selvages for all fence heights.

2.4 Accessories

A. All accessories, except tie wires, shall be galvanized to comply with ASTM A153. Finish matching framing and fabric.

B. Post Tops: pressed steel or malleable iron (designed as a weather tight closure cap for tubular posts). Where top rail is used, provide tops to permit the passage of the top rail.

C. Stretcher Bars (for tubular end, corner, pull, or gate posts only): one piece lengths equal to the full height of the fabric, with a minimum cross section of 3/16" by 3/4". Provide one stretcher bar for each gate and end post and two for each corner and pull post.

D. Stretcher Bar Bands: heavy pressed steel spaced not over 15" on center to secure stretcher bars to tubular end, corner pull, and gate post.

E. Wire Ties: For tying fabric to line posts, use 9 gauge aluminum wire ties for tubular posts, spaced 14" on center. For tying fabric to rails and braces, use 9 gauge aluminum wire ties spaced 24" on center. For tying fabric to tension wire, use 11 gauge hog rings spaced 24" on center.

F. Nuts and bolts are galvanized but not vinyl coated. Paint with PVC touch up paint to match color coat.

2.5 Gates

A. Ballfield Gates – Gates shall be pre-fabricated units to match the ballfield fencing posts in finish.

B. Site Gates - Fabricate gate perimeter frames of 1.90" outside diameter tubular members galvanized in accordance with ASTM A120. Provide additional horizontal and vertical members to ensure proper gate operation and to allow for attachment of fabric, hardware, and accessories. Allow for concrete curb at dugout and infield gates. Frame to be painted with minimum of three (3) coats of PVC paint of color to match fabric.

C. Assemble gate frames by welding or fittings and rivets for rigid connections. Use same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges, and tie at top and bottom edges. Attach stretcher bars to gate frame at not more than 15" on center. Attach hardware with rivets or by other means that will provide security against removal or breakage.

D. Provide diagonal cross bracing that consists of 3/8" diameter adjustable length truss rods on gates where necessary to provide frame rigidity without sag or twist.

E. Gate Hardware: Provide the following hardware and accessories, with a heavy galvanized finish, for each gate:

1. Hinges: pressed steel or malleable iron to suit gate size, nonlift-off type, offset to permit 180 degrees gate opening. Provide one pair of hinges for each leaf.

2. Latch: forked type or plunger bar type to permit operation from either side of the gate. Provide padlock eye as an integral part of the latch.

3. Keeper: Provide a keeper for all vehicle gates that automatically engages the gate leaf and holds it in the open position until manually released.

4. Double Gates: Provide gate stops for all double gates consisting of mushroom type or flush plate with anchors. Set in concrete to engage the center drop rod or plunger bar. Provide locking device and padlock eyes as an integral part of the latch, with one padlock for locking both gate leaves.

F. Gate hardware to be galvanized but not vinyl coated. Paint with with minimum of two (2) costs of PVC touch up paint to color coat.

2.6 Fencing Schedule

A. Line Fencing: Line fences shall be at the heights as shown on the drawings with top and center rails. Stretch from outside wire.

1. Line Posts: Type SS20 2" nominal diameter

2. Terminal Posts: Type SS40 2½" nominal diameter

3. Fabric: The fabric shall consist of one piece fabric width composed of 2" mesh of either 6 or 9 gauge wire. Refer to the Drawings.

4. Bottom Bracing: Bottom Rail as specified.

Part 3 Execution

3.1 Installation of Fencing

A. The Packing For All Products Shall Be Level C.

B. Set All Posts In A 3,500 Psi Concrete Footing.

1. Trowel smooth the top of each footing at a 20 degrees angle from the post to the surrounding ground so as to shed water away from the post. The post shall extend to the full depth of the footing. Fencing 8' high and below shall have a footing (4) times the width of the post (min) in diameter and 3' deep. Fencing above 8' shall have a footing (4) times the width of the post (min) in diameter and 4’ deep (min).

C. Install All Fencing To The Limits Shown On The Drawings.

1. Install end or corner posts at any break in the alignment greater than 20 degrees. Install intermediate posts between end or corner posts, spaced equally at a maximum of 10 feet center to center. Install end, corner, or gate posts on both sides of a gate. Only one end or corner post shall be installed at the junction of different heights of fence and shall be consistent with the largest post required at the junction.

2. Install gates to allow a clear and level swing in either direction to their maximum limit. Set all posts with a vertical tolerance of less than 1" in 10' as measured with a plumb bob.

D. All Corner, Terminal, And Gate Posts For Fence 6' And Higher Shall Have A Mid-Rail And 3/8 Round Adjustable Truss Rod To The Next Post.

E. All Gates Shall Have A Full Wraparound Hinge System With A Positive Latch With Provision For A Padlock. Gates 5' And Under Shall Have A Self-Closing Mechanism.

F. All Fences Shall Have A Bottom Rail Attached To The Fabric And Posts.

END OF SECTION

Part 1 General

1.1 Summary

A. Provide all equipment and materials, and do all work necessary to complete the site grading, as indicated on the Drawings and as specified.

1.2 Related Work

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

1.3 References

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American Society for Testing and Materials (ASTM):

D 1556	Density of Soil in Place by the Sand-Cone Method
D 2167	Density and Unit Weight of Soil In Place by the Rubber-Balloon Method

1.4 Existing Conditions

A. By submitting a bid, the Contractor affirms that he has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

1.5 Quality Control

A. The Architect/Engineer reserves the right to perform on-site observation during the grading operations. The observations may include, but not be limited to the following:

1. Observation of subgrade preparation for slab-on-grade and paved areas.

2. Observation of rough and finish grading operations.

B. All grade breaks shall be staked with grade stakes at each end, any change of direction, and at 20’ centers along the length for Architect/Engineer’s review during grading operations.

C. The Architect/Engineer's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Architect/Engineer, nor any observations and testing performed by him shall excuse the Contractor from defects discovered in his work.

1.6 Protection Of Existing Structures And Utilities

A. The work shall be executed in such manner as to prevent any damage to adjacent property and any other property and existing improvements such as, but not limited to: streets, curbs, paving, utility lines and structures, monuments, bench marks and other public and private property.

B. In case of any damage or injury caused in the performance of the grading work, the Contractor shall, at his own expense, make good such damage or injury to the satisfaction of, and without cost to the Owner. Existing roads, sidewalks, and curbs damaged during the grading work shall be repaired or replaced to their original condition at the completion of operations. The Contractor shall replace, at his own cost, existing benchmarks, monuments, and other reference points which are disturbed or destroyed.

1.7 Coordination

A. Prior to start of grading operations, the Contractor shall arrange an on-site meeting with the Architect/Engineer for the purpose of establishing Contractor's schedule of operations and scheduling inspection procedures and requirements.

B. As construction proceeds, the Contractor shall be responsible for notifying the Architect/Engineer prior to start of grading operations requiring inspection and/or testing.

C. The Contractor shall be responsible for obtaining test samples of soil materials proposed to be used and transporting them to the site sufficiently in advance of time planned for use of these materials for testing of materials to be completed. Use of these proposed materials by the Contractor prior to testing and approval or rejection, shall be at the Contractor's risk.

Part 2 Products

2.1 Source Of Materials

A. Material shall be obtained from off-site sources.

Part 3 Execution

3.1 Grading - General

A. Uniformly grade areas within the limits of site grading under this section, including adjacent transition areas. Smooth finished surfaces within specified tolerances, and between points where elevations are shown, or between such points and existing grades.

B. The degree of finish required will be that ordinarily obtainable from either blade-grader or scraper operations.

1. Grade Breaks located on the plans indicate crisp transitions, not blended or rounded edges. These should be clean, sharp, and uniform in line and curve as indicated on the plans.

3.2 Rough Grading

A. General: Rough grading shall include the shaping, trimming, rolling and refinishing of all surfaces of the subbase, shoulders, earth embankments and the preparation of grades as shown on the Drawings. The grade of shoulders and sloped areas may be done by machine methods.

B. Do all cutting, filling and grading to lines and grades indicated on the Drawings. Grade evenly to within the dimensions required for grades shown on the Drawings and specified herein. No stones larger than 4 in. shall be placed in upper 6 in. of fill. Fill shall be left in compacted state at the end of work day and sloped to drain.

1. Architect/Engineer may make such adjustments in grades and alignments as are found necessary to avoid special conditions encountered.

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

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

C. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.

2. Pavements: Plus or minus 1/4 inch.

3. Up to 2 in. in 10 ft. – 0 in. tolerance shall be permitted on slopes provided the slopes are uniform in appearance and without any abrupt changes.

4. Traffic of men and equipment across soil subgrade areas shall be prohibited following excavation to the required lines and grades.

3.3 Fine Grading

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

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

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

B. Finish Grading:

1. Lawn or Unpaved Areas: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

2. Pavements: Shape the surface of the areas under pavement to line, grade and cross- section, with the finish surface not more than 1/4 in. above or below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains. Include such operations as plowing, disking, and any moisture or aerating required to provide the optimum moisture content for compaction. Fill low areas resulting from removal of unsatisfactory soil materials, obstructions, and other deleterious materials, using satisfactory soil material. Shape to line, grade, and cross- section as shown on the Drawings.

3.4 Maintenance

A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to the specified tolerances.

C. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, re-shape, and compact to the required density prior to further construction.

3.5 Construction Waste Management

A. Comply with the requirements of Division 01 for removal and disposal of construction debris and waste.

END OF SECTION

Part 1 General

1.1 Scope Of Work

A. Provisions established within the General and Supplementary Conditions of the Contract, Division 1 – General Requirements, and the Construction Drawings are collectively applicable to this section.

B. Extent of landscape work is indicated on Drawings and in Schedules. Where specifications and plans contradict, the more stringent requirements shall apply. Where written and drawn quantities contradict, the drawn quantities shall apply.

C. Provide all labor, material and equipment required or inferred from Drawings and Specifications to complete the Work of this Section.

1.2 Quality Assurance

A. Reference Standards:

1. Standardized Plant Names, 1988 edition, by the American Joint Committee on Horticultural Nomenclature.

2. American Standard for Nursery Stock, ANSI Z-60.1, 2014 edition, by American Horticulture Industry Association.

3. American National Standards Institute, Inc. (ANSI):

   a. Z60.1 American Standard for Nursery Stock (Sponsor: American Association of Nurserymen, Inc.)

   b. A300 American National Standards for Tree Care Operations

4. American Society for Testing and Materials (ASTM):

   a. F 405 Corrugated Polyethylene (Pe) Tubing and Fittings

5. "Hortus Third", A Concise Dictionary of Plants Cultivated in the United States and Canada, Cornell University, L.H. Bailey Hortorium, MacMillian Publishing Co., New York, NY.

6. International Society of Arboriculture (ISA)

B. Source Quality Control:

1. General: The only plant material accepted will be grown in an established nursery within industry standard horticultural practice. The stock will be free of disease, insects, eggs, larvae, and defects such as knots, sun-scald, injuries, abrasions or disfigurement.

2. Inspection of Plant Material prior to Digging:

    a. Contractor will secure all plant material to be supplied for the Project and inform the Owner's Representative in writing of supplier location(s) within ten (10) days of the Contract being awarded.

    b. Owner's Representative reserves the right to approve 100% of plant materials for the Project provided by the Contractor's sources.

    c. Should the plant material be determined unacceptable, the Contractor will pursue other sources until acceptable plant material is obtained, at no additional cost to the Owner.

    d. Approval at the plant source or by other means of communication such as email does not affect the Owner's right to reject material at the time of delivery or before, during or after installation.

    e. Contractor will inform the Owner's Representative 72 hours prior to delivery of plant material to arrange for an inspection. The Owner's Representative reserves the right to be present during delivery and to inspect the plant material prior to installation. The Landscape Architect may reject plant materials at this time. Approval of delivered material does not affect the Landscape Architect's right to reject material before, during or after installation.

3. Shipping:

    a. Landscape materials will be shipped with certificates of inspection as required by governing authorities. Inspection by Federal and/or State Governments at the site does not preclude rejection of plant material by the Landscape Architect. Plants must be properly prepared for shipment to avoid damage.

    b. Plant material may be rejected if not properly shipped. Water plant material during shipment as needed to avoid damage.

    c. Do not ship plant material when temperatures are below 20 degrees Fahrenheit.

C. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by a recognized laboratory.

D. Do Not Make Substitutions: If specified landscape material is not available, submit to the Landscape Architect proof of non-availability from up to six reliable nursery sources (AmericanHort members) and proposal for use of equivalent material. Proof of non-availability must be submitted if the plant in question is not available in the Eastern United States.

1.3 Submittals

A. Material Approvals: All materials requiring approval by the Owner's Representative must be submitted so that approval is obtained prior to beginning of Work. Standard landscape materials that require samples to be submitted for approval include, but are not limited to:

1. Hardwood Mulch

2. Organic Compost Product (with certified analysis)

3. Off-site Fill/Backfill Dirt (with soil test report)

4. All Contractor Provided Landscape Planting Soils

B. Soil Test Reports: When soil test reports are required, obtain reports from a Owner's approved laboratory such as State of Tennessee Cooperative Extension Office. Reports shall not be older than 30 days at time of submittal to Owner's. Cost of soil test reports shall be borne by the Contractor. Reports shall be based on the specified "crop" and include the following data:

1. Existing and Recommended pH levels.

2. Existing phosphorous, potassium, calcium, magnesium, zinc, and manganese content.

3. Recommended nutrient (fertilizer, lime, etc.) applications.

C. Certified Analysis: Organic Compost Products (OCP) must provide Certified Analysis that includes all the Soil Test Report content outlined above. Additionally, it must include Organic Matter (OM) content. The analysis may be obtained from the OCP manufacturer or an independent lab. Certified Analysis shall not be older than 90 days at time of submittal to the Landscape Architect.

D. Planting Schedule: At least one week prior to beginning work, Contractor must submit a planting schedule with dates outlining the different components/stages of the project from start to finish.

E. Certifications: Prior to beginning work, submit certificates of inspection (if required by governmental authorities), certified analysis for soil amendments and fertilizer materials, and any other data needed to establish that materials comply with specified requirements.

F. Approval and Selection of Materials and Work: The selection of all Materials and the execution of all Work required under the Drawings and Specifications are subject to the approval of the Landscape Architect. The Owner's Representative has the right to reject any and all materials and all Work which, in their opinion, does not meet the requirements of the Contract Documents at any stage of the work operations. The Contractor shall remove rejected work and or materials from Project site and replace promptly.

1.4 Delivery, Staging, And Handling

A. Packaged Materials: Deliver packaged materials in containers displaying weight, analysis, and name of manufacturer. Protect materials from damage during delivery and while stored on site.

B. Sod: Sod should be delivered and installed within 24 hours of cutting and shall be protected from drying and breaking until installation is complete. Sod shall not be allowed to be staged at the work site for more than 6 hours prior to installation.

C. Trees, Shrubs and Groundcover: Provide freshly dug trees and shrubs. Do not prune prior to delivery. Do not damage bark or branches in handling. Cover and protect during shipment.

D. Delivery and Staging: Deliver trees and other plant material AFTER planting preparations have been completed and install IMMEDIATELY. Any delay of planting exceeding 6 hours requires proper staging and storage including: Daily watering as needed to keep roots moist, protection from severe weather, wildlife, and other physical damage. Stage all trees, shrubs, and other plants in a shaded area.

E. Labels: Label at least one tree and one shrub of each variety with a securely attached waterproof tag designating its botanical and common name. Do not remove labels on plant materials until Final Acceptance by Owner.

1.5 Job Conditions

A. Insurance on plant material and other stored or installed materials is the responsibility of the Contractor. The Contractor is liable for any losses due to theft, fire or vandalism incurred prior to date of Substantial Completion of the work. Owner shall in no way be held responsible for any loss of plant material and other stored or installed materials due to fire, theft, or vandalism.

B. Proceed with and complete all landscape work as soon as portions of the site become available.

C. Existing Utilities: Locate all underground utilities. Avoid possible damage to utilities. All damages to utilities resulting from this contract work will be repaired at the Contractor's expense. Contractor must notify the Owner’s Representative of any conflicts between proposed plant material and underground/overhead utilities.

D. Excavations: When conditions detrimental to plant growth are encountered, such as debris, poor drainage, or other subsurface deterrents, immediately notify Owner’s Representative in writing.

E. Planting Schedule: Prepare a proposed planting schedule per Section 1.03. Coordinate the schedule as needed with the general Contractor and/or any other concerned subcontractors. Plant trees after final grades are established and prior to planting of sod, unless otherwise stated. If planting of trees and other large plant

material occurs after sodding work, protect sodded areas and promptly repair damage to sodded areas resulting from planting operations.

1.6 Warranty

A. Warranty: Following the date of Substantial Completion, the Contractor shall warranty all materials against any defects or death as follows:

1. All shrubs, groundcovers and other plants, turf, irrigation, lighting, etc. shall be warrantied for a two-year period.

2. All trees shall be warrantied for a two-year period.

3. Defects and death shall be determined by the Landscape Architect. Damage by others or severe acts of nature beyond the Contractor's control are excepted.

B. Removal and Replacement: Remove and replace all dead, defective, or undesirable plant material as soon as noticed or directed by the Landscape Architect, during the warranty period. Make replacements as soon as possible during the next acceptable planting season (Spring or Fall) as directed by the Landscape Architect. All replacements will be at the expense of the Contractor.

C. Replacement Material: Replacements must match the original specifications, including size, species, variety, part number, etc. Replacements are subject to all requirements stated in the Contract Documents. All replacements will carry the original specified warranty for that item, beginning upon the replacement planting date. For example, a tree planted in January that dies during its first summer and is then replaced on November 1st shall result in the start of a new two-year warranty on the November 1st replacement date.

Part 2 Products

2.1 Organic Compost Products (Ocp)

A. Planting soils shall be amended with an Organic Compost Product, such as Sugar Hill Soil Conditioner by Cowart Mulch, as outlined in Section 3.02 of this document. The proposed OCP must include Certified Analysis and must be pre-approved by the Owner’s Representative prior to beginning work.

2.2 Fertilizer And Other Soil Nutrients

A. Contractor must provide nutrient applications (fertilizer, lime, etc.) as recommended by the Soil Test Report for each planting location. Products must be applied at the rate specified per Soil Test Report and according to manufacturer’s instructions. All fertilizers must be slow-release products, unless otherwise specified. Proposed fertilizer/nutrient products must be pre-approved by the Owner’s Representative prior to application.

2.3 Plant Materials

A. General:

1. Provide plants true to species and variety, complying with recommendations of ANSI Z60.1-2014 "American Standard for Nursery Stock".

2. Specific requirements concerning plant material are shown on the Drawings and Plant List (or Plant Schedule).

B. Quality and Size:

1. Furnish nursery grown plants that are well branched, fully foliaged when in leaf, and with healthy well developed root systems. Shrubs must have self-supporting stems. All plants must be disease free and without insect infestation (all life stages).

2. Provide vigorous plants with full and symmetrical form, unless otherwise called for.

3. Provide trees and shrubs of sizes specified. Trees and shrubs of larger size may be used if acceptable to the Landscape Architect. If larger sizes are approved, root balls must be increased proportionately per ANSI Z260.1-2014 standards. The increased size will not result in additional cost to the Owner.

4. Within specified size ranges, not less than 50% of the plants must be of the larger size specified. For example, an 8’-10’ height specification requires that not less than 50% of the plants are 10’ height.

5. Balled and Burlapped Plants: Plants designated "B&B" are to have firm root balls of natural soil and corresponding to the minimum sizes specified in ANSI Z60.1-2014 "American Standard for Nursery Stock". Root balls shall be firmly wrapped in biodegradable burlap and securely tied with biodegradable heavy twine, rope and/or wire baskets. Plants with loose, broken, or manufactured root balls will be rejected. During transportation and other movement, Root balls shall be lifted from the bottom only. Plants/trees shall not be lifted by stems or trunks.

6. Container grown plants in plastic containers will be acceptable in lieu of balled and burlapped plants, provided they are of specified size and quality. The container must be removed with care exercised to prevent injury to the plant and roots prior to planting.

C. Trees:

1. Provide trees of size and caliper specified and with branching configuration recommended by ANSI Z60.1-2014 for type and species. Provide single stem trees except where other forms are specified. Provide minimum clear trunk height as specified.

2. Caliper shall be measured 6” above ground for trees up to and including 4” caliper. Trees over 4” caliper shall be measured 12” above ground. Specified height and spread dimensions refer to the main body of the plant, not a dimension between individual branch tips. Take measurements with branches in natural position.

3. Unless otherwise directed, do not limb-up tree canopies before planting. Otherwise, prune as directed by the Landscape Architect.

D. Plants shall meet the sizes indicated on the Plant List. Plants larger or smaller than specified may be used only if accepted by the Landscape Architect. Use of larger plants shall not reduce the required plant quantity, increase the Contract price, or allow the supplier to use smaller than specified material for other plants. If larger plants are approved, the root ball, spread, and container size shall be increased proportionately to the size of the plant. Container grown plants shall be well rooted and established in the container in which they are growing.

E. Groundcovers:

1. Provide established and well-rooted groundcover plants, in removable containers or integral peat pots, having not less than the minimum number and length of runners for the pot size specified per ANSI Z60.1-2014.

F. Grass:

1. When grassing/sodding areas adjacent to residential or commercial lawns, grassing/sodding shall match the species and cultivar of grass growing on the adjacent lawn.

2. Grass Seed: Provide fresh, clean, new crop-seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed as specified.

3. Sod: Unless otherwise specified, all sod shall be Fescue Blend grass. Provide strongly rooted sod, not less than two years old and free of weeds and undesirable native grasses. Only provide sod capable of growth and development at time of planting. Provide machine cut sod with a uniform minimum soil thickness of 5/8 inch, not including the thickness of top growth and thatch. Sod pieces to be consistent in size and shape.

2.4 Miscellaneous Landscape Materials

A. Burlap for wrapping earthball shall be biodegradable jute mesh not less than 7.2oz per square yard. Wrapping materials made from man-made fibers are prohibited.

B. Stakes: Unless otherwise stated, stakes shall be 2”x2” wide and pressure treated.

C. Anchors: #4 rebars or comparable size steel stakes, 36” in length.

D. Filter Cloth: Rot resistant polypropylene filter fabric, water permeable and unaffected by freeze-thaw.

E. Drainage Gravel: Clean crushed stone no larger than 1” diameter.

F. Water: Water sourcing and transportation is the sole responsibility of the Contractor.

G. Mulch:

1. Unless otherwise indicated on the plans, mulch shall be shredded hardwood mulch. Mulch shall be clean, fresh, dark brown, and free of branches, cones, foreign matter, insects, and disease. Mulch installation shall adhere to specifications as set forth within this document or on plan details.

2. When plans specify hardwood mulch, Contractor shall submit a sample to the Owner’s Representative for approval prior to work. Hardwood mulch shall be clean, fresh, and free of branches, leaves, pine needles, manufactured wood products, foreign matter, insects, and disease. Mulch installation shall adhere to specifications as set forth within this document or on plan details.

H. Anti-Desiccant: If used, anti-desiccant must be an emulsion-type film-forming agent designed to permit transpiration but retard excessive loss of moisture from plants. Deliver for use in manufacturer's original containers/packaging and apply in accordance with manufacturer's instructions.

Part 3 Execution

3.1 Preparation

A. General:

1. Contractor shall examine conditions under which planting is to be installed, review applicable survey drawings, and confirm location of underground utilities before digging.

2. Planting operations are to be performed according to specific dates indicated on plans. If specific dates are not indicated on plans, planting shall be performed as follows:

Trees: November 1 to February 28
Shrubs, Groundcovers, and Other Plants: April 1 to April 30

a. No installation of plant material shall take place during official Owner’s Holidays or from December 24 through January 1. The Contractor guarantees the plant material as specified. Plant only during suitable weather conditions and seasons.

3. Lay out tree and shrub locations and areas for mass plantings. Flag tree locations, outline areas and secure Landscape Architect's acceptance before start of excavation for planting work. Adjust layouts as requested by the Landscape Architect.

4. Notify Owner's Representative of adverse sub-surface drainage or soil conditions. State conditions and submit a proposal for correction, including costs if necessary. Obtain approval for method of correction prior to continuing Work in the affected area. If alternate locations are selected, the Contractor shall prepare such areas at no additional expense to the Owner unless otherwise agreed to between both parties prior to proceeding.

B. Excavation for Trees and Large Shrubs:

1. Excavate planting pits according to drawings and written specifications.

2. Loosen hardpan until broken and water can drain freely.

3. For balled and burlapped (B&B) trees and shrubs, make excavations at least 3x the width of the root ball diameter for the top 1/3 of the planting pit. For the remaining depth of the pit, excavate 2x the width of the root ball diameter. Planting pit shall be dug to a depth so that the top of the root ball is 1"- 2" above the surrounding grade. Landscape Architect must approve sample tree pit prior to tree planting.

4. For container grown stock, excavate as specified for B&B stock, substituting container width for root ball width.

C. Drainage Testing:

1. For all tree and large shrub pits: Fill each pit 1/4 full of water. If percolation is less than 100% within the following 12 hours, drill a ten-inch diameter auger hole to a depth of 4' (four feet) below the bottom of the pit. Fill auger hole with drainage gravel and cover with filter cloth.

2. Perform new drainage test. If drainage is still unsatisfactory, Contractor must notify Landscape Architect in writing of the locations with unsatisfactory drainage so that a solution can be arrived at before planting.

3. Dispose of subsoil removed from landscape excavations. Do not mix with planting soil. Do not use as backfill.

3.2 Planting Soil Preparation

A. The top 12" of soil in areas to be planted with trees, shrubs, groundcovers, and other plants shall be a soil mix of:

1. 75% Existing Native Soil

2. 25% Organic Compost Product (OCP)

B. Planting areas shall be prepared as follows:

1. Soil Preparation for Planting Beds Constructed On Existing Grade

a. In locations where planting beds are to be constructed on existing ground (grade), the Landscape Contractor shall prepare a planting soil mix as follows:

1) Lay out planting beds on the ground as shown on the plans. Bed layout to first be approved by Landscape Architect prior to proceeding with the following steps.

a) Remove any existing turf, weeds, or other vegetation within entire planting bed area.

b) Outline bed area with a trench edge.

c) Rid existing soil surface of all foreign material ≥ the size of a golf ball. This includes rocks, stones, roots, sticks, clay clods, trash, etc. Other extraneous materials harmful or toxic to plant growth, such as asphalt and concrete, must be removed in their entirety before planting soil preparation.

d) Spread 3” layer of approved OCP over the prepped existing native soil within the entire bed area. Till the OCP into the top 9” of underlying native soil. Allow for settling. NOTE: Additional planting soil mix may be necessary to grade planting areas per planting details. For example, a planting bed area for which details call for a 6” crown.

e) Fine grade planting areas to ensure positive drainage after settlement has occurred. Slope surface of shrub beds to drain toward the trench edge.

2. Soil Preparation in Planting Pits for Trees and Large Shrubs

a. For tree and large shrub installation in individual planting pits outside of larger planting areas such as medians or planting beds, the Landscape Contractor shall prepare a planting soil mix for backfill as follows:

1) Excavate planting pits according to plan details and written specifications.

2) Amend excavated native soil with OCP so that resulting soil mixture is comprised of 25% OCP and 75% native soil. OCP must be thoroughly mixed into native soil.

3) Backfill soil mixture into planting pit according to plan details and written specifications. Allow for settling.

3. Soil Preparation using Off-Site Soil Source

   a. In areas where the existing native soil volume is insufficient to create the required amount of planting soil mix, off-site soil can be utilized. However, the Contractor must first obtain pre-approval for the off-site soil from the Owner's Representative. Upon approval from the Owner's Representative, the Landscape Contractor shall prepare a planting soil mix as follows:

      1) Amend off-site soil with OCP so that resulting soil mixture is comprised of 25% OCP and 75% off-site soil. For example, to prepare 10 cubic yards of planting soil, mix 2.5 cubic yards of OCP + 7.5 cubic yards of off-site soil. OCP must be thoroughly mixed into off-site soil.

      2) Backfill prepared soil mixture into planting areas as needed and according to plan details and written specifications. Allow for settling.

   NOTE: Upon completion of preparation/installation of planting soil mix, Contractor must obtain Soil Test Reports for all locations where planting soil mix has been prepared and installed. Soil Test Reports must comply with Article 1.3 B of this document. Once reports are obtained, the Contractor shall apply nutrients (fertilizer, lime, etc.) to the corresponding planting areas as recommended by the Soil Test Reports. Nutrients shall be applied 3-7 days prior to plant installation, unless otherwise directed by the product label.

3.3 Preparation Of Seasonal Color Beds

A. Lay out seasonal color beds on the ground as shown on the plans. Bed layout to first be approved by Landscape Architect prior to proceeding with the following steps.

B. Excavate top 4" of existing soil. Break through any existing hardpan and remove all stone, roots, debris, etc. Remove excavated soil.

C. Till excavated bed area to a depth of 6".

D. Outline bed area with a trench edge.

E. Backfill seasonal color bed with a soil mix best suited for seasonal color plants. Soil mix must be pre-approved by the Landscape Architect. Crown seasonal color bed for proper drainage towards edges. High point of bed should be constructed a minimum of 6" above surrounding grade. Add drainage pipe if necessary to ensure proper drainage.

3.4 Preparation of Lawn/Turf Areas

A. Obtain Soil Test Reports from existing soil within the lawn/turf areas. Reports shall be referred to as outlined in Section D below.

B. Remove existing grass/sod or other vegetation within proposed lawn/turf area. Dispose of such material off site.

C. Till/loosen the surface of new lawn/turf areas to a minimum depth of 6”. Rid soil surface of all foreign material ≥ the size of a golf ball. This includes rocks, stones, roots, sticks, clay clods, trash, etc. Other extraneous materials harmful or toxic to plant growth, such as asphalt and concrete, must be removed in their entirety.

D. Prior to start of lawn/turf installation, apply ground limestone at the rate recommended by the Soil Test Report(s) and work into top 6” of soil.

E. Prior to start of lawn/turf installation, apply fertilizer at the rate recommended by Soil Test Report(s) and work into top 2” of soil. The fertilizer application shall not precede the placement of sod by more than three days.

F. Grade lawn/turf areas to a smooth even surface with loose fine-textured soil. Roll and rake areas as required to meet finish grades. Limit fine grading to areas which can be planted immediately afterwards.

G. Prior to start of lawn/turf installation, repair any surface areas that have become eroded or otherwise disturbed after fine grading.

3.5 Planting Trees and Large Shrubs (≥ 15 Gallon or 6’ Height)

A. For individual planting pits that are located outside of planting beds, prepare soil around each tree/large shrub location prior to excavation as follows:

1. Till all soil within a 5’ radius of the proposed center of the tree/large shrub to a minimum depth of 9”.

2. If lawn/turf is present, remove prior to tilling.

3. Do not till in areas where it will result in damage to existing ornamental vegetation identified to remain.

B. Excavate planting pit per plan details and written specifications (including Article 3.1 B of this document). Set balled and burlapped (B&B) stock on a layer of compacted planting soil mixture, plumb and in center of pit, with top of root ball 2”-3” above the finish grade. Loosen and remove top 12” of burlap from root ball. Cut and remove at least the top two rings from wire baskets before backfilling. Cut and remove any visible encircling roots.

C. Backfill planting pits with soil amended per Article 3.2 of this document. Lightly compact the backfill around the root ball to eliminate voids and air pockets. When

planting pit is backfilled 2/3 full, water thoroughly before placing remainder of backfill.

D. Install container grown stock exactly as specified above for balled and burlapped stock. Remove containers without damaging root balls. Cut and remove any visible encircling roots.

E. As needed, apply anti-desiccant if deciduous trees or shrubs are shipped and transplanted in full leaf. Spray with anti-desiccant at nursery before transporting and again after planting as per manufacturer's recommendations.

F. Construct tree saucers as instructed per plan details and written specifications.

G. Immediately after planting work has been completed, mulch all planting areas to a minimum depth of 3". For individual trees, mulch ring must be a minimum radius of 5' (10' diameter). Do not mulch within 5" of trunk/base of trees. Finish mulch ring edges according to plan details and written specifications.

H. All trees and specimen shrubs must be sufficiently watered at time of planting. Sufficient watering is determined by soil conditions, site conditions, weather, and season. Soil moisture must be verified using a soil moisture probe. Initial watering must include an Owner approved Moisture Manager product, applied per manufacturer's specifications. Water thereafter as required by Section 3.09 D of this document.

I. After one week and/or upon full settlement of soil, set trees/large shrubs plumb as needed.

J. Inspect trees/large shrubs for problems such as injury, disease, insect infestation, etc. Inform Owner's Representative of any found issues.

3.6 Staking, Guying, and Pruning of Trees and Large Shrubs (≥ 15 Gallon or 6' Height)

A. Stake and guy trees/large shrubs immediately after planting per plan details and written specifications. Set plumb if needed after staking/guying. Maintain stakes and guys until time of removal.

B. Contractor must remove all stakes and guys exactly one year after date of Substantial Completion.

C. Prune as needed to remove broken or dead branches from trees/large shrubs. Also, prune to remove cross branching that may result in injury to crossed limbs. Do not prune central leaders and other main stems unless directed by the Landscape Architect.

3.7 Planting Shrubs, Groundcover, and Other Plants

A. Prepare planting beds according to plan details and written specifications, including Article 3.2 of this document.

B. Remove plants from containers without damaging root balls and set in planting holes per plan specifications.

C. Backfill planting holes with planting soil mix. Lightly compact the backfill around the root ball to eliminate voids and air pockets.

D. Immediately after planting work has been completed, mulch all planting areas/beds to a minimum depth of 3". Keep mulch off plant bodies and foliage. Finish mulched area edges according to details and written specifications.

E. All plants must be sufficiently watered at time of planting. Sufficient watering is determined by soil conditions, site conditions, weather, and season. Soil moisture must be verified using a soil moisture probe. Initial watering must include an Owner approved Moisture Manager product, applied per manufacturer's specifications. Water thereafter as required by Article 3.9 D of this document.

3.8 Installing Sod

A. When sodding areas adjacent to residential or commercial lawns, grassing/sodding shall match the species and cultivar of grass growing on the adjacent lawn unless otherwise specified.

B. Water soil in area to be sodded PRIOR to installing sod. Soil must be moist but not saturated when laying sod.

C. Lay sod within 24 hours from time of cutting by grower. Sod shall not be allowed to be staged at the work site for more than 6 hours prior to installation.

D. Do not install dormant sod.

E. Do not install sod on frozen ground.

F. Lay sod to form a solid mass with tightly fitted joints. Do not overlap. Stagger strips. Work from plywood to avoid damage to subgrade or sod. Tamp or roll lightly with water filled roller to ensure contact with subgrade. Work sifted soil into gaps between pieces of sod; remove excess soil to avoid smothering.

G. Anchor sod with 6" sod staples on slopes where specified or if slippage and/or erosion is anticipated. Lay sod perpendicular to slope direction with staggered joints.

H. Water all sod immediately following installation, applying a minimum of 1" of water. The following day, water to apply an Owner approved Moisture Manager product per

manufacturer's specifications. Water thereafter according to plans and written specifications.

3.9 Maintenance and Watering

A. Begin maintenance immediately after planting. Maintain trees, shrubs, and other plants as necessary to keep healthy and thriving until date of Substantial Completion. Maintain trees, shrubs, and other plants by all accepted horticulture practices such as: watering, pruning, cultivating, spraying for insects and disease. Other maintenance items may include, but not be limited to, touch-up mulching, restoring planting saucers, tightening/repairing stakes and guys, pruning dead and broken limbs, straightening/plumbing trees/plants, adjusting planting depth of trees/plants. Contractor must remove all stakes and guys exactly one year after date of Substantial Completion of the project.

B. Maintain lawn/turf areas until date of Substantial Completion. Maintain lawn/turf areas as needed by watering, weeding, mowing, repairing eroded areas, and re-seeding or re-sodding as necessary to establish thriving and uniform lawn/turf areas.

C. All trees and other plants must be sufficiently watered at time of planting and then daily throughout the landscape installation project until project completion. Initial watering must include an Owner approved Moisture Manager product, applied per manufacturer's specifications. Sufficient watering is determined by soil conditions, site conditions, weather, and season. SOIL MOISTURE MUST BE VERIFIED USING A SOIL MOISTURE PROBE.

1. Upon completion of all planting, Contractor is responsible for watering of all trees and plants during year-one as follows:

    a. Trees, Shrubs, Groundcovers, and Other Plants

        1) Daily during first 2 weeks (10 waterings)

        2) Twice weekly during next 6 months (26 wks / 52 waterings)

        3) Weekly until established* (24 wks / 24 waterings)

        4) Total for Year-One = Up to 86 Total Waterings

2. Trees must be watered via slow-release watering bag product such as Treegator. Bags must be installed according to manufacturer's specifications. For example, a double bag setup is often required for trees ≥4" caliper.

3. Contractor must provide a watering schedule prior to tree/plant installation. If conditions do not require trees/plants to be watered, the Contractor must submit a written explanation to Owner's Representative stating the reason for bypassing watering. Explanations for skipping scheduled watering must be submitted prior to or on the same day watering is bypassed.

4. Contractor shall submit a weekly watering report to the Owner's Representative. Reports are due each Tuesday for the previous week and shall include the following:

    a. Date of each watering visit.

    b. Summary of moisture level readings recorded during each watering visit.

    c. Percent of project watered.

5. Contractor shall bill for watering each month based on total watering visits. Invoices for watering are due on the 3rd of each month for the previous month. Invoices must include quantity of watering visits performed for the month.

6. Failure to meet the above watering requirements without prior written approval by the Owner's Representative may result in reduced payment, bond claims, or potential contract termination.

7. Upon completion of year-one watering, Contractor must remove all watering bags and replace them with TreeDiaper hydration product "TD48R", unless otherwise specified. TreeDiapers must be installed according to the manufacturer's instructions and covered with mulch to match existing mulch ring or planting bed. All existing tree saucers must be removed at this time. Soil from tree saucers shall not be placed over roots of trees.

8. Contractor will be responsible for TreeDiaper removal exactly one-year after the date of installation.

3.10 Clean-Up And Protection

A. Keep all work areas including roadways, sidewalks, staging locations, etc.in a safe and orderly condition.

B. Upon completion of work, remove all debris, materials, and equipment. Any damage inflicted upon the work area or surrounding areas must be repaired to the condition of the site prior to the damage occurrence. For example, damaged sod areas may require grading and re-sodding. Damaged sidewalk panels may require removal and replacement to specifications matching the existing sidewalk.

C. As necessary, protect installed landscape from damage due to operations by other workers and subcontractors. Maintain protection during installation and maintenance periods. For example, put barricade in place to separate newly installed planting bed from adjacent grading activity for sod installation. Damage to landscape from other workers and subcontractors will be repaired/replaced at no expense to the Owner.

D. Theft: Contractor is responsible for theft of any plant material (staged, installed, or otherwise) at the Project Site until date of Substantial Completion.

3.11 Inspection And Acceptance

A. Periodic site inspections will be made from time to time by the Owner's Representative to review the quality and progress of the work. Unacceptable work must be corrected within five (5) calendar days.

B. Upon completion of work, the Contractor shall notify the Owner's Representative at least ten (10) days prior to requested date of Substantial Completion for inspection of all portions of the work. Based upon inspection, the Owner's Representative will issue a punch list for work to be corrected. All work in the punch list must be completed within five (5) working days from receipt of punch list. Where inspected work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected and receipt of Certificate of Substantial Completion by the Owner's Representative.

C. Certificate of Substantial Completion will be issued for acceptable work. Substantial Completion will not be issued for items with outstanding punch list requirements.

D. Warranty commences on the date of issuance of the Certificate of Substantial Completion. All new plant material and maintenance is the responsibility of the Contractor. Replacements and repair during the warranty shall be at the expense of the Contractor.

E. Final Acceptance: One year after the date of Substantial Completion, the Owner will inspect shrubs and groundcovers and associated work for Final Acceptance of those items. Two years after the Date of Substantial Completion the Owner will inspect trees and associated work for Final Acceptance of those items. Upon satisfactory completion of repairs and/or replacements, warranty obligations will have been met.

END OF SECTION

Part 1 General

1.1 Summary

A. Provide all materials and equipment, and do all work required to complete the seeding and sodding of lawn areas, including removal of existing vegetation, grading, furnishing and placing planting soil, as indicated on the Drawings and as specified.

1. Extent of sod and seed areas will be reviewed and approved by Landscape Architect and Owner prior to commencement of Work of this Section.

2. The placement of the sod shall be sequenced in such a manner as to allow proper root growth and establishment prior to the completion of the project and acceptance by the Owner.

1.2 Related Work

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 31 20 00 – Earth Moving; Establishment of subgrade elevation.

2. Section 32 91 19 – Landscape Grading.

3. Section 32 93 03 – Landscaping.

1.3 References

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American Society for Testing and Materials (ASTM):

a. C 136 Sieve Analysis of Fine and Coarse Aggregates

b. D 422 Particle-Size Analysis of Soils

c. E 11 Wire-Cloth Sieves for Testing Purposes

2. American Sod Producers Association –Guideline Specifications for:

a. Sodding: FSO-F-241 Fertilizers, Mixed, Commercial

1.4 Submittals

A. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod, identifying source, including name and telephone number of supplier.

B. Onsite Topsoil Sample: Submit 1quart of topsoil proposed for use.

C. Soil Mix Sample: Submit 1 quart of each proposed soil mix, including the components of the soil mix.

D. Soil Report: Submit results of laboratory soil tests of on-site soil and proposed topsoil for soil mix.

E. Fertilizer Analysis (to be used in soil mix and on lawn areas): Submit label or technical data for fertilizer bearing the trade name, manufacturer's name, weight and analysis.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required initial maintenance periods.

1.5 Owner's Inspection and Testing

A. Work will be subject to inspection at all times by the Landscape Architect. The Owner reserves the right to engage an independent testing laboratory to analyze and test materials used in the construction of the work. Where directed by the Landscape Architect or the Owner, the testing laboratory will make material analyses and will report to the Landscape Architect whether materials conform to the requirements of this specification.

1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.

2. Testing equipment will be provided by and tests performed by the testing laboratory.

3. Upon request by the Landscape Architect, shall provide such auxiliary personnel and services needed to accomplish the testing work.

4. Gradation of granular materials shall be determined in accordance with ASTM C 136.

5. Sieves for determining material gradation shall be as described in ASTM E 11.

1.6 Contractor's Inspection and Testing

A. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Landscape Architect, to perform the topsoil/planting soil tests and analyses specified herein. All costs associated with testing shall be the Contractor's responsibility.

1. Particle size analysis shall include the following gradient of mineral content:

USDA Designation	Size in mm
Gravel	+ 2 mm
Very coarse sand	1-2 mm
Coarse sand	0.5-1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	< 0.002 mm

2. Chemical analysis shall include the following:

a. pH and buffer pH.

b. percentage of organic content by oven-dried weight.

c. Nutrient levels by parts per million, including phosphorus, potassium, magnesium, manganese, iron, zinc, and calcium. Nutrient test shall include testing laboratory recommendations for supplemental additions to the soil, if necessary, based on the requirements for ornamental horticultural plants. Recommendations shall include rates at which additives are to be applied.

d. Soluble salt by electrical conductivity of a 1:2 soil/water sample.

1.7 Delivery, Storage, and Handling

A. Digging Sod:

1. Sod shall not be dug at the nursery or approved source until ready to transport sod to the site of the work or acceptable storage location.

2. Before stripping, sod shall be mowed at a uniform height of 2 in.

3. Cut sod to specified thickness and to standard width and length desired.

B. Transportation of Sod:

1. Sod transported to the Project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle

to prevent injury. Closed vehicles shall be adequately ventilated to prevent overheating of the sod.

2. Evidence of inadequate protection following the digging, carelessness while in transit, or improper handling shall be cause for rejection.

3. Sod shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the sod is in transit, being handled, or are in temporary storage.

4. Upon arrival at the temporary storage location or the site of the work, sod material shall be inspected for proper shipping procedures. Should the sod be dried out, the Landscape Architect will reject the sod. When sod has been rejected, the Contractor shall at once remove it from the area of the work and replace it with acceptable material.

5. Unless otherwise authorized by the Landscape Architect, the Contractor shall notify the Landscape Architect at least two working days in advance of the anticipated delivery date of sod material. Certificate of Inspection when required shall accompany each shipment.

C. Handling and Storage of Sod:

1. Sod material shall be handled with extreme care to avoid breaking or tearing strips.

2. Sod shall not be stored for longer than 30 hours prior to installation. Sod shall be stored in a compact group and shall be kept moist. Sod shall be prevented from freezing.

3. Sod that has been damaged by poor handling or improper storage will be rejected by the Landscape Architect.

D. Deliver seed in original sealed containers, labeled with analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging, location of packaging, and name of seed grower. Damaged packages will not be accepted.

E. Seed shall be stored under cool and dry conditions so that the endophytic seed in the mixture is capable of maintaining a high level of endophytes.

F. Deliver fertilizer in sealed waterproof bags, printed with manufacturer's name, weight, and guaranteed analysis.

1.8 Planting Season

A. Planting season shall be as follows:

Material:	Planting Season:	
Spring	Fall	
Seeding: Cool Season	3/1 to 5/15	9/1 to 11/15
Sodding: Cool Season	3/1 to 5/15	9/1 to 11/15

B. Planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.

C. Planting season may be extended with the written permission of the Landscape Architect.

1.9 Warranty

A. Warranty for a period of one year, following the Date of Substantial Completion of the Project, all grass / seed against any defects (including: death and unsatisfactory growth) as determined by the Owner’s Representative. Defects resulting from neglect by the Owner, abuse or damage by others, or unusual phenomenon or incidents beyond the Contractor's control are expected. Should questions arise concerning the responsibility of replacement, the Owner’s Representative will be available for arbitration provided the Owner and Contractor mutually desire.

B. Remove and replace all lawn found to be dead or in unhealthy condition during warranty period as determined by Owner’s Representative or Owner. Make replacements as soon as weather conditions permit.

C. Replacements: Match adjacent specimens of same species. Replacements are subject to all requirements stated in the Contract Documents and are subject to inspection by the Owner’s Representative prior to removal.

D. Repair grades, lawn areas, paving and any other damage resulting from replacement planting operations, at no additional cost to the Owner.

E. Inspect Project Site monthly during warranty period to determine what changes, if any, should be made in the maintenance program. Submit all recommended changes in writing to the Owner.

F. Replacements made during the Warranty Period or following inspection for Final Acceptance will carry on additional one year warranty beginning at the time of replacement.

Part 2 Products

2.1 Seed

A. Seed mixture: Standard grade seed of the most recent season's crop. Seed shall be dry and free of mold. Seed shall be inoculated with endophytes. Unless otherwise directed by the Owner, seed mixture shall be as follows:

1. Seed Mix:

a. Fescue ‘Rebel’ Blend seed at a rate of 175 pounds per acre.

2.2 Sod

A. Certified Turfgrass Sod: Superior sod grown from certified, high-quality Rebel fescue seed or from plantings of certified grass seedlings or stolons. It shall be inspected by the certification agency of the state in which it is grown to assure satisfactory genetic identity and purity, overall high-quality and freedom from noxious weeds as well as excessive quantities of other crop and weedy plants at time of harvest. All seed or original plant material in mixture must be certified. Turfgrass sod shall meet the published state standards for certification.

1. Sod shall be as shown on the plans.

B. Sod shall be nursery grown on cultivated mineral agricultural soils. Sod shall have been mowed regularly and carefully, and otherwise maintained from planting to harvest.

C. Type and Size of Sod:

1. Furnish either big roll or block sod. Ensure that big roll sod is a minimum of 21 in. wide x 52 ft. long. Minimum dimensions for block sod shall be 12 in. wide x 22 in. long. Ensure that all sod consists of uniform soil thickness of not less than 1 in.

D. Strength of Sod Strips: Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape if suspended vertically when grasped in the upper 10% of the section.

E. Moisture Content: Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.

F. Time Limitations: Sod shall be harvested, delivered, and transplanted within a 36 hour period unless a suitable preservation method is approved prior to delivery. Sod not transplanted within this period shall be inspected and approved by the Landscape Architect prior to its installation.

G. Thatch: Sod shall be relatively free of thatch. A maximum of 1/2 in. (uncompressed) thatch will be permitted.

H. Diseases, Nematodes, and Insects: Sod shall be free of diseases, nematodes, and soil- borne insects. State Nursery and Plant Materials Laws require that all sod be inspected and approved for sale. The inspection and approval must be made by the State Agricultural Department, Office of the State Entomologist.

I. Weeds: Sod shall be free of objectionable grassy and broad leaf weeds. Turfgrass sod shall be considered free of such weeds if less than five such plants are found per 100 sq. ft. of area.

1. Turfgrass sod shall not be acceptable if it contains any of the following weeds: common bermudagrass (wiregrass), quackgrass, johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel and bromegrass.

2.3 Sod Farm Growing Medium

A. Soil in which sod was grown shall be classified as loam or sandy loam (silt loam is not acceptable) and shall conform to the following grain size distribution for material passing the #10 sieve:

U.S. Sieve No.	% Passing by Weight	
	Minimum	Maximum
10	100	---
20	75	100
40	30	85
100	12	45
270	5	25
0.002 mm	1	4

1. The maximum retained on the #10 sieve shall be 15% by weight of the total sample.

2. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422.

3. The organic content shall be between 3.0 and 8.0 percent.

2.4 Planting Soil

A. Existing Topsoil

1. Existing topsoil from on-site source(s) may be used for planting soil, to the extent available, if testing of soil indicates that it meets the requirements of this Section for planting soil, or if approved by the Landscape Architect.

B. Native Planting Soil

1. Planting soil shall be composed of a natural, fertile, friable soil typical of cultivated topsoils of the locality, suitable for the germination of seeds and support of vegetative growth, with additives, if required, to achieve particle distribution and organic content specifications. Topsoil shall be taken from a well-drained, arable site, free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots, other objectionable, extraneous matter, or debris nor contain toxic substances. Topsoil shall be screened using a mobile mechanical screening machine with a 1/2” sizes sieve. Planting soil shall have a pH value between 5.5 and 6.5 and organic matter content of 5 to 10% of total dry weight.

2. Planting soil shall have the following mechanical analysis (see Article 1.6 for particle sizes):

Approximate Particle Distribution
Gravel Less than 10%
Coarse to medium sand 55 – 65%
Fine to very fine sand 10 – 20%
Silt 15– 25%
Clay 15 – 20%

3. Minimum planting soil nutrient levels shall be: Nitrogen @ 5% average of organic matter, Phosphorus @ .02 to .05% average of total soil content, Potassium @ 1.2% average of total soil content.

4. The Contractor shall provide the Landscape Architect with planting soil test results, as specified in Paragraph 1.06, before the start of planting operations. If planting soil does not fall within the required particle distribution, organic content, or pH range, it shall be adjusted to meet the specifications through the addition of sand, compost, limestone, or aluminum sulfate to bring it within the specified limits.

C. Planting Soil Type:

1. 100% Existing or Native Planting Soil

2.5 Compost

A. Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, mixed solid waste and biosolids (treated sewage sludge) that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

1. Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture Content	35% - 55%
Soluble Salts	≤ 4.0 mmhos (dS)
C:N ratio	15 – 30:1
Particle Size	< 1”
Organic Matter Content	> 50%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

2. Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements.

3. Guidelines for quantity of compost required to achieve suitable soil organic content in soil mixes for ornamental horticultural planting shall be as recommended by the compost manufacturer.

4. Organic matter shall be commercially prepared compost and meet US Composting Council STA/TMECC criteria or equal for Class I or II stable mature product. Compost made from primarily green yard waste shall not be acceptable.

2.6 Limestone

A. Ground limestone shall be an agricultural limestone containing a minimum of 85% total carbonates, by weight. Ground limestone shall be graded within the following limits:

Sieve Size	% Passing by Weight
10	100
20	90
100	60

2.7 Water

A. Water shall be suitable for irrigation and free from ingredients harmful to seeded or sodded areas.

2.8 Commercial Fertilizer

A. Starter fertilizer shall be HD Scotts Starter Fertilizer or approved equal.

B. Fertilizer shall conform to the following:

1. When applied as a topsoil amendment, fertilizer shall have an analysis that will deliver appropriate amounts of nitrogen, phosphorus, and potassium as required to remedy deficiencies revealed by testing the topsoil.

a. 50% of nitrogen shall be derived from natural organic source of ureaform.

b. Available phosphorus shall be derived from superphosphate, bone meal, or tankage.

c. Potassium shall be derived from muriate of potash containing 60% potash.

C. Fertilizer shall be delivered in manufacturer's standard container printed with manufacturer's name, material weight, and guaranteed analysis.

D. Fertilizers with N-P-K analysis other than that stated above may be used provided that the application rate per square foot of nitrogen, phosphorus, and potassium is equal to that specified.

2.9 Superphosphate

A. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes and containing not less than 20% available phosphoric acid. The superphosphate shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any superphosphate which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

2.10 Weed Control

A. Weed control for stockpiled topsoil shall be a non-selective weed killer for control of grassy and broadleaf weeds; weed control shall have short residual, allowing seeding and sodding operations to occur within 7 days of application.

Part 3 Execution

3.1 Preparation of Subgrade

A. Subgrade shall be examined to ensure that rough grading and all other subsurface work in lawn areas and other areas to be seeded or sodded is done prior to start of seeding.

B. The area to be sodded or seeded shall be stripped of any excess organic material or grass prior to installation. Topsoil remaining after organic material removal shall be removed, cleaned and stockpiled for later use. Remove small loose rocks, stone and debris of 1/2” or larger with a Harley Rock Machine or equivalent as required leaving the grade reasonably free of such miscellaneous matter.

C. Existing subgrade shall be loosened or scarified to a minimum depth of 3 in. prior to spreading topsoil. Subgrade shall be brought to true and uniform grade and shall be cleared of stones greater than 2 in., sticks, and other extraneous material.

3.2 Spreading of Planting Soil

A. Planting soil shall be spread and placed to required depths, as indicated on the drawings.

B. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.

C. Prior to installing any planting soil mix, the Landscape Architect will approve the condition of the subgrade.

D. In areas of soil installation, till the planting soil mix into the top layer of subgrade.

1. Scarify or till the surface of subgrade to a depth of 2 – 3 in. with a backhoe or other suitable device.

2. Spread a layer of the specified planting soil mix 2 – 3 in. deep over subgrade.

3. Thoroughly till the planting soil mix and the subgrade together.

4. Immediately install the remaining planting soil mix in accordance with the following specifications. Protect the tilled area from traffic. Do not allow tilled subgrade to become overly compacted.

5. In the event that the tilled area becomes overly compacted, till the area again prior to installing the planting soil mix.

E. Install the remaining planting soil mix in 8 – 10 in. lifts to the required depths.

F. The depths and grades indicated on the Drawings are the final grades after settlement and shrinkage of the organic material. Contractor shall install the planting soil mix at a higher level to compensate for this anticipated reduction of planting soil volume depending upon the predicted settling properties of each planting soil mix type.

3.3 Planting Soil Compaction

A. Compact each 8 – 10 in. lift with mechanical compaction equipment to the compaction rates indicated.

1. Achieve a soil density of between 1.45 to 1.55 grams per cubic centimeter over dry weight divided by volume (80 to 85% of the standard proctor maximum dry density.)

2. Planting mix compaction shall be tested at each lift using a cone penetrometer calibrated to the mockup soil and its moisture level. The same penetrometer and moisture meter used for the testing of the mockup shall be used to test installed soil throughout the work.

3. Maintain at the site a hand penetrometer with pressure dial and a soil moisture meter to measure the compaction rates relative to the mock up soil compaction.

B. Maintain moisture conditions within the planting mixes during installation to allow for satisfactory compaction. Suspend installation operations if the planting mix becomes wet. Do not place planting mixes on wet of frozen subgrade.

C. Provide adequate equipment to achieve consistent and uniform compaction of the planting mixes. Use the smallest equipment that can reasonably perform the task of spreading and compaction.

1. Testing shall be performed by the Contractor.

2. Record the test results on a soil compaction log. This report shall include the location of the test. The depth of the test measures from the proposed finish grade, the penetrometer reading and the moisture meter reading.

3. Submit the compaction log at the end of the soil installation period. Soil compaction log shall be kept current and available at the site for review at all times.

3.4 Application of Fertilizer and Conditioners

A. Do not apply nitrogen between October 15 and March 15.

B. Fertilizer and conditioners shall be applied at the following rates:

1. Compost - as required by test results of topsoil.

2. Limestone - as required by test results of topsoil.

3. Fertilizer - as required by test results of topsoil.

C. Mixing with planting soil:

1. Fertilizer and conditioners shall be spread over the entire lawn areas at the application rates indicated above.

2. Materials shall be uniformly and thoroughly mixed into the top 4 in. of planting soil by disking, rototilling, or other approved method.

3.5 Finish Grading

A. Refer to Section 32 91 19 – Landscape Grading.

B. Planting soil shall not be fine graded until it is possible to follow immediately or within 24 hours with seeding or sodding operations. If topsoil is spread prior to this time it shall be cultivated to loosen soil prior to seeding or sodding.

C. Planting soil shall not be placed when subgrade or topsoil material are frozen, excessively wet, or excessively dry.

D. Contractor shall set grade lines for Landscape Architect's review and approval.

1. Final surface of topsoil immediately before seeding and sodding shall be within + 1/2 in. of required elevation, with no ruts, mounds, ridges, or other faults, and no pockets or low spots in which water can collect. Stones, roots, and other debris greater than 1 in. in any dimension, which are visible at the surface, shall be removed and the resulting holes filled with topsoil, leaving a uniform planar surface.

E. Finish grade surface with a drag or rake. Round out all breaks in grade, smooth down all lumps and ridges, fill in all holes and crevices. Rolling with a light roller is acceptable, if the surface is scarified afterward.

F. In the event of settlement, the Contractor shall readjust the work to required finished grade.

G. Allow for sod thickness in areas to be sodded.

H. Remove small loose rocks, stone and debris of 1/2" or larger with a Harley Rock Machine or equivalent as required leaving the grade reasonably free of such miscellaneous matter. Remove all debris legally from the Site.

3.6 Seed Application

A. Seed shall be applied in two applications by mechanical spreader.

B. First Application: Seed shall be broadcast by means of an approved mechanical spreader, to give a uniform application at the following rates:

Seed
Refer to Article 2.1 Seed.

1. Seed shall be applied in two equal applications for uniform coverage; direction of travel of spreader for second pass shall be perpendicular to that of the first pass. Seeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 mph.

2. Following seeding the area shall be lightly raked to mingle seed with top 1/8 to 1/4 in. of soil. Area shall then be fine graded. Stones and other debris greater than 1 in. in any dimension which are visible on surface shall be removed.

C. Following seeding and raking, entire area shall be rolled with a hand roller having a weight of 60 to 90 lb./ft. of width, and a minimum diameter of 2 ft. Entire area shall then be watered by use of lawn sprinklers, or other approved means. Initial watering shall continue until the equivalent of a 2 in. depth of water has been applied to entire seeded surface, at a rate which will not dislodge the seed. Watering shall be repeated thereafter as frequently as required to prevent drying of

the surface, until the grass attains an average height of 1/4 in. Watering methods and apparatus which may cause erosion of the surface shall not be permitted.

D. Evenly apply wheat straw 2 in. thick over all seeded areas. (Approximately 60 bales per acre). The Contractor shall not, under any circumstances, use local hay as it will most likely be Johnson Grass (Sorghum Halepense).

E. Apply asphalt emulsion binder to mulch at rate to effectively hold mulch in place. Immediately replace mulch that blows away.

F. Rope off entire seeded area to prevent vehicles and pedestrians from entering area.

3.7 Sodding

A. Edges of the sodded areas shall be smooth, and all sodded areas shall conform to the design cross sections and grade. At edges adjacent to curbs, paved areas, etc., top surface of earth in sod shall be 1/2 in. below adjacent hard surface.

B. Sod shall be placed and all sodding operations completed within 72 hours following stripping from sod source bed.

C. On slopes steeper than 2 to 1, sod shall be fastened in place with suitable wood pins or other approved methods, spaced at not less than 1 pin per square foot.

D. Surface of completed sodded area shall be smooth. Sod shall be laid edge-to-edge, with tight-butted, staggered joints. Sod shall be carefully placed to insure that it is neither stretched or overlapped. Immediately after laying sod shall be pressed firmly into contact with sod bed by tamping or rolling, to eliminate air pockets. Following compaction, topsoil shall be used to fill all cracks, and excess soil shall be worked into grass with rakes or other suitable equipment. Sod shall not be smothered with excess fill soil.

E. Immediately after sodding operations have been completed, entire surface shall be compacted with a cultipacker roller or other approved equipment weighing 100 to 160 lb./ft. of roller.

F. Lay sod to form a solid mass with tightly fitted joints. Snugly fit ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.

G. Lay sod if from rolls as specified. Monofilament mesh is to be removed from the sod as it is placed. Lay sod to form a solid mass with tightly fitted joints. Trim ends of rolls as necessary to provide square joints and snugly fit ends and sides. Tamp or roll lightly to ensure contact with subgrade. Work sifted sand into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.

H. Anchor sod with sod staples to prevent slippage on slopes equal to or greater than 3:1 and wherever erosion can be anticipated. Lay sod perpendicular to slope direction, with staggered joints.

I. Immediately after sod installation, water thoroughly with a fine spray until the soil is damp to a depth of 4". The watering shall be the responsibility of the Contractor during the installation and maintenance period. The sod shall be kept moist until rooting occurs and then irrigate as needed a healthy and vigorous stand of grass.

J. Roll the surface after "rooting in" has occurred.

3.8 Hydroseeding

A. Hydroseeding may be used on any grassing area. Under this method, spread the seed, fertilizer, and wood fiber mulch in the form of a slurry. Seeds of all sizes may be mixed together.

B. Apply hydroseeding as follows:

1. Use wood fiber mulch as a metering agent and seed bed regardless of which mulching method is chosen. Apply wood fiber mulch at approximately 1000-1500 lbs./acre.

2. Prepare the ground for hydroseeding as specified for conventional seeding. Starter fertilizer may be added to the surface of the seed bed. Verify that all areas to receive the hydroseed mixture are free of vegetation and other objectionable materials. Verify that grades are within final specified standards and that the area is uniformly compacted.

3. Use specially designed equipment to mix and apply the slurry uniformly over the entire seeding area.

4. Agitate the slurry mixture during application.

5. Discharge slurry within one hour after being combined in the hydroseeder. Do not hydroseed when winds prevent an even application.

6. Closely follow the equipment manufacturer's directions unless the Engineer modifies the application methods.

7. Mulch the entire hydroseeded area.

8. Take precautions against overspray onto adjacent roads, curbs, sidewalks, buildings, and other surfaces except the ground areas scheduled to receive the seed. Contractor shall promptly clean all areas of overspray to the satisfaction of the Owner and Landscape Architect.

3.9 Fertilizer

A. After sod is installed, apply liquid fertilizer for grow-in purposes. Alternate applications of 32-0-0 and 12-4-12 at a rate of 8 ½ gallons of each product per acre per week for a three week period, with three to four days between applications of 32-0-0 and 12-4-12.

B. Fertilizers shall be applied only during the growing season when Bermuda is completely out of dormancy. If fertilizer brand type recommends a different rate, the Contractor shall advise the Owner's Representative of the rate recommended prior to applying any fertilizer to clarify the proper rate of use.

C. 32-0-0 liquid fertilizer to be comprised of 7.89% ammoniacal nitrogen, 7.89% nitrate nitrogen and 16.22% urea nitrogen.

D. 12-4-12 liquid fertilizer to be comprised of 12% total nitrogen (N), 4% available phosphate (P2O5) and 12% soluble potash (K2O).

3.10 Maintenance

A. Begin maintenance immediately after installation.

B. Maintain sod until Date of Substantial Completion of the Project in total.

C. Maintain lawns by watering, weeding, fertilizing, weekly mowing, repair of eroded areas and re-seeding or re-sodding as necessary to establish a uniform stand of the specified grasses. Contractor shall perform "Grow-In" activity (weed control, fertilizing, watering & mowing) throughout the contract period and at a minimum, shall include 6 weeks of "Grow-In" activity and monitoring, after initial laying of sod. Grow-in activity per turf manufacturer recommendations. Provide written Grow-in and normal maintenance instructions to the Owner. Grow in activity shall continue until final acceptance by the Owner.

3.11 Clean Up and Protection

A. During Work, keep pavements clean and work area in an orderly condition.

B. Upon completion of Work, clear grounds of debris, superfluous materials and all equipment. Remove from Site to satisfaction of Owner.

C. Protect Sod from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged Work as directed by Owner's Representative, at no additional cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section describes products to be incorporated into the water mains and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements as detailed in the Columbus Water Works Specifications and Details for the Design and Construction of Sanitary Sewer and Water Systems dated 2020.

1.02 SUBMITTALS

A. Submit in accordance with Section 01 33 00 - Submittal Procedures.

B. Submit to the Engineer shop drawings and product data for all products.

1.03 DELIVERY AND HANDLING

A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. 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. Handling: Handle pipe, fittings, valves 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.

1.04 STORAGE AND PROTECTION

A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas. Store PVC pipe away from non-solar heat and direct sunlight.

B. Stored materials shall be kept safe from damage. Store materials on site in enclosures or under protective covering. The interior of all pipe, fittings, valves and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

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 gaskets shall be placed in a 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.

1.05 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 the removal of roots, sticks, rocks, and other debris in order to provide a neat and pleasing appearance.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

Part 1 General

1.1 Summary

A. Section Includes:

1. Pipe and fittings for domestic water service connections to buildings.
2. Corporation stop assembly.
3. Curb stop assembly.
4. Water meters and meter setting equipment.
5. Backflow preventers.
6. Underground pipe markers.
7. Bedding and cover materials.

B. 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), National Science Foundation (NSF) Standard 61, or other recognized standards. Latest revisions of all standards are applicable. Additionally, products shall meet the Federal lead-free requirements as stated in the Reduction of Lead in Drinking Water Act.

1.2 Related Sections:

A. Section 31 23 33 – Trenching and Backfilling: Excavating backfilling and compacting for Work of this section.

B. Section 33 05 13 - Manholes and Covers.

C. Section 33 01 10.58 - Disinfection of Water Utility Piping Systems

1.3 Definitions

A. Utility Company: Columbus Water Works

1.4 Submittals

A. Submit in accordance with Section 01 33 00 - Submittal Procedures.

B. Shop Drawings: Provide shop drawings for precast concrete vaults to include detail drawings showing the vault and accessories.

C. Product Data: Submit data on pipe materials, pipe fittings, corporation stop

assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventer, and accessories.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

E. Submit Project Record Documents in accordance with Section 01 78 23. Record actual locations of piping mains, curb stops, connections, thrust restraints, and invert elevations.

F. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 Quality Assurance

A. Perform Work in accordance with utility company standards, state and local laws, and the DOT Standard Specifications.

B. Maintain one copy of referenced documents on site.

1.6 Delivery, Storage, and Handling

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. During loading, transporting, and unloading of materials and products, exercise care to prevent any damage.

C. Store products and materials off ground and under protective coverings and custody, away from walls and in manner to keep these clean and in good condition until used.

D. Exercise care in handling precast concrete products to avoid chipping, cracking, and breakage.

Part 2 Products

2.1 Water Piping and Fittings

A. General: All pipe and fittings shall comply with NSF 61, NSF 372, and Federal lead-free requirements.

B. Copper Tubing: ASTM B88, Type K, annealed:

1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.

2. Joints: Compression connection or AWS A5.8, BCuP silver braze.

C. Polyethylene Water Service Lines: Pipe or tubing in accordance with AWWA C901, ASTM D2239, ASTM D3035, or ASTM D2737, with rated pressure of 200 psig

1. IPS pipe produced per ASTM D3035:

    a. Joints: Heat Fusion and Electrofusion

    b. Fittings: Mechanical Compression fittings. Internal stiffeners shall be provided on all stab and mechanical fittings

2. CTS pipe produced per ASTM D2737:

    a. Joints: Heat Fusion

    b. Fittings: Mechanical Compression fittings or Stab fittings. Internal stiffeners shall be provided on all stab and mechanical fittings

2.2 Corporation Stop Assembly

A. Manufacturers:

1. Ford Meter Box Company.

2. Mueller Company.

3. McDonald Company.

4. Or Equal

5. Substitutions: per Section 01 25 00.

B. Corporation Stops:

1. Brass or red brass alloy body conforming to Federal No-Lead requirements.

2. Inlet end threaded for tapping according to AWWA C800.

3. Outlet end suitable for service pipe specified.

C. Service Saddles: Double strap type, designed to hold pressures in excess pipe working pressure. Manufacturers:

1. Rockwell.

2. McDonald Company.

3. Or Equal

4. Substitutions: per Section 01 25 00.

2.3 Curb Stop Assembly

A. Manufacturers:

1. Ford Meter Box Company.
2. Mueller Company.
3. McDonald Company.
4. Or Equal
5. Substitutions: per Section 01 25 00.

B. Curb Stops:

1. Brass or red brass alloy body conforming to Federal No-Lead requirements.
2. Plug type valve.
3. Positive pressure sealing.

C. Curb Boxes and Covers:

1. Cast iron body, Extension Type or Buffalo Type.
2. Minneapolis or Arch Pattern Base.
3. Lid with inscription WATER, with Pentagon Plug.

2.4 Meter Setting Equipment

A. Manufacturers:

1. Ford Meter Box Company.
2. Mueller Company.
3. Or Equal
4. Substitutions: per Section 01 25 00.

B. Outside Meter Setting:

1. Meter Yokes: Copper or iron, riser type assembly with bronze inlet inverted key angle valve expansion type outlet connection and Ell fitting; flared copper tubing connections both ends.
2. Meter Yokes: Copper or iron, inlet and outlet horizontal or vertical setting with matching couplings, fittings, and stops.

2.5 Water Meters

A. Physical and Common Requirements

1. Metering system components shall be installed according to the Metering System Schedule shown on the drawings.

2. Surge withstand shall conform to IEEE C37.90.1.

B. Cold-Water Meters - Displacement Type 5/8-inch x 3/4-inch, 1-inch, 1-1/2-inch, 2-inch Size

1. Small meters shall be as follows or shall be approved equivalents: Positive displacement meters provided hereunder shall be full-size nutating-disc, magnetic drive, sealed register, cold water meters and shall fully comply with the requirements of AWWA C700 unless otherwise specified hereunder.

2. No oscillating-piston style meters will be accepted.

3. Materials

a. Cases 5/8-Inch x 3/4-Inch, 1-Inch, 1-1/2-Inch: The main case of the meter shall be cast all-bronze, bottom caps shall be cast all-bronze, excepting register boxes and register box lids which shall be bronze or an approved plastic material as specified in AWWA C700. Meter cases constructed of plastic will not be accepted.

b. Cases 2-Inch: The main case of the meter shall be cast all-bronze, including bottom caps, excepting register boxes and register box lids which shall be bronze or an approved plastic material. Meter cases constructed of plastic will not be accepted.

c. Register Box Rings and Lids: Register box rings and lids shall be made of a copper alloy containing not less than 57 percent copper, or all bronze, or an approved suitable synthetic polymer.

d. Measuring Chambers: Measuring chambers shall be made of a copper alloy containing not less than 85 percent copper and suitable amounts of tin, zinc, or of a suitable synthetic polymer.

e. Discs: Discs shall be made of vulcanized hard rubber or a suitable synthetic polymer with specific gravity approximately equal to that of water. They shall have sufficient dimensional stability to retain operating clearances at working temperatures of up to +27 degrees Centigrade and not warp or deform when exposed to operating temperatures of +37 degrees Centigrade.

f. Measuring Chamber Diaphragms: Measuring chamber diaphragms shall be made of phosphor bronze, stainless steel, hard rubber, or a suitable synthetic polymer.

g. Spindles, Thrust Rollers, and Thrust-Roller Bearing Plates: Spindles, thrust rollers and thrust-roller bearing plates shall be made of phosphor bronze, stainless steel, hard rubber, or a suitable synthetic polymer.

h. Intermediate Gear Trains: Frames, gears, and pinions shall be made of a suitable copper alloy, other suitable non-corrosive metals, or other suitable materials.

i. External Fasteners (Casing Bolts, Studs, Nuts, Screws, and Washers): External fasteners shall be made of a copper alloy containing not less than 57 percent copper, stainless steel, or steel treated to resist corrosion by a process approved by the Owner. Fasteners for no-pressure assemblies may be made of a suitable synthetic polymer. All external case closures, such as rings, clamps, screws, bolts, cap bolts, nuts and washers, shall be designed for easy removal following lengthy service.

j. Water Meter Coupling - 5/8-Inch x 3/4-Inch: A water coupling shall be composed of one meter coupling nut, one meter coupling tail piece (straight), and one rubber-type washer for meter coupling. The meter coupling tailpiece and nut shall be a copper alloy containing not less than 57 percent copper. The coupling nut shall have internal straight pipe threads conforming to ASME B1.20.1. Pitch diameter shall be that shown on AWWA C700. The coupling tailpiece shall have external taper pipe threads conforming to ASME B1.20.1 and an internal diameter approximately equal to the nominal thread size of the tailpiece. Lengths and thread sizes shall be those listed in AWWA C700. One water meter coupling and one additional rubber-type washer for meter coupling (total of two rubber-type washers) shall be provided with each meter.

k. Companion Flanges - 1-1/2-Inch and 2-Inch: Companion flanges shall be made of cast iron.

4. General Design

a. Pressure Requirements: Meters supplied under this specification shall operate without leakage or damage to any part at a working pressure of 150 psi.

b. Accessibility: All 1-1/2-inch and 2-inch meters shall be designed for easy removal of all interior parts without disturbing the connections to the pipeline.

5. Detail Design

a. Cases: All meters shall have an outer case with separate, removable measuring chambers. Cases shall not be repaired in any manner. The inlet and outlet shall have a common axis. A meter case shall include the top case and bottom case, or main case and bottom plate, whichever is applicable. Connection flanges shall be parallel.

b. Connections: Meter case connections for 5/8-inch x 3/4-inch and 1-inch meters shall be meter casing spuds on both ends. Spuds shall have external straight threads conforming to ASME B1.20.1 as far as the specifications apply. Pitch diameters shall be those shown in AWWA

C700. Main case connections for 1-1/2-inch and 2-inch meters shall be oval-flanged on both ends. Flanges shall be faced and drilled and shall be the oval type. The drilling shall be on a horizontal axis; the number of bolt holes and the diameters of the bolt holes and bolt circle shall be as listed in AWWA C700. Two oval companion flanges, gaskets, bolts and nuts shall be provided with each meter. Companion flanges shall be faced, drilled, and tapped in conformance with ASME B1.20.1. Dimensions shall be those listed in AWWA C700. Companion flanges shall be cast iron.

c. Registers: Registers shall be straight-reading and shall read in 1000-gallon increments. The register shall be equipped with a center-sweep test hand with the test circle located on the periphery of the register and graduated in 100 equal parts, with each tenth graduation being numbered. Register construction shall conform to all applicable requirements of AWWA C700.

d. Register Boxes: The lid shall be recessed and shall overlap the register box in order to protect the lens. The lens shall be held securely in place.

e. Intermediate Gear Trains: Intermediate gear trains may be mounted on the measuring chamber, in the upper main casing, or when not exposed to water, combined with or adjacent to the register gearing.

    1) Oil-enclosed type - Gear trains exposed to water shall be of the oil-enclosed type, shall have a separate housing or form housing with the main casing or measuring chamber, and shall operate in a suitable lubricant.

    2) Magnetic coupled drives - When intermediate gear trains are located in the water compartment of the meter, the revolutions of the train output spindles shall be transmitted to the registers by means of magnetic couplings through the meter cases. When the intermediate gear trains are located in the register compartments, the disc nutations shall be transmitted by magnetic couplings.

f. Measuring Chambers: The measuring chambers shall be self-contained units, smoothly finished, firmly seated, and easily removed from the main cases, and shall not be cast as part of the main cases. The measuring chambers shall be so secured in the main cases that the accuracy of the meter will not be affected by any distortion of the cases that might occur when operating with a pressure less than 150 psi.

g. Discs: Discs shall be smoothly finished, disc plated, whether flat or conical, shall be either reinforced or equipped with thrust rollers. Discs may be one piece or composed of a plate with two half balls. The disc spindles shall be fastened securely. The disc nutations shall not exceed the quantities listed in AWWA C700.

h. Strainers: All meters shall be provided with strainer screens installed in

the meter. Strainer screens shall be rigid, fit snugly, be easy to remove, and have an effective straining area at least double that of the main case inlet.

i. Seal Wire Holes: Register box screws and inlet and outlet coupling nuts, if provided, shall be drilled for seal wires. Seal wire holes shall not be less than 3/32 inch in diameter.

j. Registration Accuracy: Meters shall meet the following requirements for accuracy with water of a temperature of less than +27 degrees Centigrade.

1) Normal Flow Limits - At any rate of flow within the normal test flow limits specified on AWWA C700, the meter shall not register less than 98.5 percent and not more than 101.5 percent of the water that actually passes through it.

2) Minimum Test Flow - At the minimum test flow rate specified in AWWA C700, the meter shall not register less than 95 percent and not more than 101 percent of the water that actually passes through it.

k. Markings: The size, model, and direction of flow through the meter shall be marked permanently on the outer case of all meters. All meters shall have the manufacturer's serial numbers stamped on the meter main case and top of the reading lid.

l. Register Boxes: The name of the manufacturer shall be marked permanently on the lid of the register box. The serial number of the meter shall be imprinted on the lid and the main case.

C. Cold-Water Meters - Compound Type 2-Inch, 3-Inch, 4-Inch, and 6-Inch Size

1. Compound meters shall consist of a combination of a main-line meter of the turbine type for measuring high rates of flow and a meter of appropriate size for measuring low rates of flow. The compound meter shall have an automatic valve mechanism for diverting low rates of flow through the bypass meter. Both metering devices with registers shall be contained in the same case. The operating and physical characteristics shall conform to those specified within AWWA C702.

2. Materials

a. Cases: The main case of the meter shall be made of a copper alloy containing not less than 75 percent copper.

b. Register Box Rings and Lids: Register box rings and lids shall be made of a cast copper alloy containing not less than 75 percent copper, forged or die-cast copper alloy containing not less than 57 percent copper or a suitable synthetic polymer.

c. Measuring Cages or Chambers: Measuring cages or chambers shall be made of a copper alloy containing not less than 84 percent copper and suitable amounts of tin and zinc or of a suitable synthetic polymer.

d. Measuring Turbines, Pistons and Discs: Turbines, pistons and discs shall be made of vulcanized hard rubber or a suitable synthetic polymer with specific gravity approximately equal to that of water. They shall have sufficient dimensional stability to retain operating clearances at working temperatures of up to +27 degrees Centigrade and not warp or deform when exposed to operating temperatures of +37 degrees Centigrade.

e. Disc and Turbine Spindles: Measuring chamber spindles shall be made of phosphor bronze, stainless steel, ceramic, or suitable synthetic polymer.

f. Intermediate Gear Trains: Frames, gears and pinions of intermediate gear trains exposed to water shall be made of copper alloy containing not less than 85 percent copper and suitable amounts of tin and zinc, or suitable synthetic polymer.

g. When not exposed to water, intermediate gear trains may be made of a suitable synthetic polymer.

h. External Fasteners (Casing Bolts, Studs, Nuts, Screws, and Washers): External fasteners shall be made of a copper alloy containing not less than 57 percent copper, stainless steel, or steel treated to resist corrosion by a process approved by the Government. Fasteners for no-pressure assemblies may be made of a suitable synthetic polymer. All external case closures, such as rings, clamps, screws, bolts, cap bolts, nuts and washers, shall be designed for easy removal following lengthy service.

i. Companion Flanges: Companion flanges shall be made of cast iron.

j. Automatic Valves: The valve weights shall be lead, or a copper alloy containing not less than 75 percent copper, or a copper alloy shell loaded with lead. The valve and supplemental hinge pins or spindles shall be a copper alloy containing not less than 75 percent copper, or stainless steel, and all valve and supplemental weight hinge bearings shall be bushed with hard rubber or bronze or other suitable bushing material. If the valve contains a clapper, it shall be faced with a removable semi-hard seat. Valve seats shall be made of a copper alloy containing not less than 75 percent copper and suitable amounts of tin, lead, and zinc.

3. General Design

a. Pressure Requirements: Meters supplied under this specification shall operate without leakage or damage to any part at a working pressure of 150 psi.

b. Accessibility: All compound meters shall be designed for easy removal of

all interior parts without disturbing the connections to the pipeline.

c. Registration Accuracy: Meters shall meet the following requirements for accuracy with water of a temperature of less than +27 degrees Centigrade.

1) Normal Flow Limits - The meter shall not register less than 97 percent and not more than 103 percent of the water actually passed through it at any rate of flow within the normal test flow limits specified in AWWA C702, except in the registration of flows within the changeover from bypass meter to main meter.

2) Changeover Flow - The beginning of the changeover is when the accuracy of registration falls below 97 percent due to the operation of the automatic valve mechanism, and the end of changeover is when accuracy of registration again reaches 97 percent. The registration of these changeover rates of flow shall not be less than 90 percent and not more than 103 percent. The difference in the rate of flow at the beginning and at the end of the changeover shall not exceed the figures listed in AWWA C702.

3) Minimum Test Flow - There shall not be less than 95 percent of actual flow recorded when a test is made at the minimum test flow shown in AWWA C702.

d. Markings: The size, model, and direction of flow through the meter shall be cast or stamped in the outer case of all meters.

1) Register Boxes - The name of the manufacturer shall be permanently impressed on the lid of the register box. The serial number of the meter shall be imprinted on the lid.

4. Detail Design

a. Main Case: All meters shall have an outer case with separate, removable measuring chambers. Cases shall not be repaired in any manner. The inlet and outlet shall have a common axis. Connection flanges shall be parallel.

b. External Case Screw, Bolts, Nuts and Washers: All external screws, bolts, cap bolts, nuts and washers shall be designed for easy removal after lengthy service.

c. Main Case Connections: All main case connections shall be flanged. The bolt holes shall comply with AWWA C702.

1) 2-Inch Meters - The flanges for 2-inch meters shall be oval. The drilling of oval flanges shall be on the horizontal axis.

2) Meters Larger than 2-Inch - The flanges for 3-inch, 4-inch, and 6-

inch meters shall be the round type, faced and drilled, and shall conform to ASME B16.1 for bronze pipe flange, Class 125.

d. Companion Flanges: Companion flanges of the same size and type as the meter flanges shall be provided, and gaskets, nuts, and bolts shall be provided. Round companion flanges shall be faced, drilled, and tapped in accordance with ASME B1.20.1 and shall conform to ASME B16.1 for cast-iron pipe flange, Class 125. All companion flanges shall comply with AWWA C702 for drilling, diameter, and thickness specifications.

e. Tapped Bosses: All meters shall be provided with tapped bosses in the top of the case near the outlet for field testing purposes.

f. Registers: Registers shall be straight reading and shall read in gallons. Except for those instances when test conditions require the use of a different register, the register provided with the meter shall be the same register that was on the meter when it was tested for accuracy. The register lock and side gears shall be fastened securely to the number wheel discs and hubs. The tumbler pins shall mesh accurately at the turnover points with the lock and side gears of the adjacent number wheels. Both main and pinion shafts shall be so secured in the register frame and/or register plates that they cannot get out of position. The pinion shaft shall be so designed that there is no possibility of its bending and allowing the pinion to skip the turnover point. The numerals on the number wheels shall not be less than 3/16 inch in height and should be readable at a 45-degree angle from vertical. Registers that are hermetically sealed shall have gears and pinion which shall run free on fixed shafts or be fixed on shafts that run free in the register frame and/or register plates and shall be constructed so that they cannot be unmeshed. The registers shall have a center-sweep test hand with a test circle located on the periphery of the register and graduated in 100 equal parts, each tenth graduation numbered. The maximum quantity indicated by a single revolution of the test hand and the minimum capacity of the register shall be as listed in AWWA C702. The maximum indication on the test circle and the minimum register capacity of the bypass unit shall be in accordance with the approved AWWA Standard for the type of meter used as the bypass unit.

    1) Coordinator Registers - The meter may be equipped with a coordinator so that the readings of both sections can record on a single register. The register construction shall conform to previously mentioned requirements, and the maximum quantity indicated by a single revolution of the test hand and the minimum capacity of the register shall conform to AWWA C702.

g. Register Boxes: The lid shall be recessed and shall overlap the register box to protect the lens.

h. Intermediate Gear Trains: Intermediate gear trains may be mounted on the measuring chamber or cage or in the main casings. When not

exposed to water, they may also be combined with or adjacent to the register gearing. Gear trains exposed to water shall be the oil-enclosed type, shall have separate housings or shall form housings with the main casings or measuring chambers, and shall operate in a suitable lubricant. Gear trains made of non-corrosive metals or synthetic polymers may be exposed to water.

i. Measuring Chambers or Cages: The main-line section chambers or cages shall be self-contained units firmly seated and easily detached and removed from the main case. Chambers or cages with turbines that have revolving spindles shall have removable bearings for such spindles. Chambers or cages with stationary spindles on which the turbines revolve shall provide rigid, centrally located fastenings for the spindles. The spindles shall be removable. The main-line section chambers or cages shall be interchangeable in all meters of the same size, make, and model.

    1) Bypass Chamber - The bypass chamber shall be a type covered by an approved AWWA Standard. The chamber shall be a self-contained unit, firmly seated and easily removed from the case, and shall not be cast as part of the outer case. The chamber shall be secured in position in the outer case so that any slight distortion of the case which might occur under 150 psi pressure will not affect the accuracy of the meter.

j. Measuring Turbines and Discs: Measuring turbines that have revolving spindles shall rotate on spindles supported by bushings or replaceable bearings. Turbines that rotate on stationary spindles shall also have bushings or replaceable bearings. The plates of disc pistons, whether flat or conical, shall have metal reinforcements or shall be equipped with thrust rollers.

k. Magnetic Coupled Drives: When intermediate gear trains are located in the water compartment of the main or bypass section of the meter, the revolutions of the train output spindles shall be transmitted to the registers by means of magnetic couplings through the meter case. When intermediate gear trains are located in the register compartments, the revolutions shall be transmitted by magnetic coupling.

l. Automatic Valves: The automatic valve shall be of a type suitable for such purpose. It shall close by force. The weight of the valve and any supplemental force imposed on it shall offer sufficient resistance to the incoming water to divert all small rates of flow through the bypass meter until such time as the rate of flow through the meter is great enough to ensure efficient operation of the main measuring section. Valve hinge pins or spindles shall be bushed. Valve sets shall be bronze or other corrosion-resistant material, shall have a satisfactory width of face, and shall be held firmly in place. A clapper or swing-type valve shall be provided with a removable semi-hard seat.

m. Bypass Meter: The physical and operating characteristics and dimensions of the bypass meter shall be in accordance with the approved AWWA Standard for the type of meter used as the bypass.

n. Strainers: Strainers, if provided, shall be rigid, shall be easily removed and shall have an effective straining area at least double that of the water main-case inlet.

o. Seal Wire Holes: Register box screws shall be drilled for seal wires. Seal wire holes shall be not less than 3/32 inch in diameter.

D. Cold-Water Meter - Turbine Type 2-Inch Size

1. Turbine meters provided hereunder shall be Class II, in-line, horizontal-axis, high-velocity type and shall fully conform to the requirements of AWWA C701, except as otherwise specified herein. The 2-inch turbine meter shall have oval flanged ends and shall be supplied with one companion flange, gaskets, and with bolts and nuts as specified herein.

2. Material

a. Cases: All turbine main cases shall be bronze. No exceptions will be allowed.

b. Register Box Rings and Lids: Register box rings and lids shall be made of a cast copper alloy containing not less than 75 percent copper, forged or die-cast copper alloy containing not less than 57 percent copper or a suitable synthetic polymer.

c. Measuring Cages or Chambers: Measuring cages or chambers shall be made of a copper alloy containing not less than 84 percent copper and suitable amounts of tin, lead, and zinc or of a suitable synthetic polymer.

d. Measuring Turbines, Pistons and Discs: Turbines, pistons and discs shall be made of vulcanized hard rubber or a suitable synthetic polymer with specific gravity approximately equal to that of water. They shall have sufficient dimensional stability to retain operating clearances at working temperatures of up to +27 degrees Centigrade and not warp or deform when exposed to operating temperatures of +37 degrees Centigrade.

e. Disc and Turbine Spindles: Measuring chamber spindles shall be made of phosphor bronze, stainless steel, ceramic, or suitable synthetic polymer.

f. Intermediate Gear Trains: Frames, gears and pinions of intermediate gear trains exposed to water shall be made of copper alloy containing not less than 85 percent copper and suitable amounts of tin, lead, and zinc, or suitable synthetic polymer. When not exposed to water, intermediate gear trains may be made of a suitable synthetic polymer.

g. External Fasteners: (casing bolts, studs, nuts, screws, and washers). External fasteners shall be made of a copper alloy containing not less than 57 percent copper, stainless steel, or steel treated to resist corrosion by a process to be approved by the Government. Fasteners for no-pressure assemblies may be made of a suitable synthetic polymer. All external case closures, such as rings, clamps, screws, bolts, cap bolts, nuts and washers, shall be designed for easy removal following lengthy service.

h. Companion Flanges: Companion flanges shall be made of cast iron.

3. General Design

a. Pressure Requirements: Meters supplied under this specification shall operate without leakage or damage to any part at a working pressure of 150 psi. Pressure drop through turbine meters and strainers, when operated within specified normal flow limits, shall not exceed the characteristics outlined in AWWA C701.

b. Accessibility: All turbine meters shall be designed for easy removal of all interior parts without disturbing the connections to the pipeline. Turbine meters shall have readily accessible change gears, adjustable vanes or other approved means to adjust meter registration. Such adjustment feature shall be an integral part of the removable rotor/register assembly and not of the main or bottom case of the meter.

c. Registration Accuracy: Meters shall meet the following requirements for accuracy with water of a temperature of less than +27 degrees Centigrade.

1) Normal Flow Limits - The meter shall not register less than 97 percent and not more than 103 percent of the water actually passed through it at any rate of flow within the normal test flow limits specified in AWWA C702, except in the registration of flows within the changeover from bypass meter to main meter. Turbine meters shall be designed to allow prolonged operation at or near the upper limit of the specified normal flow range without premature degradation of registration accuracy or other evidence of undue wear. Meters shall also be capable of accepting sudden increases in flow at high rates of flow without decoupling the register.

E. Cold-Water Meter Strainers 2-Inch, 3-Inch, 4-Inch and 6-Inch Size

1. General: All strainers provided shall have top access. Cases for 2-inch, 3-inch, 4-inch and 6-inch strainers shall be bronze. Strainer plates for all sizes shall be 18-8 stainless steel or bronze. All strainers shall conform to AWWA C702.

F. Meter Programming

G. Register Requirements for Remote Registration

1. Meters must have encoder-type remote-registration conforming to the latest version of AWWA C707. Registers using generator pulses or low voltage conversions are not permitted. Power requirement for data transmission must be supplied by an interrogation device. Registers must be compatible with various brands of interrogation equipment. The register must provide at least six-digit visual registration at the meter. The units, the month and year of manufacture, and other identification information must clearly be printed on the face of the register. The register must also have a full test sweep hand or dial. The register must, in a digital format, simultaneously encode at least six significant digits of the meter reading for transmission through the remotely located receptacle. A meter identification number must also be provided with each reading.

2. All registers shall be easily upgraded to Automatic Meter Reading (AMR), which includes telephone, radio, cable, Energy Management and Control System (EMCS), Direct Digital Control (DDC), and Supervisory, Control and Data Acquisition (SCADA), with the substitution of the remote receptacle with a Meter Interface Unit (MIU). Data transmission shall be instantaneous and supplied in ASCII format without conversion or modification. The register must operate reliably down to at least 3.0 volts. Color-coded wire terminals (red, green and black) shall be provided; however, only the red and black terminals will be utilized for a two-wire connection to the interface ScanPad. The green terminal shall only be utilized to convert to AMR via the use of a MIU. A suitable wire terminal cover shall be provided and be factory potted when ordered for underground pit installations.

3. All registers must be removable without disassembly of the meter or depressurizing the service line. The register must be free of openings to protect the internal electronics of the register. Lens covers shall be made of polycarbonate or other suitable engineering polymer for indoor installations and mineral glass for underground pit installations. All other register assembly and material requirements stated herein shall also apply.

2.6 Communications

A. Energy Monitoring and Control (EMCS) or Automatic Meter Reading Interfaces

1. Water meters shall be capable of interfacing (output signal equivalent to flow rate) with the existing Energy Management Control System (EMCS) and Automatic Meter Reading systems for data gathering in units of GPM.

2. Meters shall not require power to function and deliver data. Output signal shall be either a voltage or amperage signal which can be converted to a flow rate specification.

3. Communication protocols used must be OPC-compliant, such as MODUBUS, LonWorks, and BACnet. System must be nonproprietary open architecture and able to interface with third-party vendor software.

4. Meter shall be equipped with one pulse output channel ("Pulse" in Metering Systems Schedule) that can be configured for operation.

2.7 Backflow Preventers

A. Manufacturers:

1. Watts Industries

2. Febco

3. Or Equal

4. Substitutions: per Section 01 25 00.

B. Reduced Pressure Backflow Preventers:

1. Comply with ASSE 1013.

2. Bronze body, with bronze internal parts and stainless steel springs.

3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

C. Double Check Valve Assemblies: Comply with ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.8 Underground Pipe Markers

A. Plastic Ribbon and Trace Wire Tape: Brightly colored blue continuously printed with "WATER SERVICE" in large letters, minimum 6 inches wide by 4 mils thick, with magnetic detectable conductor manufactured for direct burial service.

2.9 Precast Concrete Vault

A. Product Description: Precast vault designed in accordance with ASTM C858, comprising modular, interlocking sections complete with accessories.

B. Conform to Section 33 05 13.

C. Shape and Size: As indicated on Drawings.

D. Frames and Covers: ASTM A48; Class 30B gray cast iron, machine finished with flat bearing surfaces. Furnish cover marked WATER SERVICE.

E. Steps: Polypropylene plastic step with 1/2 inch steel reinforcement. Cast steps at 16

inches on center vertically.

2.10 Concrete

A. Concrete: Class A Concrete conforming to DOT Standard Specifications.

1. Compressive strength of 3,000 psi at 28 days.

2. Air entrained.

3. Water cement ratio of 0.488 with rounded aggregate and 0.532 with angular aggregate.

4. Maximum slump of 3.5 inch for vibrated concrete and 4 inch for non-vibrated concrete.

5. Minimum cement content of 564 pounds per cubic yard for vibrated concrete and 602 pounds per cubic yard for non-vibrated concrete.

2.11 Bedding and Cover Materials

A. Backfill around pipe and above pipe: As specified in Section 31 23 33 –Trenching and Backfilling.

Part 3 Execution

3.1 Preparation

A. Verify building service connection and municipal utility water main size, location, and invert are as indicated on Drawings.

B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

3.2 Installation - Corporation Stop Assembly

A. Make connection for each different kind of water main using suitable materials, equipment and methods approved by the Engineer.

B. Provide service clamps for mains other than of cast iron or ductile iron mains.

C. Screw corporation stops directly into tapped and threaded iron main at 10 and 2 o'clock position on main's circumference; locate corporation stops at least 12 inches apart longitudinally and staggered.

D. For plastic pipe water mains, provide full support for service clamp for full

circumference of pipe, with minimum 2-inch width of bearing area; exercise care against crushing or causing other damage to water mains at time of tapping or installing service clamp or corporation stop.

E. Use proper seals or other devices so no leaks are left in water mains at points of tapping; do not backfill and cover service connection until approved by the Engineer.

3.3 Excavation, Bedding and Backfill

A. Excavate pipe trench in accordance with Section 31 23 33 for Work of this Section.

B. Place bedding material at trench bottom, level in one continuous layer not exceeding 6-inch loose thickness; compact to 95 percent in accordance with Section 31 23 33.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact to 95 percent in accordance with Section 31 23 33.

D. Maintain optimum moisture content of fill material to attain required compaction density.

3.4 Installation - Pipe and Fittings

A. Maintain separation of water main from sewer piping in accordance with state and local codes or a minimum of 10 feet horizontal and 18 inches vertical distance, whichever is more stringent.

B. Group piping with other site piping work whenever practical.

C. Install pipe to indicated elevation to within tolerance of 5/8 inch.

D. Route pipe in straight line.

E. Install pipe to allow for expansion and contraction without stressing pipe or joints.

F. Install access fittings to permit disinfection of water system performed under Section 33 13 00.

G. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.

H. Establish elevations of buried piping with not less than 3 feet of cover.

I. Install plastic ribbon with trace wire continuous over top of pipe buried 6 inches below subgrade above pipe line; coordinate with Section 31 23 33.

J. Backfill trench in accordance with Section 31 23 33.

3.5 Installation - Curb Stop Assembly

A. Set curb stops on solid bearing of compacted soil.

B. Center and plumb curb box over curb stops. Set box cover flush with finished grade.

3.6 Installation - Backflow Preventers and Water Meters

A. Install positive displacement meters in accordance with AWWA M6, as indicated on Drawings, and in accordance with manufacturer's instructions.

B. Install backflow preventer where indicated on Drawings and in accordance with manufacturer's instructions.

C. Comply with local water company requirements and plumbing codes regarding testing and installation requirements.

3.7 Service Connections

A. Install water service to 5 feet of building and plug.

3.8 Precast Concrete Vault

A. Construct valve vaults of precast concrete.

B. Install in accordance with Section 33 05 13.

C. Seal vault joints watertight with preformed plastic joint sealant compound. Apply asphalt waterproofing to exterior walls.

D. Seal annular space between pipe and wall sleeves as indicated on Drawings.

E. Install vault covers and frames; adjust to finished grade elevation.

3.9 Disinfection of Domestic Water Piping System

A. Flush and disinfect system in accordance with Section 33 13 00.

3.10 Field Quality Control

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Compaction testing for bedding and backfill: Conform to Section 31 23 33.

C. Pressure testing: Perform pressure test on water service connections in accordance with AWWA C600.

D. Notification: Notify Engineer and Owner 72 hours in advance of test and have them witness test.

E. Test Pressure: Not less than 200 psi or 50 psi in excess of maximum static pressure, whichever is greater.

F. Procedure:

1. After completion of pipeline installation, but prior to backfill and final connection to existing system, conduct concurrent pressure and leakage tests in accordance with AWWA C600.

2. Provide equipment required to perform leakage and pressure tests.

3. Conduct tests for at least two-hour duration.

4. No pipeline installation will be approved when pressure varies by more than 5 psi at completion of pressure test.

5. Before applying test pressure, completely expel air from section of piping under test. Provide corporation cocks so air can be expelled as pipeline is filled with water. After air has been expelled, close corporation cocks and apply test pressure. At conclusion of tests, remove corporation cocks and plug resulting piping openings.

6. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.

7. Examine exposed piping, fittings, valves, and joints carefully during pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.

8. No pipeline installation will be approved when leakage is greater than that determined by the following formula:

$$L = \left(SD\sqrt{P}\right)/C$$

L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during leakage test, in pounds per square inch gauge
C = 133,200

9. When leakage exceeds specified acceptable rate, locate source and make repairs. Repeat test until specified leakage requirements are met.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Construction of gravity sanitary utility piping, including piping, manholes, and appurtenances

B. Testing and inspection

1.02 SECTION INCLUDES

A. This Section describes products to be incorporated into the sanitary sewer systems and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements as detailed in the Columbus Water Works Specifications and Details for the Design and Construction of Sanitary Sewer and Water Systems dated 2020.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 33 00 – Submittal Procedures

B. Shop Drawings

1. Detailed pipe drawings showing pipe details, special fittings and bends, dimensions, coatings, and other pertinent information.
2. Detailed manhole drawings showing details, connections, dimensions, castings, anti-flotation provisions and other pertinent information.

C. Product Data

1. Pipe data, including pressure class, wall thickness, reinforcing, and strength calculations.
2. Manufacturer's data for couplings, saddles, gaskets and other pipe accessories.
3. Manhole data, including wall thickness, reinforcing, and strength calculations.

1.04 CLEANUP

A. After completing each section of the sewer line, remove all debris, construction materials, and equipment from the site work, grade and smooth over the surface on both sides of the line, and leave the entire right-of-way in a clean, neat, and serviceable condition.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

Part 1 General

1.1 Section Includes

A. Furnish and install storm drainage facilities including drain piping, fittings, accessories and bedding; catch basins; manholes and other facilities.

1.2 Related Sections

A. Section 31 20 00 – Earthwork

1.3 Submittals

A. Submit the following in accordance with [Section 01 33 00 - Submittal Procedures]:

B. Action Submittals:

1. Shop Drawings: Indicate openings in inlets and junction boxes, inverts and sizes. Indicate grating type and installation.

2. Product data: Provide product data for precast structures, pipe, and pipe accessories.

C. Informational Submittals:

1. Product Data Placing Pipe: Submit printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

2. Manufacturer’s Certificate: Certify that products meet or exceed applicable state DOT requirements.

1.4 Delivery, Storage, and Handling

A. Delivery and Storage

1. Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling.

2. Materials shall not be stored directly on the ground.

3. The inside of pipes and fittings shall be kept free of dirt and debris.

4. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material.

5. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Engineer.

6. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

B. Handling

1. Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition.

2. Pipe shall be carried to the trench, not dragged.

Part 2 Products

2.1 Pipe for Culverts and Storm Drains

A. Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.2 Round Concrete Pipe

A. Manufactured in accordance with and conforming to AASHTO M 170, Class III as modified in Section 843.2.01 of the GDOT Standard Specifications.

B. Gaskets:

1. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe. The rubber-type gaskets shall conform to AASHTO M 198, with the additional requirement that they shall be of sufficient volume to fill the pipe joint space. Gaskets shall have not more than one factory-fabricated splice.

2. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of AASHTO M 198. Certified copies of test results shall be delivered to the Engineer before gaskets or jointing materials are installed.

2.3 Perforated Piping

A. Polyvinyl Chloride (PVC) Pipe: ASTM D2729.

2.4 PVC Pipe

A. Submit the pipe manufacturer's resin certification, indicating the cell classification of PVC used to manufacture the pipe, prior to installation of the pipe.

B. Type PSM PVC Pipe: ASTM D3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D1784, minimum cell class 12454-B.

C. Corrugated PVC Pipe: ASTM F949 produced from PVC certified by the compounder as meeting the requirements of ASTM D1784, minimum cell class 12454-B.

D. Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.

2.5 Drainage Structures

A. Flared End Sections: Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A929/A929M.

B. Precast Reinforced Concrete Box: Manufactured in accordance with and conforming to ASTM C1433.

2.6 Miscellaneous Materials

A. Concrete

1. Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 4000 psi concrete. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C231. The concrete covering over steel reinforcing shall not be less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches between steel and ground.

2. Expansion-joint filler material shall conform to ASTM D1751, or ASTM D1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D1752.

B. Mortar: Mortar for connections to other drainage structures, and brick or block construction shall conform to ASTM C270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case shall exceed 1.5 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalis, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and

finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

C. Brick: Brick shall conform to ASTM C62, Grade SW; ASTM C55, Grade S-I or S-II; or ASTM C32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 13 mm 1/2 inch of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.

D. Precast Reinforced Concrete Manholes

1. Conform to ASTM C478. Joints between precast concrete risers and tops shall be [full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure] [made with flexible watertight, rubber-type gaskets].

E. Frame and Cover for Gratings

1. Submit certification on the ability of frame and cover or gratings to carry the imposed live load.

2. Frame and cover for gratings shall be cast gray iron, AASHTO M105, Class A; or cast ductile iron, ASTM A536, Grade 65-45-12. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans. The word "Storm Sewer" shall be stamped or cast into covers so that it is plainly visible.

2.7 Steel Ladder

A. Steel ladder shall be provided where the depth of the storm drainage structure exceeds 12 feet. These ladders shall be not less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2-1/2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A123.

2.8 Resilient Connectors

A. Flexible, watertight connectors used for connecting pipe to manholes and inlets shall conform to ASTM C923.

2.9 Erosion Control Riprap

A. Provide nonerodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness of as indicated.

Part 3 Execution

3.1 Excavation for Pipe Culverts, Storm Drains, and Drainage Structures

A. Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 31 20 00 - Earthwork and the requirements specified below.

B. Trenching

1. The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 24 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified, without any overexcavation.

2. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Owner.

C. Removal of Rock

1. Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe.

2. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe.

3. Rock excavation shall be as specified and defined in Section 31 20 00 - Earthwork.

D. Removal of Unstable Material

1. Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Engineer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING.

2. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Owner.

3.2 Bedding

A. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

B. Concrete Pipe Requirements

1. When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in granular material minimum 4 inch in depth in trenches with soil foundation. Depth of granular bedding in trenches with rock foundation shall be 1/2 inch in depth per foot of depth of fill, minimum depth of bedding shall be 8 inch up to maximum depth of 24 inches.

2. The middle third of the granular bedding shall be loosely placed.

3. Bell holes and depressions for joints shall be removed and formed so entire barrel of pipe is uniformly supported. The bell hole and depressions for the joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

C. Plastic Pipe: Bedding for PVC and PE pipe shall meet the requirements of ASTM D2321. Use Class IB or II material for bedding, haunching, and initial backfill.

3.3 Placing Pipe

A. Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements.

B. Pipelines shall be laid to the grades and alignment indicated.

C. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe.

D. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

E. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (percent)
Plastic (PVC, HDPE)	5

F. Note post installation requirements of paragraph DEFLECTION TESTING in PART 3 of this specification for all pipe products including deflection testing requirements for flexible pipe.

G. Concrete and PVC Pipe: Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

H. PE Pipe: Laying shall be with the separate sections joined firmly on a bed shaped to line and grade and shall follow manufacturer's guidelines.

3.4 Jointing

A. Concrete Pipe

1. Flexible Watertight Joints: Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

2. External Sealing Band Joint for Noncircular Pipe: Surfaces to receive sealing bands shall be dry and clean. Bands shall be installed in accordance with manufacturer's recommendations.

3.5 Drainage Structures

A. Manholes and Inlets

1. Construction shall be of reinforced concrete or precast reinforced concrete, complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated.

2. Pipe connections to concrete manholes and inlets shall be made with flexible, watertight connectors.

B. Walls and Headwalls: Construction shall be as indicated.

3.6 Steel Ladder Installation

A. Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6 feet vertically, and shall be installed to provide at least 6 inches of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 Backfilling

A. Backfilling Pipe in Trenches

1. After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth.

2. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe.

3. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation equal to the midpoint (spring line) of RCP or has reached an elevation of at least 12 inches above the top of the pipe for flexible pipe.

4. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 6 inches.

5. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Engineer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly.

    a. Untreated sheeting shall not be left in place beneath structures or pavements.

B. Backfilling Pipe in Fill Sections

1. For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below.

2. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming.

3. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less.

4. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 8 inches. Use select granular material for this entire region of backfill for flexible pipe installations.

C. Movement of Construction Machinery: When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be

avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

D. Compaction
1. Minimum Density

a. Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

b. Under paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.

c. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

d. Under nontraffic areas, density shall be not less than that of the surrounding material.

2. Determination of Density:

a. Testing is the responsibility of the Contractor and performed at no additional cost to the Owner. Testing shall be performed by an approved commercial testing laboratory.

b. Tests shall be performed in sufficient number to ensure that specified density is being obtained.

c. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D698 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper.

d. Field density tests shall be determined in accordance with ASTM D2167 or ASTM D6938. When ASTM D6938 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D6938 results in a wet unit weight of soil and ASTM D6938 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D6938.

e. Test results shall be furnished the Engineer. The calibration checks of

both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

3.8 Pipeline Testing

A. Leakage Tests

1. Lines shall be tested for leakage by low pressure air or water testing or exfiltration tests, as appropriate.

    a. Low pressure air testing for concrete pipes shall conform to ASTM C969.

    b. Low pressure air testing for plastic pipe shall conform to ASTM F1417.

    c. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C828 or ASTM C969, after consultation with the pipe manufacturer.

2. Testing of individual joints for leakage by low pressure air or water shall conform to ASTM C1103. Prior to exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection.

3. Visible leaks encountered shall be corrected regardless of leakage test results.

4. When the water table is 2 feet or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Engineer.

5. An exfiltration test shall be made by filling the line to be tested with water so that a head of at least 2 feet is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested.

    a. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be reestablished.

    b. The amount of water required to maintain this water level during a 2-hour test period shall be measured.

    c. Leakage as measured by the exfiltration test shall not exceed 250 gallons per inch in diameter per mile of pipeline per day. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished.

B. Post-Installation Inspection

1. Check each reinforced concrete pipe installation for joint separations, soil migration through the joint, cracks greater than 0.01 inches, settlement and alignment.

2. Check each flexible pipe (HDPE, PVC) for rips, tears, joint separations, soil migration through the joint, cracks, localized bucking, bulges, settlement and alignment.

3. Replace pipes having cracks greater than 0.1 inches in width or deflection greater than 5 percent deflection.

4. An engineer shall evaluate all pipes with cracks greater than 0.01 inches but less than 0.10 inches to determine if any remediation or repair is required.

5. Repair or replace any pipe with crack exhibiting displacement across the crack, exhibiting bulges, creases, tears, spalls, or delamination.

6. Reports: The final post installation inspection report shall include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design, grade, deviation from line, deflection and deformation of flexible pipe systems, inspector notes, condition of joints, condition of pipe wall (e.g. distress, cracking, wall damage dents, bulges, creases, tears, holes, etc.).

END OF SECTION