FAYETTEVILLE NC
AMERICA'S CAN DO CITY

PURCHASING

April 7, 2026

MEMO TO: Prospective Bidders

FROM: Kimberly Toon, Purchasing Manager

SUBJECT: **Addendum #2:** Tryon Drive Drainage Improvements Project -Re-Advertisement

DUE DATE AND TIME: **APRIL 14, 2026; 2:00 p.m.**

1. The Bid Documents are hereby modified by this Addendum #2 dated April 7, 2026. To include the following:

    a. **Replace Project Manual sections 00 01 07 through Appendix F (attached-sealed by Kimley-Horn)**

        i. **Note: Construction Drawings in Appendix F are the same as previously included; see Addendum 2 items for revisions.**
        ii. **Project Manual replacement pages (sealed 12/1/2025) are attached.**

    b. **Clarifications– (attached-sealed by Kimley-Horn)**

    c. **Project Special Provisions, Item B-18 – (attached-sealed by Kimley-Horn)**

    d. **Pre-bid Meeting Sign in Sheet – Attached**

    e. **Q&A (attached-sealed Addendum 2 by Kimley-Horn)**

    f. **Updated Section 00 41 16 – Bid Form (replaces bid form in 12/1/2025 Project Manual - Attached)**

2. The foregoing changes shall be incorporated in the Bid Documents, and a copy of the Addendum #2, signed by the Bidder, must accompany the Bid to indicate the Bidder's familiarity with the changes.

Bidder Acknowledgement:

Bidder Name (Print):_____

Bidder Signature:_____

Date of Signature:_____

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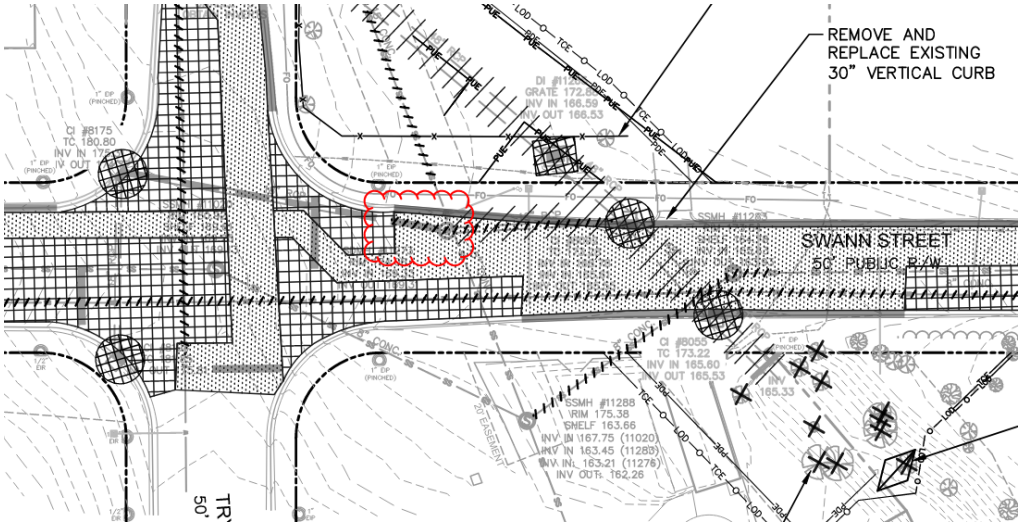
TO: PROSPECTIVE BIDDERS HOLDING PLANS AND SPECIFICATIONS

RE: TRYON DRIVE DRAINAGE IMPROVEMENTS PROJECT ADDENDUM NO. 2

The following changes and clarifications are applicable to the referenced project and are now a part of its Contract Documents. Where any article, division, or subparagraph of the original contract documents or other addenda is supplemented herein, the provisions of the original documents shall remain in effect. All the supplemental provisions shall be considered as added thereto. Where any such article, division, or subparagraphs are amended, voided, or superseded thereby, the provisions of such article, division, or subparagraph not so specifically amended, voided, or superseded shall remain in effect.

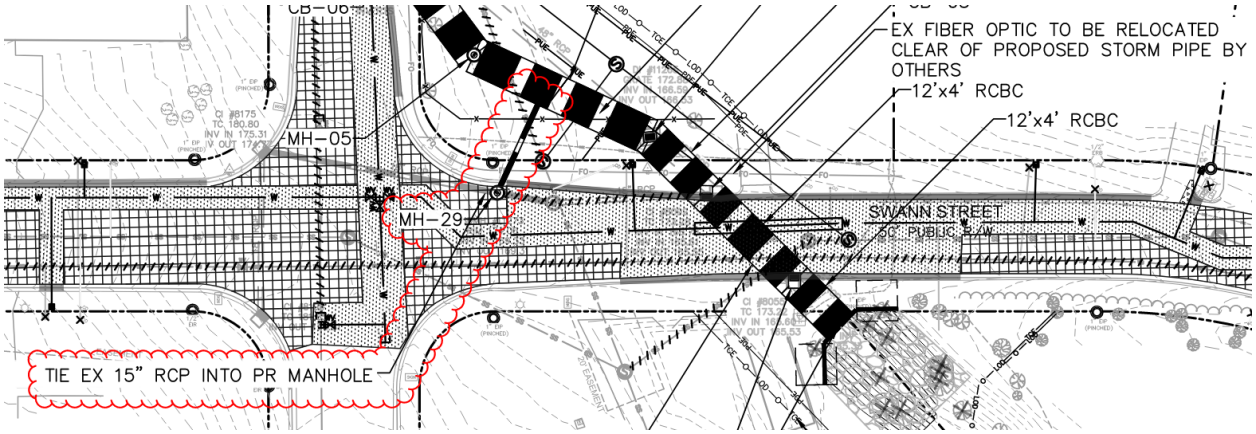
The attention of each contractor is called to the following clarifications, additions to, and changes in the plans signed November 24, 2025, and specifications signed July 28, 2025, on the above project. It will be the responsibility of each contractor to call such clarifications, additions, and changes in plans and specifications to the attention of subcontractors concerned. The City in no way assumes any responsibility for notifying any subcontractor, material dealers, or others not having received the original Contract Documents.

Bidder must acknowledge receipt of this Addendum by including a copy with the bid and initialing in the lower left corner of each page. All addenda must be acknowledged in Article 5 of the Bid Form, Section 00 41 14. Bidder shall use revised Section 00 41 16 for bid; original pages with strikethroughs will not be accepted.

Item 1:	• **Replace Project Manual sections 00 01 07 through Appendix F (sealed in 00 01 07 on 7/28/2025) in its entirety with addendum Attachment 1 (sealed 12/1/2025). Edits to the Project Manual described in this addendum modify the 12/1/2025 version.** • **Replace the Bid Form in the 12/1/2025 version of the Project Manual with the version attached hereto.**
Item 2:	**Construction Drawings – any change specified or shown to a single sheet shall apply across all drawings where applicable without having to be shown on each drawing.** • Sheet 6 of 45 – Modify to include removal of the section of 18" RCP and manhole as shown below. 

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- Page 8 of 45
  - Modify the location of the proposed storm manhole and add note as shown below.



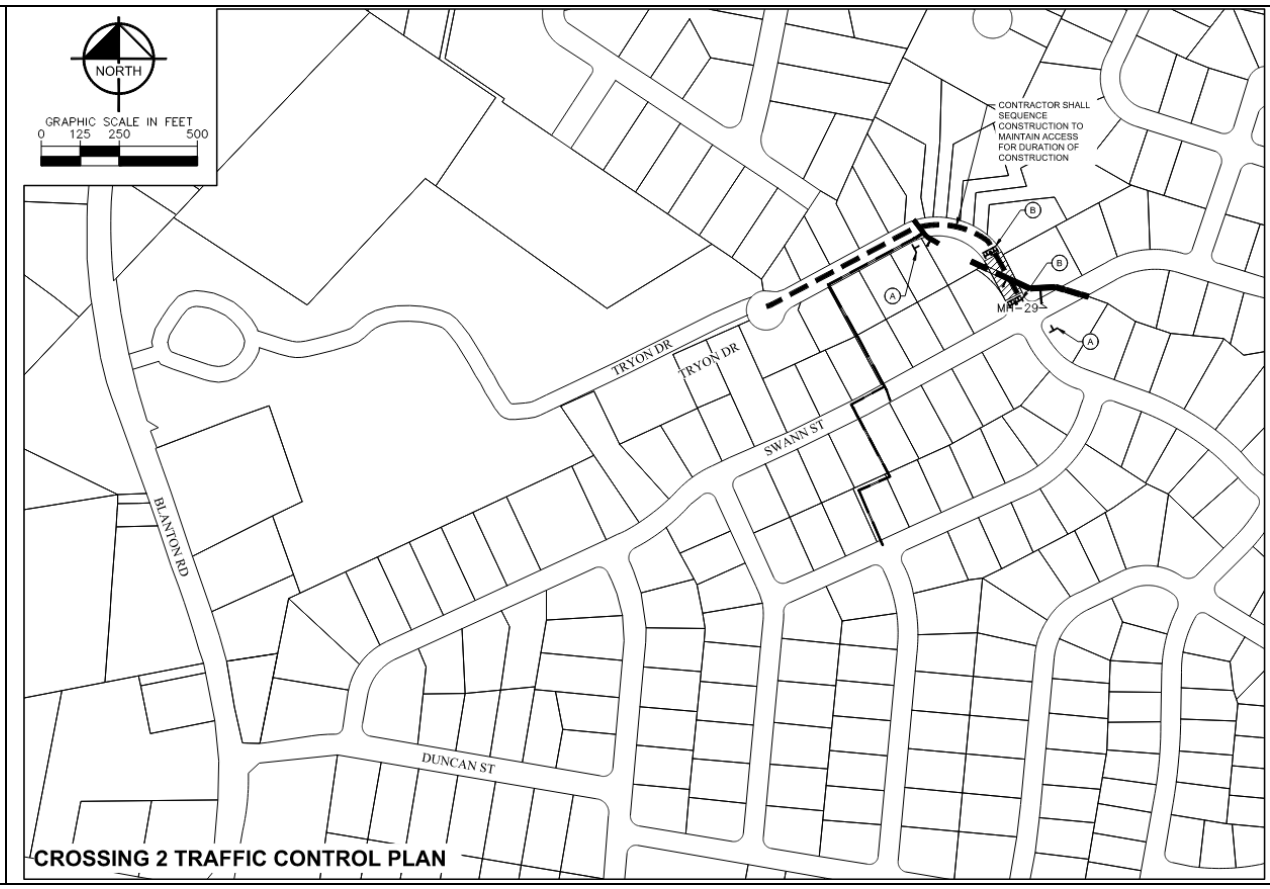
  - Modify Note 2 as shown below:

2. THE FOLLOWING DETAILS APPLY TO THE VARIOUS STRUCTURE DESIGNATIONS:

*MH	COF ~~DR-14, DR-14.1~~ DR-6, DR-6.1
*DI	COF DR-16
*CB	COF DR-3, DR-3.1
*EW	SEE STRUCTURAL DESIGN SHEETS
*CB-11	DR-1, DR-3.1 WITH OVERSIZED CATCH BASIN STRUCTURE, SEE STRUCTURAL DESIGN SHEETS.

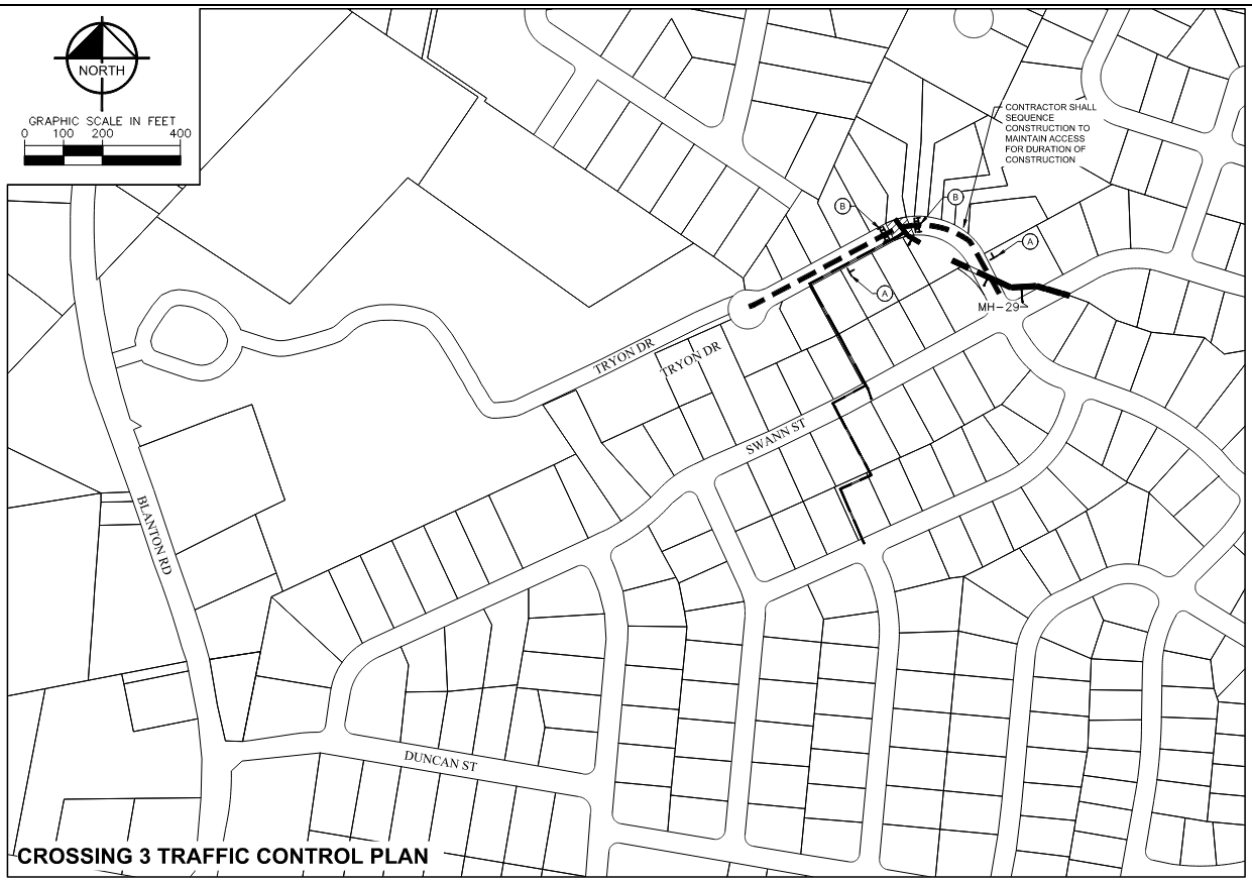
- Page 9 of 45 – Modify Crossing 2 Traffic Control Plan and Crossing 3 Traffic Control Plan as shown below. Note, detour via adjacent apartment complex will not be available to meet access requirements.

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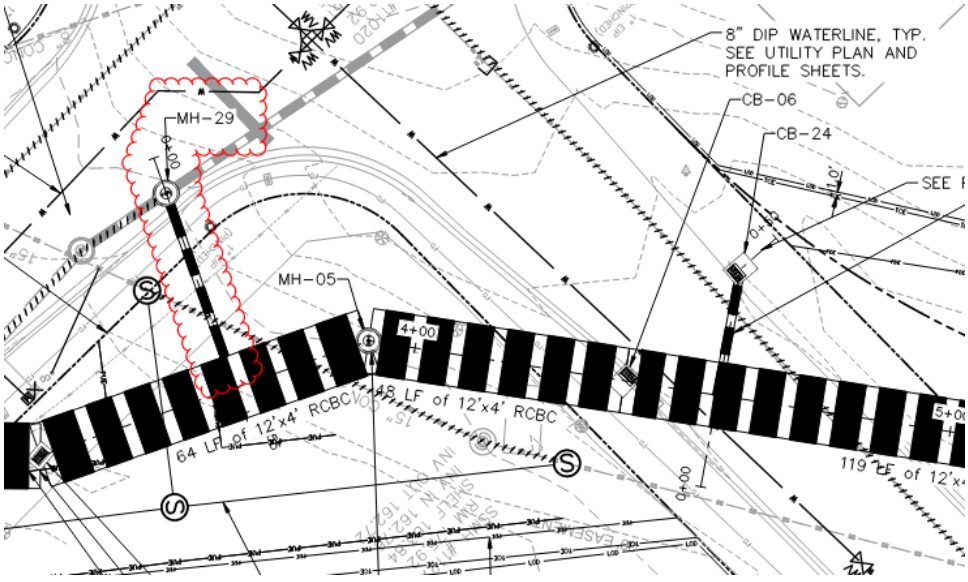


Addendum #2 _____

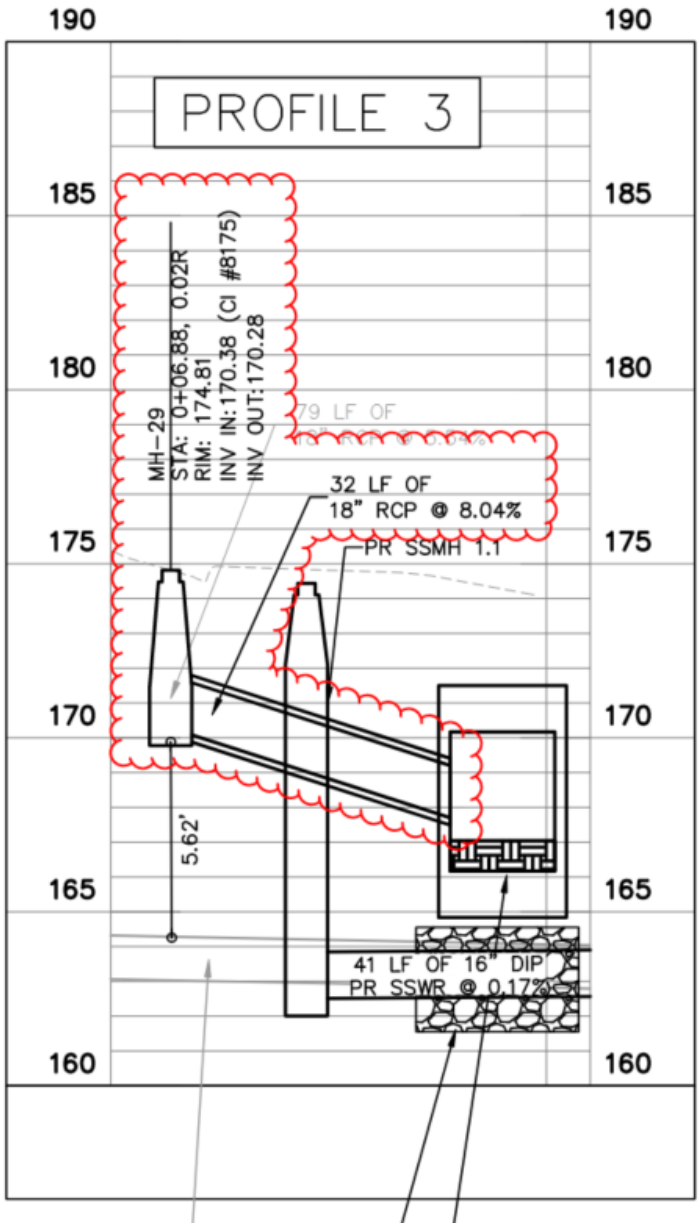
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- Sheet 11 of 45 – Modify Profile 3 as shown below to account for revised location of storm Manhole MH-29.



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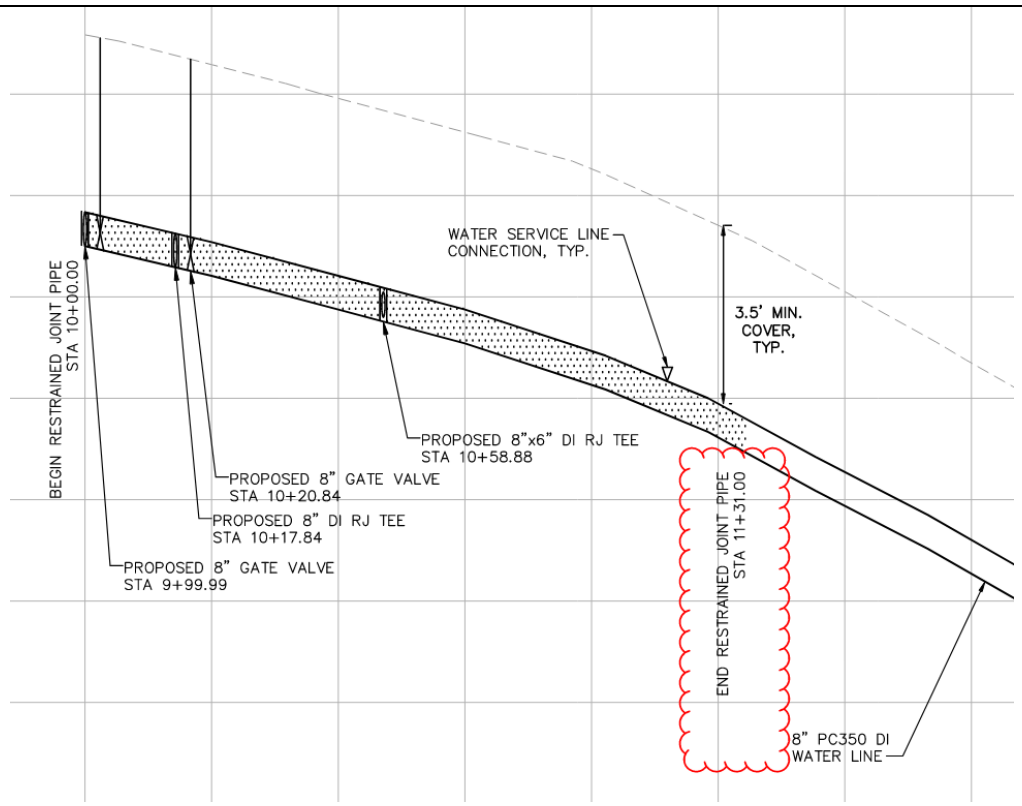


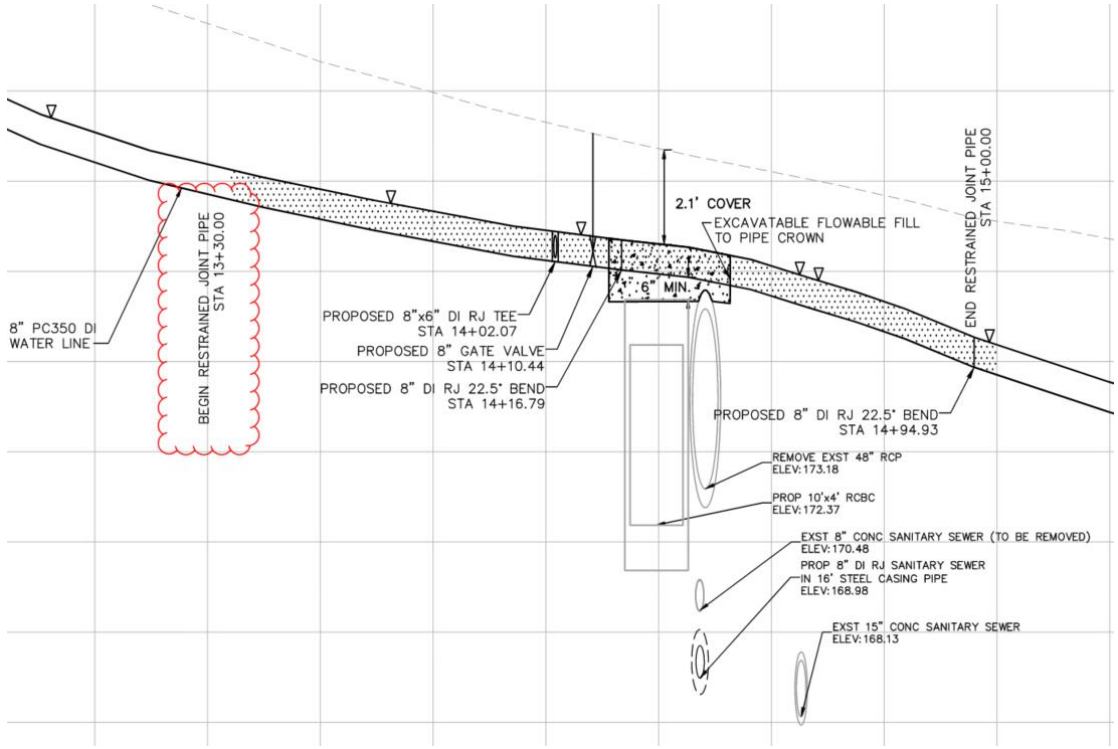
- Sheet 21 of 45
  - Replace Note 5 with the below note:

Sewer service line shall be made of 4" SDR-26 PVC unless the following vertical separations are not achieved, in which case the sewer service line shall be DI: 24" between storm and sanitary sewer service; 18" between water and sanitary sewer service (sanitary sewer service below the water main); or all sanitary sewer services above water mains. Service line slope shall be 2% minimum.

  - Modify limits of restrained joint pipe as shown below.

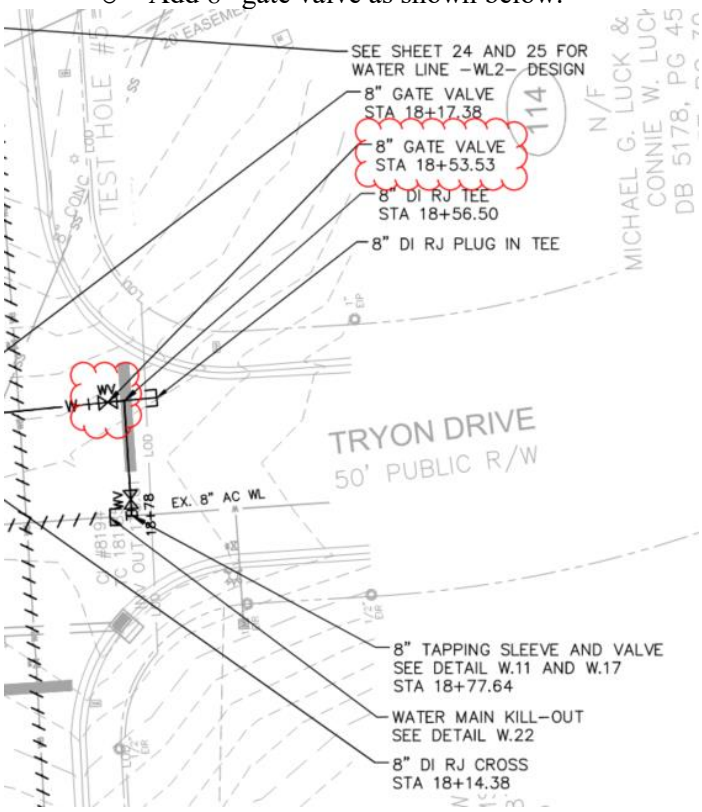
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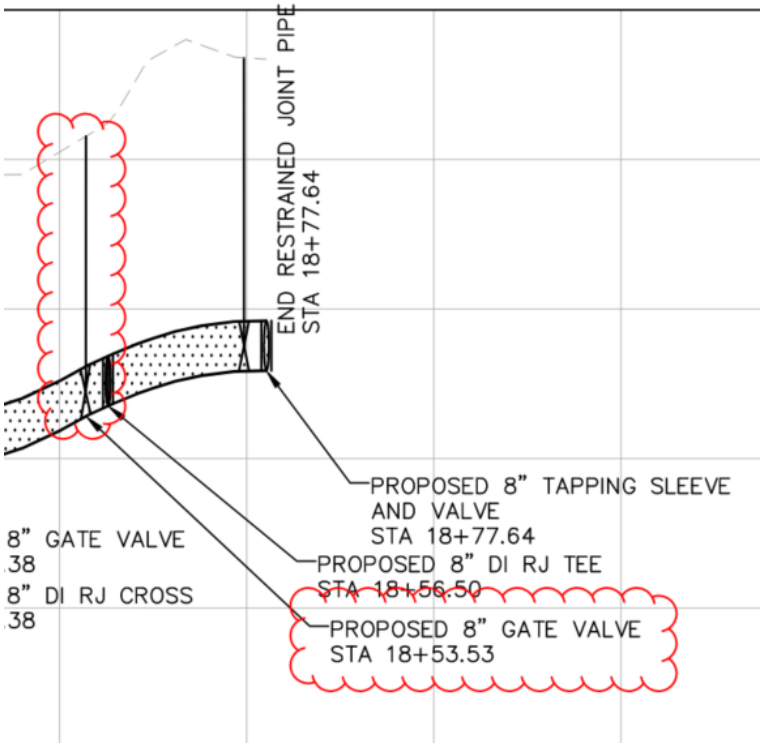


- Sheet 22 of 45:
  - Replace Note 5 with the below note:

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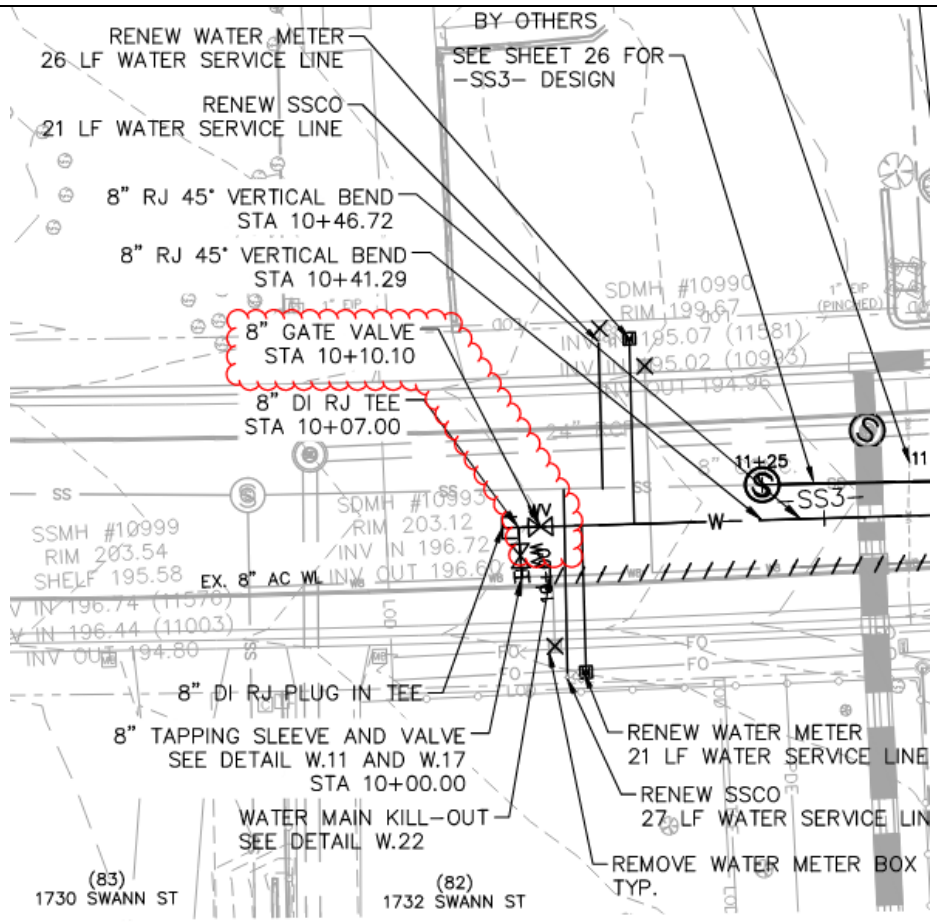
	Sewer service line shall be made of 4" SDR-26 PVC unless the following vertical separations are not achieved, in which case the sewer service line shall be DI: 24" between storm and sanitary sewer service; 18" between water and sanitary sewer service (sanitary sewer service below the water main); or all sanitary sewer services above water mains. Service line slope shall be 2% minimum. o Add 8" gate valve as shown below. 

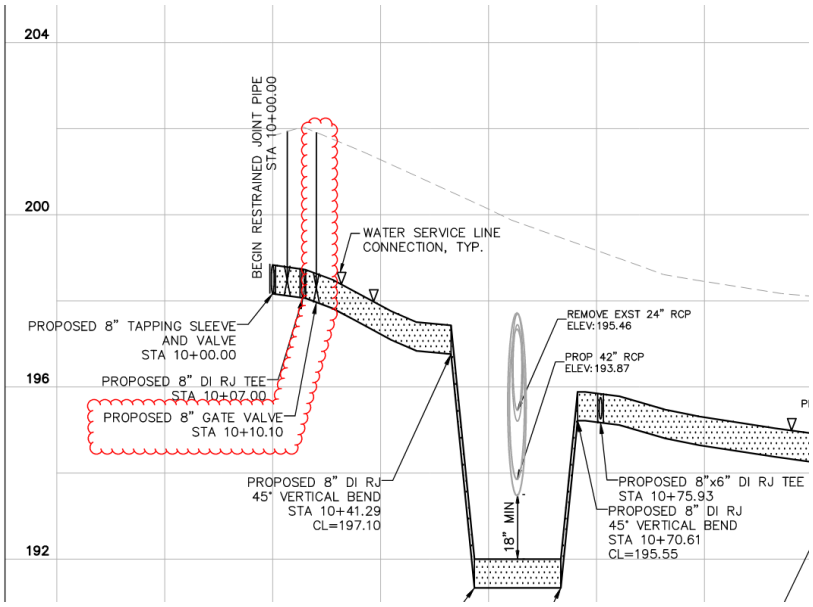
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- Sheet 23 of 45
  - Add 8" gate valve as shown below.
  - Modify limits of restrained joint pipe as shown below.

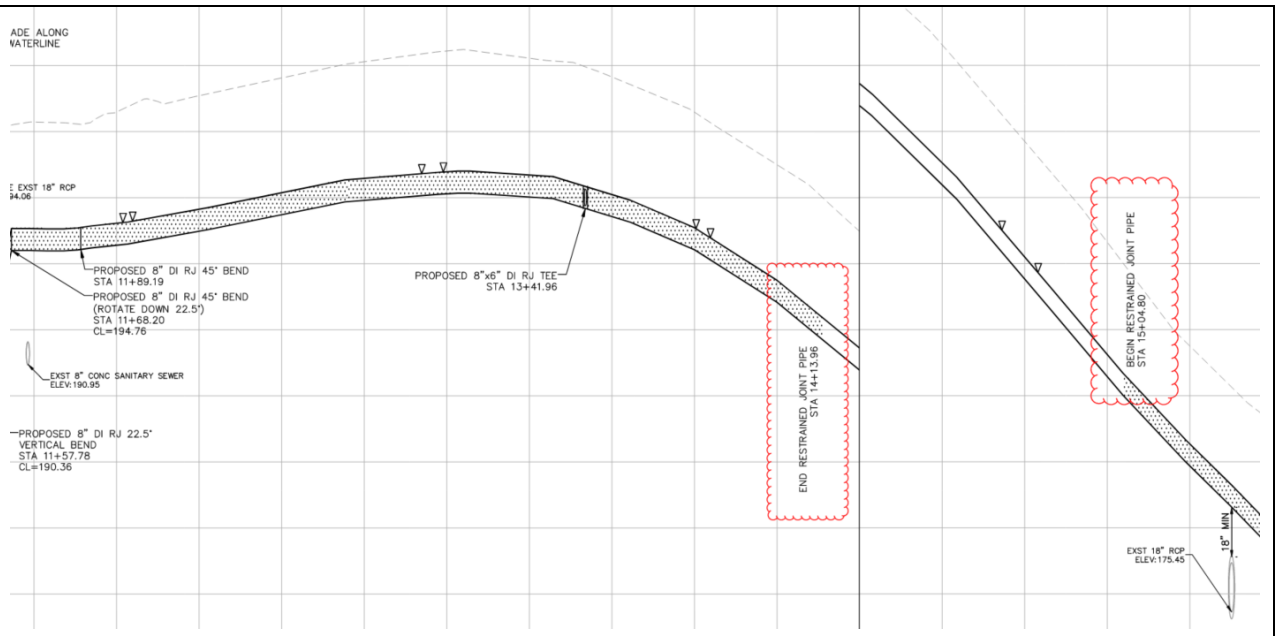
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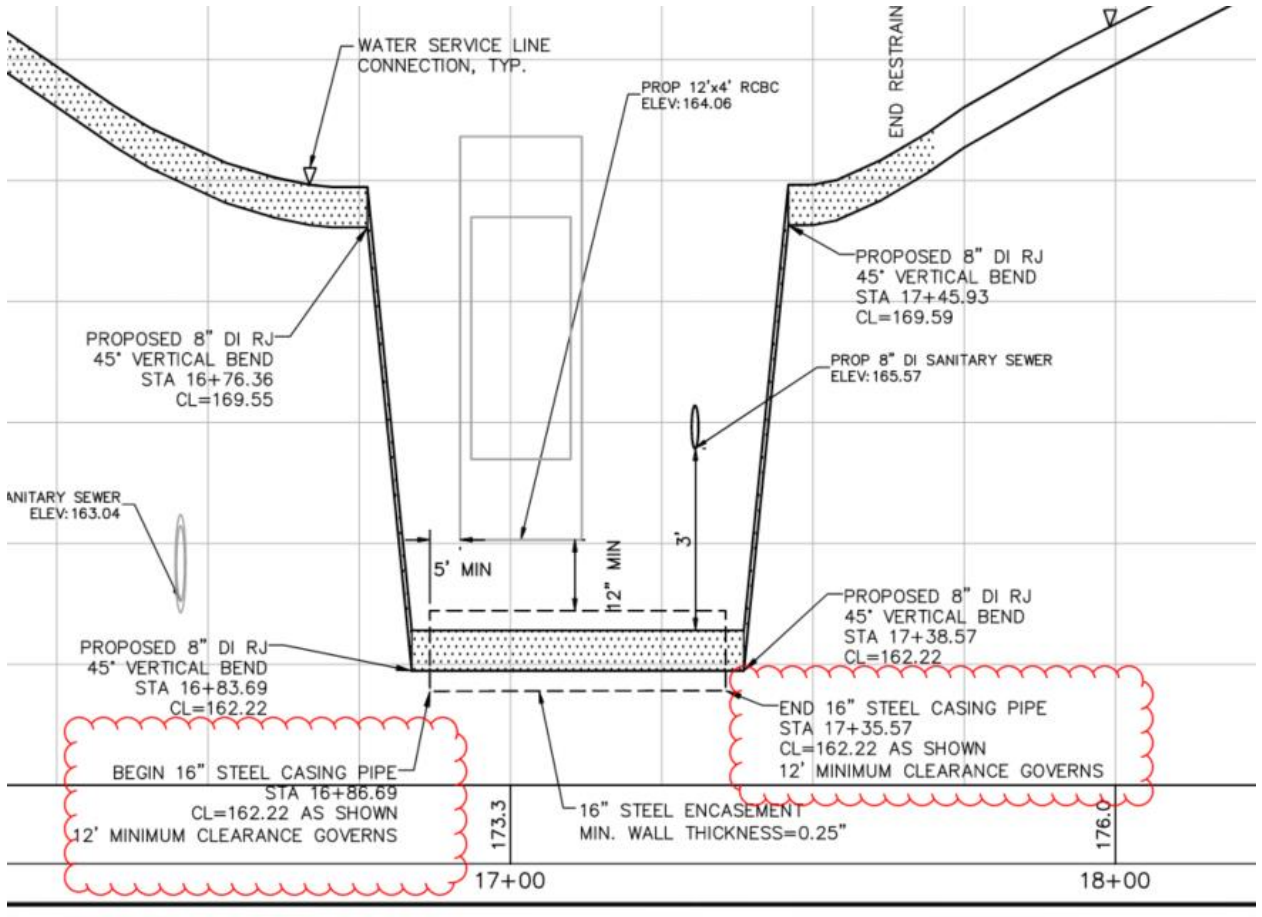


Addendum #2 _____

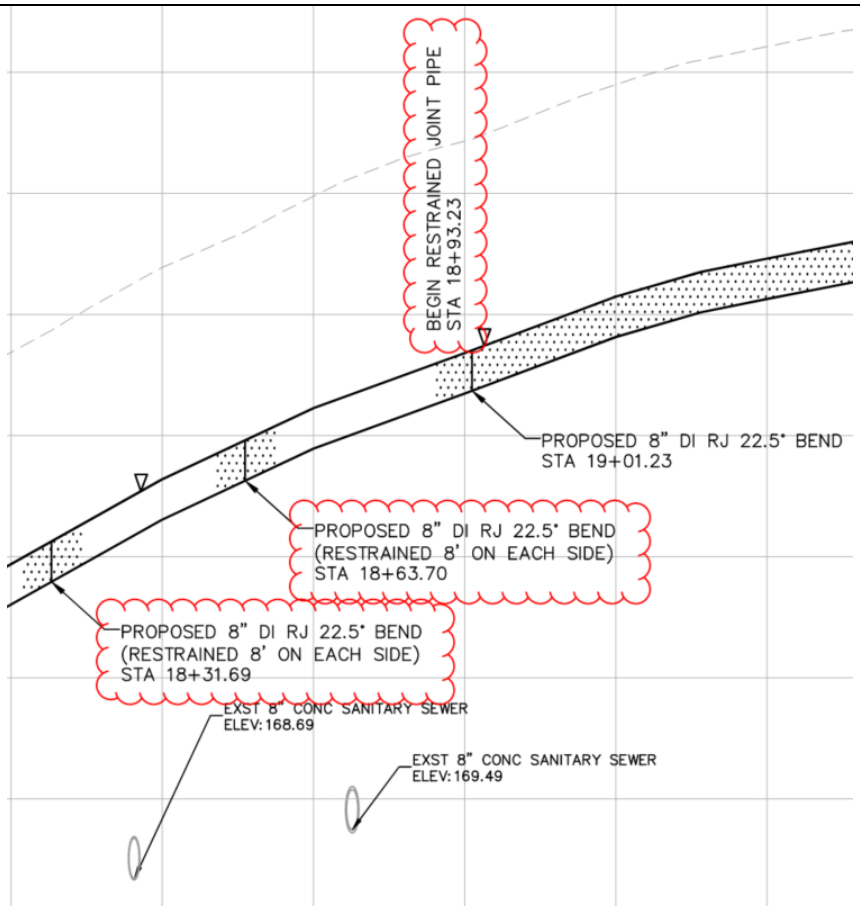
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- Sheet 24 of 45
  - Modify casing pipe notes as shown below.
  - Modify limits of restrained joint pipe as shown below.



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Item 3	**Clarifications** • Horizontal datum for plans is NAD 83 (2011). The Vertical datum for plans is NAVD 88. • For all locations where AC line is in conflict with proposed piping (storm, sewer, water, etc.), the AC line must be removed and disposed of at a location with all required permits. This shall be considered incidental; there shall be no measurement or payment for this work. • Note that all PWC Standard Details apply for the project. The Contractor's attention is called to PWC Standard Detail S.10, which applies to all sewer services/laterals. Wyes, saddles, or taps shall be separated horizontally at least five (5) feet, measured along the pipe. • Elevations for all waterline bends (horizontal and vertical) shall be recorded on Contractor asbuilts. • Note that restrained joint pipe shall not be paid separately from other types of pipe. Cost for all pipe types shall be incorporated into the unit cost for DI Water Line. • All proposed water mains shall be factory restrained within a casing. Proposed sewer mains shall be factory restrained or restrained with field-lok gaskets within a casing. There shall be no mechanical restraint permitting within a casing.
Item 4	**Project Special Provisions, Item B-18** Update the Description to add the following *italicized* sentence:

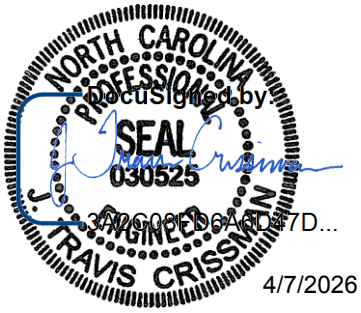
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	Description Provide new complete water meter assembly, including meter box and all other components within the meter box, as shown on the Drawings and as directed by the Owner or Engineer. *All components shall be new except water meter itself, which shall be reused from existing water meters.* Connect water meter to service lateral from main and to service line entering private property. Water meters shall meet applicable requirements of PWC Master Specifications Section 02660 and applicable PWC details.
Item 5	**Contractor Questions** 1. Under the line item for A-04) Unclassified and Undercut Excavation- what material are we backfilling with? Answer: Section 00127, paragraph 1.10 of the technical specifications states that backfill shall consist of "select granular material". 2. For Permanent Seeding, the quantity is listed as 1 SY. Should this instead be 1 Lump Sum? Answer: See updated bid form for corrected quantity. 3. I have not seen any addendums or RFI documents to the city website. When will these be posted? Answer: Addendum #1 was issued 3/30/26, in which the bid due date and time was changed to April 14, 2026 at 2:00 pm. 4. Will a new bid form be released? The scope of work has changed from the original bid. However, the bid form remained the same. Will quantities and descriptions be updated? Answer: See attached updated Project Manual sections sealed 12/1/2025. Note that the bid form attached hereto replaces the bid form in the 12/1/2025 version of the Project Manual.

ATTACHMENTS:

1. Project Manual replacement pages (sealed 12/1/2025)
2. Updated Section 00 41 16 – Bid Form (replaces bid form in 12/1/2025 Project Manual)
3. March 3, 2026 pre-bid meeting sign-in sheet

ALL OTHER CONDITIONS AND DOCUMENTS REMAIN THE SAME.



By: Travis Crissman, P.E.
Kimley-Horn and Associates, Inc.

END OF ADDENDUM #2

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00 41 16 Bid Form Exhibit A

Project:	Tryon Drive Drainage Items		**Project No.:**
Owner:	City of Fayetteville		
Engineer:	Kimley-Horn and Associates		
Offeror:			

Base Bid

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Extended Amount
Items in Base Bid (excluding Allowances) per Section 01 29 01 "Measurement and Basis for Payment"					
A-01	MOBILIZATION (MAX 5% OF "A" ITEM TOTAL)	LS	1		
A-02	TRAFFIC CONTROL (MAX 5% OF "A" ITEM TOTAL)	LS	1		
A-03	CLEARING AND GRUBBING	AC	2		
A-04	UNCLASSIFIED AND UNDERCUT EXCAVATION	CY	490		
A-05	STONE CONSTRUCTION ENTRANCE	EA	4		
A-06	ROCK CHECK DAM	EA	1		
A-07	SILT SACK	EA	14		
A-08	DROP INLET PROTECTION	EA	2		
A-09	DEWATERING OF CONSTRUCTION AREA	LS	1		
A-10	STORMWATER BYPASS PUMPING	LS	1		
A-11	SILT FENCE	LF	2,200		
A-12	SELECTED TREE REMOVAL, 10"	EA	5		
A-13	SELECTED TREE REMOVAL, 15"	EA	10		
A-14	REMOVE AND DISPOSE OF EXISTING 15" RCP	LF	10		
A-15	REMOVE AND DISPOSE OF EXISTING 18" RCP	LF	69		
A-16	REMOVE AND DISPOSE OF EXISTING 24" RCP	LF	770		
A-17	REMOVE AND DISPOSE OF EXISTING 30" RCP	LF	304		
A-18	REMOVE AND DISPOSE OF EXISTING 42" RCP	LF	366		
A-19	REMOVE AND DISPOSE OF EXISTING 48" RCP	LF	380		
A-20	REMOVE AND DISPOSE OF EXISTING STORMWATER STRUCTURE	EA	15		
A-21	REMOVE AND DISPOSE OF EXISTING ENDWALL/WINGWALL	EA	4		
A-22	REMOVE AND DISPOSE OF EXISTING OVERSIZED STRUCTURE	EA	1		
A-23	SHED RELOCATION AND DECK REMOVAL (1716 TRYON DR.)	LS	1		
A-24	TEMPORARY SHED RELOCATION (1733 DAISY LN.)	LS	1		
A-25	REMOVE, STORE, AND RESET BLOCK WALL AT 1735 SWANN ST.	LF	136		
A-26	REMOVE, STORE, AND RESET BRICK WALL AT 1730 SWANN ST.	LF	15		
A-27	REMOVE AND DISPOSE OF CHAIN LINK FENCE	LF	611		
A-28	REMOVE AND DISPOSE OF WOOD LATTICE FENCE	LF	75		
A-29	REMOVE AND DISPOSE OF WOOD/PVC PRIVACY FENCE	LF	12		
A-30	CHAIN LINK FENCE (5' HEIGHT)	LF	611		
A-31	WOOD LATTICE FENCE (4' HEIGHT)	LF	75		
A-32	WOOD/PVC PRIVACY FENCE (6' HEIGHT)	LF	12		
A-33	REMOVE, STORE, AND RESET WROUGHT IRON FENCE	LF	300		
A-34	TEMPORARY 4' TALL CHAIN LINK BARRIER FENCE	LF	650		
A-35	SHEET PILE FOUNDATION PROTECTION	SF	5,150		
A-36	STANDARD CATCH BASIN, 0'-6' DEPTH	EA	3		
A-37	STANDARD CATCH BASIN, 6'-8' DEPTH	EA	5		
A-38	OPEN THROAT CATCH BASIN, 0'-6' DEPTH	EA	1		
A-39	OPEN THROAT CATCH BASIN, 6'-8' DEPTH	EA	2		
A-40	OPEN THROAT CATCH BASIN, 8'-10' DEPTH	EA	1		
A-41	JUNCTION BOX, 0'-6' DEPTH	EA	3		

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Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Extended Amount
A-42	JUNCTION BOX, 6'-8' DEPTH	EA	2		
A-43	12' x 4' RC BOX CULVERT BEND, 6'-8' DEPTH	EA	3		
A-44	10' x 4' RC BOX CULVERT BEND, 6'-8' DEPTH	EA	1		
A-45	WINGWALLS, ENDWALLS, CURTAIN WALLS ON STRUCTURAL SHEETS	CY	190		
A-46	10' x 4' RC BOX CULVERT	LF	90		
A-47	12' x 4' RC BOX CULVERT	LF	320		
A-48	18" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	35		
A-49	24" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	0	------	------
A-50	30" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	45		
A-51	36" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	155		
A-52	42" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	745		
A-53	42" RCP STORM SEWER, CLASS IV, 0'-6' DEPTH	LF	200		
A-54	RIP RAP, CLASS I WITH FILTER FABRIC	TN	500		
A-55	PERMANENT SEEDING	SY	10,000		
A-56	SOD	SY	9,800		
A-57	TOPSOIL	CY	1,000		
A-58	REMOVE AND REPLACE CONCRETE CURB AND GUTTER	LF	1,250		
A-59	REMOVE AND REPLACE EXISTING CONCRETE DRIVEWAYS (NO OVERAGE ALLOWED)	SY	170		
A-60	REMOVE AND DISPOSE OF EXISTING ASPHALT PAVEMENT	SY	1,890		
A-61	TEMPORARY PAVEMENT PATCH	SY	1,890		
A-62	THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)	LF	1,020		
A-63	MILLING BITUMINOUS PAVEMENT	SY	2,000		
A-64	1.5" THICK S9.5B ASPHALT OVERLAY	SY	3,890		
B-01	MOBILIZATION (MAX 5% OF "B" ITEM TOTAL)	LS	1		
B-02	TRAFFIC CONTROL (MAX 5% OF "B" ITEM TOTAL)	LS	1		
B-03	REMOVE AND REPLACE CONCRETE CURB AND GUTTER - PWC	LF	1,230		
B-04	REMOVE AND DISPOSE OF EXISTING ASPHALT PAVEMENT - PWC	SY	2,120		
B-05	TEMPORARY PAVEMENT PATCH - PWC	SY	2,120		
B-06	FLOWABLE FILL AT UTILITY CROSSINGS - PWC	CY	10		
B-07	8" PC350 DI WATER LINE - PWC	LF	1,980		
B-08	DUCTILE IRON WATER PIPE FITTINGS - PWC	LB	4,800		
B-09	6" GATE VALVE - PWC	EA	4		
B-10	8" GATE VALVE - PWC	EA	11		
B-11	8" TAPPING SLEEVE AND VALVE - PWC	EA	5		
B-12	WATER MAIN KILL-OUT - PWC	EA	7		
B-13	FIRE HYDRANT - PWC	EA	4		
B-14	HYDRANT LEG - PWC	LF	60		
B-15	16" STEEL ENCASEMENT PIPE - PWC	LF	50		
B-16	24" STEEL ENCASEMENT PIPE - PWC	LF	21		
B-17	30" STEEL ENCASEMENT PIPE - PWC	LF	25		
B-18	RENEW WATER METER - PWC	EA	31		
B-19	WATER SERVICE LINE - PWC	LF	700		
B-20	8" P-401 DI SANITARY SEWER - PWC	LF	225		
B-21	12" P-401 DI SANITARY SEWER - PWC	LF	51		
B-22	16" P-401 DI SANITARY SEWER - PWC	LF	115		
B-23	RENEW SANITARY SEWER CLEANOUT - PWC	EA	29		

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Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Extended Amount
B-24	SEWER SERVICE LINE - PWC	LF	750		
B-25	4' DIA SANITARY SEWER MANHOLE - PWC	EA	4		
B-26	4' DIA MANHOLE WALL - PWC	LF	20		
B-27	6' DIA SANITARY SEWER MANHOLE - PWC	EA	3		
B-28	6' DIA MANHOLE WALL - PWC	LF	20		
B-29	REMOVE FIRE HYDRANT - PWC	EA	2		
B-30	REMOVE MANHOLE - PWC	EA	2		
B-31	ABANDON 8" UTILITY PIPE - PWC	LF	2,150		
B-32	ABANDON 15" UTILITY PIPE - PWC	LF	85		
B-33	CORED CONNECTION TO EXISTING MANHOLE - PWC	EA	2		
B-34	SANITARY SEWER BYPASS PUMPING - PWC	LS	1		
	Total Base Bid Items Amount (Sum of Extended Amounts for each Base Bid Line Item) in Figures: (I.E. 1,727,850.00)				
	Total Base Bid Items Amount (Sum of Extended Amounts for each Base Bid Line Item) in Writing:				
	I.E. One Million Seven Hundred Twenty-Seven Thousand Eight Hundred Fifty Dollars and No Cents				

BID SUBMITTED BY:

Offeror: _____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

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PRE-BID TRYON DRIVE DRAINAGE PROJECT RE-ADVERTISEMENT

DATE: MARCH 03, 2026 TIME: 2:00 pm

SUBJECT: PRE-BID TRYON DRIVE DRAINAGE PROJECT

NAME	COMPANY	PHONE	FAX	MOBILE	E-MAIL
Jeff Riddle	City of Fayetteville	910-322-6358			jeffrevriddle@fayettevillenc.gov
ETHAN RIDDLE	CoF	910 433 1271			ETHANRIDDLE@FAYETTEVILLENC.GOV
Ben Sullivan	Moffat Pipe	919-295-4638			Bids@moffatpipe.com
BOB SHULTES	INFRASTRUCTURE CONSULT & ENGR	919-650-9975			bob.shultes@ice-eng.com
MICHAEL SCHORTINO	INFRASTRUCTURE CONSULTANTS LLC	252-432-5354			MIKE.SCHORTINO@ICE-RALE.COM
Jordan Betts	Gitto Enterprises INC	919 809 2860			pete@gittobuilds.com
Derek Andrews	Fred Smith Company	984-209-0785			dandrews@fredsmithcompany.net
Joe Hollis	Fred Smith Company	984-332-0138			jhollis@fredsmithcompany.net
BJ Lanier	Lanier Construction	252-286-6739			bj@lanierconstruction.com
Jimmy Coats	Pipeline Utilities	910-237-3931			jcoats@pui-nc.com
Tim Arnetto	TARR Corp	910-739-8899			Timarnetto.8199@gmail.com
Wil Whitley	Symco Construction	919-202-5659			Symco.Construction@gmail.com

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PRE-BID TRYON DRIVE DRAINAGE PROJECT RE-ADVERTISEMENT

DATE: MARCH 03, 2026 TIME: 2:00 pm

SUBJECT: PRE-BID TRYON DRIVE DRAINAGE PROJECT

NAME	COMPANY	PHONE	FAX	MOBILE	E-MAIL
Jeff Riddle	City of Fayetteville	910-322-6358			jeffreyriddle@fayettevillenc.gov
Jim Talian	COF	910-929-5970			jamestalian@"
Scott Johnson	Pink Ribbon Truck	910-624-8729			
Jeff Greer	Gillespie Precast	704-330-3512			jgreer@gillespieprecast.com
Travis Crissman	Kimley-Horn	984-275-3576			travis.crissman@kimley-horn.com
Anthony Biagini	Roadworks	617-435-3021			abiagini@roadworksconstruction.com
BRIANNA GEMMELL	PWC				BRIANNA.GEMMELL@FAYPWC.COM

Tryon Drive Drainage Improvements

DIVISION 00

FAYETTEVILLE NC

AMERICA'S CAN DO CITY

A message from the City of Fayetteville City Manager, Douglas J. Hewett, ICMA-CM

The City of Fayetteville is fully committed to provide Small Local Business Enterprises (SLBE's) an equal opportunity to participate in all aspects of City contracting including, but not limited to, participation in the procurement of contracts relating to the construction of and improvements to facilities throughout the City. It is also the policy of the City to prohibit discrimination against any person or business in pursuit of these oppo1tunities on the basis of race, sex, color, religion or national origin and to conduct its contracting and purchasing programs so as to prevent such discrimination. The City is also committed to follow all applicable State and Federal laws as they relate to procurement practices.

The City will actively seek and identify qualified SLBE's and offer them the opportunity to participate in the procurement of contracts for all City purchasing and service contracts as well as construction and repair contracts.

The City aspires to spend 40% of its eligible contract dollars with small local suppliers and contractors. Towards this end the City's Charter has been amended by the General Assembly (H.B. 198) to allow the City to establish a race and gender neutral small business enterprise program to promote the development of small local businesses. The City is authorized to establish bid and proposal specifications that include subcontracting goals and good-faith effort requirements to enhance participation by small business enterprises located in Cumberland and Hoke Counties.

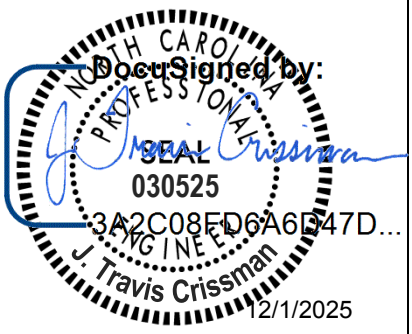
For more information or questions about the SLBE policy, please contact the Purchasing Division at 910-433-1942.

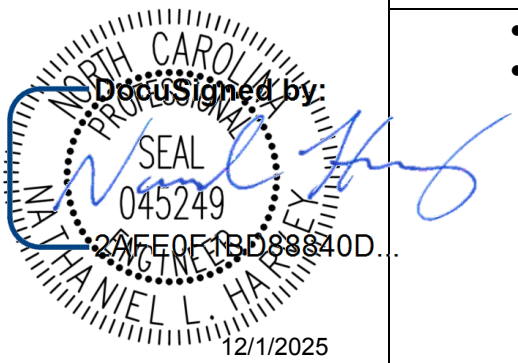
CITY OF FAYETTEVILLE

Douglas J. Hewett, ICMA-CM
City Manager

Docusign Envelope ID: 56987AD7-EF4A-42B4-81B8-956660DBC2B7

00 01 07 ENGINEER'S SEALS

[Place seal here]	Specification Sections Sealed	
		• Technical Specifications (City) • Non-Utility Project Special Provisions
PE License #030525 **Kimley-Horn** **Firm License #F-0102**		

	Specification Sections Sealed
	• Technical Specifications (Fayetteville PWC) • Water/Sewer Project Special Provisions
PE License #45249 **Kimley-Horn** **Firm License #F-0102**	

END OF SECTION

Docusign Envelope ID: 56987AD7-EF4A-42B4-81B8-956660DBC2B7

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6	EXISTING CONDITIONS EROSION CONTROL PHASE 1 AND DEMOLITION PLAN
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END OF SECTION

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ADVERTISEMENT FOR BIDS

City of Fayetteville
Fayetteville, NC
Tryon Drive Drainage Improvements

General Notice

City of Fayetteville (Owner) is requesting Bids for the construction of the following Project:

Tryon Drive Drainage Improvements

Bids for the construction of the Project will be received at **City of Fayetteville City Hall, Attn: Kimberly Toon** located at **City of Fayetteville City Hall, 433 Hay Street, Fayetteville, NC, 28301,** until **[day]**, **[date]** at **[time for receipt of Bids]** local time. At that time the Bids received will be publicly opened and read.

The Project includes the following Work:

Contractor shall complete all work as specified or indicated in the contract documents. The project is located in Cumberland County. Project is located within the city limits of Fayetteville, NC and consists of installation of approximately 1,250 feet of drainage piping and 400 feet of box culvert, beginning at the intersection of Daisy Lane/Webster Avenue and continuing across private lots, crossing Swann Street, private properties, then running along Tryon Drive. There are two Tryon Drive crossings and one additional Swann Street crossing. Also included is asbestos cement waterline abandonment and replacement with approximately 2,000 feet of 8" PC350 ductile iron waterline. Utility work includes renewal of water and sewer service laterals. The project also involves installation of storm inlets, manholes, sanitary sewer, endwalls and wingwalls, grading, rip rap, paving, curbing, driveways, erosion control, traffic control, etc.

The Project has an expected duration of **480** days.

Obtaining the Bidding Documents

Information and Bidding Documents for the Project can be found at the following designated website:

[URL for designated document website Procurement Website]

Bidding Documents may be downloaded from the designated website. Prospective Bidders are urged to register with the designated website as a plan holder, even if Bidding Documents are obtained from a plan room or source other than the designated website in either electronic or paper format. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

Pre-bid Conference

A pre-bid conference for the Project will be held on **[day, date]** at **[time]** at **339 Alexander Street, Fayetteville, NC, 28301.** Attendance at the pre-bid conference is encouraged but not required.

Instructions to Bidders.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

This Advertisement is issued by:

Owner: City of Fayetteville
By: Kimberly Toon
Title: Purchasing Manager
Date: **[Date of initial publication of advertisement]**

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

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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 Documents are to be issued, and which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.04 *Electronic Documents*

A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.

1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version **2022.001.20169** or later. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences

arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

C. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.

1. Electronic Documents that are available in native file format include:

a. **Existing Conditions CADD File**

2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.

3. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.

In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within fifteen (15) days of Owner's request, Bidder must submit the following information:

A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments. Use 00 45 13 "Qualifications Statement."

B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.

C. Bidder's state or other contractor license number, if applicable.

D. Subcontractor and Supplier qualification information.

E. Other required information regarding qualifications.

3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

4.01 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.

4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site and Other Areas*

A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:

a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.

b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.

c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

d. Technical Data contained in such reports and drawings.

2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in 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.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

1. See also Section 01 11 00 "Summary of Work" Part 1.05 "Consideration and Cooperation with Utilities" for further requirements.

2. See also Section 01 31 00 "Project Management and Coordination" Part 1.08 "Protection of Existing Structures and Utilities" for further requirements.

5.03 *Other Site-related Documents*

A. In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:

1. **Project Drawings**

Owner will make copies of these other Site-related documents available to any Bidder on request.

B. Owner has not verified the contents of these other Site-related documents, and Bidder may not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.

C. The other Site-related documents are not part of the Contract Documents.

D. Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.

E. No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.

B. A Site visit is scheduled following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.

C. Bidders visiting the Site are required to arrange their own transportation to the Site.

D. If the Site, in part or in whole, consists of private property and/or a secured area, then a site tour may be arranged though the City of Fayetteville, at its convenience. Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: .

E. If the Site, in part or in whole, consists of private property and/or a secured area, then a site tour may be arranged though the City of Fayetteville, at its convenience. Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site:

F. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

G. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

5.05 *Owner's Safety Program*

A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.06 *Other Work at the Site*

A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents. Addenda will be issued no later than **twenty-four (24) hours** prior to the Bid Opening.

7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Owner and Engineer in writing. Contact information and submittal procedures for such questions are as follows:

A. **Procurement Website as indicated in 00 01 16 "Advertisement for Bids for Construction Contract"**

7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than **forty-eight (48) hours** prior to the date for opening of Bids may not be answered.

7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

8.01 A Bid must be accompanied by Bid Security made payable to City of Fayetteville in the amount of five (5) percent of the Bidder's maximum Bid price (determined by adding the base bid and all alternates).

8.02 Bidders must submit an acceptable bid bond, cashier's check, or certified check as Bid Security with their Bid pursuant to North Carolina General Statute § 143-129. The acceptable bid bond must be issued by a surety legally authorized to do business in North Carolina and meet the requirements of the General Conditions. Cashier's or certified checks must be drawn on a bank or trust insured by the Federal Deposit Insurance Corporation and made payable to the City of Fayetteville. Checks shall be effective on the day Bids are opened and valid for a period of at least ninety (90) days from the date the check is issued.

8.03 The bid bond may be submitted as "C-430 2018 Bid Bond Penal Sum Form" or Bidders may provide their surety's standard penal sum bid bond form. The bid bond must reference the Owner and Project by name as identified in this Section.

8.04 Bidders must submit an acceptable Bid Security with their Bids as a guarantee that the Successful Bidder will enter into a contract for the Project with the Owner within 90 days from the date of the opening of the Bids. The Successful Bidder must execute the Contract Documents, including performance and payment bonds, and provide evidence of insurance as required by the Contract Documents.

8.05 Owner may annul the Notice of Award and retain the Bid Security of the apparent Successful Bidder upon Bidder's failure to execute and deliver the Agreement or Amendments to the Agreement.

8.06 Bid Securities are to remain in effect until the Contract is executed. Bid bonds will become void and checks will be returned by the Owner when the Contract is awarded, or all Bids are rejected.

ARTICLE 9—CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.

9.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 11—SUBCONTRACTORS

11.01 The Contractor shall submit to the Design Professional and the City a list giving the names and addresses of subcontractors, equipment suppliers, and material suppliers they propose to use, together with the scope of their respective parts of the work. At no time shall the Contractor subcontract more than 40% of the total original contract amount, except:

11.02 Any items designated in the contract as specialty items may be performed by a qualified subcontractor and the cost of such special items so performed by subcontract will be deducted from the total amount bid before computing the amount of work required to be performed by the Contractor and their own organization, and

11.03 Any other items sublet to Small Disadvantaged Business Enterprises, pursuant to Section 00 41 00 "Small Disadvantaged Business Enterprise Program," up to the value of the contract SDBE goal, will be deducted from the total amount bid before computing the amount of work required to be performed by the Contractor and their own organization.

11.04 In any event, the Contractor shall perform with their own organization work amounting to not less than 35% of the difference between the total amount bid and the value of specialty items that have been sublet.

11.05 Purchasing materials for subcontractors is not included in the percentage of work required to be performed by the Contractor. IF the Contractor sublets items of work but elects to purchase material for the subcontractor, the value of the material purchased will be included in the total dollar amount considered to have been sublet.

ARTICLE 12—PREPARATION OF BID

12.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.

12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.

12.04 A Bid by a partnership must 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 must be shown.

12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.

12.06 A Bid by an individual must show the Bidder's name and official address.

12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.08 All names must be printed in ink below the signatures.

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

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

12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Unit Price*

A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.

B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity", which Owner or its representative has set forth in the Bid Form, for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total

will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 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.

ARTICLE 14—SUBMITTAL OF BID

14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.

14.02 Submit the Bid no later than the date and time prescribed and at the place indicated in "00 01 16 Advertisement for Bids for Construction Contracts." Enclose the Bid in an opaque sealed envelope plainly marked with the Project number, Project title, bidder's name, address, and contractor's license number. Address the envelope to the name and address of the Offeror, along with the Bid Security and other required documents. If sent by mail or other delivery service, enclose the sealed envelope containing the Bid in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." Address the outer envelope to the mailing or physical address shown in "00 01 16 Advertisement for Bids for Construction Contracts." Offeror assumes full responsibility for ensuring that the Bid arrives at the prescribed location before the prescribed time.

14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

14.04 Provide the documentation required by Section 00 41 00 "Small Disadvantaged Business Enterprise Program" to demonstrate compliance with or to demonstrate a good faith effort in attempting to meet the goals for this Project.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

15.01 An unopened Bid may be 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. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.

15.03 Bids may be withdrawn prior to the award of the Contract if the Offeror files a signed written notice with the Owner within 72 hours after Bids are opened. Any request made by an Offeror to withdraw its Bid for this Project will be subject to the requirements of NCGS §143-129.1.

ARTICLE 16—OPENING OF BIDS

16.01 Bids will be opened at the time and place indicated in "00 01 16 Advertisement for Bids for Construction Contracts." if the requisite number of bids have been submitted. The Owner will

publicly acknowledge receipt of Bids received in time to be considered and then open and read aloud the names of the Offerors and the amount bid as required by applicable Laws and Regulations. Upon opening, all bids shall become property of the City of Fayetteville and will not be returned to the Offeror.

ARTICLE 17—CONFIDENTIALITY OF BID INFORMATION

17.01 Bids will be opened in a manner that avoids disclosure of trade secrets and confidential information to competing Offerors and that will keep the Bids from the public until a contract is awarded. All Bids submitted to the Owner will be open for public inspection after the Contract is awarded. Information that has designated as confidential or as a trade secret at the time Bids are submitted may not be subject to disclosure to the public under Chapter 132 of the North Carolina General Statutes.

17.02 Clearly indicate which specific documents are considered to be trade secrets or confidential information by stamping or watermarking all such documents with the word "confidential" prominently on each page or sheet as well as on the cover of bound documents. Place "confidential" stamps or watermarks so that they do not obscure any of the required information on the document, either in the original or in a way that would obscure any of the required information in a photocopy of the document.

17.03 Submit all confidential information in a different binder so this confidential material is separate from the rest of the Bid.

17.04 The Owner will protect this information to the extent allowed by state Laws and Regulations. However, if the Owner is requested or becomes legally compelled (by oral questions, interrogatories, requests for information or documents, subpoena, civil or criminal investigative demand, public information requests, including requests under Chapter 132 of the North Carolina General Statutes, or similar process) or is required by a regulatory body to make any disclosure that is prohibited or otherwise constrained by this Agreement, the Owner will provide Offeror with prompt notice of this request so that it may seek an appropriate protective order or other appropriate remedy.

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 Bid Form, 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 also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work. Any bid including any unit or lump sum bid price that is unbalanced to the potential detriment of the City will be considered irregular and may be rejected.

19.02 Owner may conduct such investigations as it deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, any proposed Subcontractors or Suppliers,

consultants, individuals, or entities proposed to furnish parts of the Work in accordance with the Contract Documents.

19.03 Qualifications Statement: Submit information as required in C-451 2018 "Qualifications Statement" within fifteen (15) days of the date Bids are due if requested to do so by the Owner.

19.04 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible or in its best interest

19.05 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.

19.06 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.

19.07 Each Bidder agrees to waive any claim it has or may have against the members of the Owner, Engineer, and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any Bid.

19.08 Notwithstanding any other provision of the Contract Documents, it is stipulated and agreed that by accepting a Bid, the Owner has not and does not waive its sovereign immunity from suit and/or liability.

19.09 *Evaluation of Bids*

A. In evaluating Bids, Owner will consider whether 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.

B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner will announce to all bidders a "Base Bid plus alternates" budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.

C. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

19.10 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

ARTICLE 20—BONDS AND INSURANCE

20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any),

and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

20.02 Provide performance and payment bonds for this Project that fully comply with the provisions of Chapter 44A of the North Carolina General Statutes. Administration of these bonds will conform to Chapter 44A of the North Carolina General Statutes and the provisions of the Contract Documents.

20.03 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 21—SIGNING OF AGREEMENT

21.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within fifteen (15) days of receiving the signed documents from the Successful Bidder, or within a longer time-frame specified by the Owner via written notice to the Successful Bidder, the Owner will deliver one set of fully signed counterparts to the Successful Offeror together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22—SALES AND USE TAXES

22.01 Bidders will be required to comply with applicable North Carolina state Laws and Regulations related to the payment of sales and use taxes for this Project. Additional requirements for the reporting of state sales tax expenditures and reimbursable sales taxes are included in Section 00 45 04 “North Carolina State Sales Tax Requirements.”

22.02 Said taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

ARTICLE 23—DIVERSE BUSINESS PARTICIPATION PROGRAM

23.01 Offerors will be required to comply with any applicable diverse business participation goals required by Chapter 143 of the North Carolina General Statutes.

23.02 Offerors will also be required to comply with the Owner’s diverse business participation program as specified in Section 00 41 00 “Small Disadvantaged Business Enterprise Program.”

00 41 12 BIDDER'S CHECK-LIST

☐ *Section 00 41 00 SDBE Program Requirements* – Execute Affidavits A and B as applicable.

☐ *Section 00 41 14 Bid Form* – Complete and sign to acknowledge receipt of Addenda. Sign document where indicated for Bid Delivery. Verify that the phone number and email address for giving notice are accurate.

☐ *Section 00 41 16 Bid Form Exhibit A* – Complete and sign where indicated.

☐ *Section 00 41 19 Bid Bond* – Complete and sign where indicated.

☐ *Section 00 45 02 Non-Collusion Certification* - Sign document where indicated. Verify that the business address, phone number, and email address are accurate.

☐ *Section 00 45 03 E-Verify* – Mark where applicable. Sign and date where indicated.

☐ *Section 00 45 05 Byrd Anti-Lobbying Certification* – Complete, Sign and date where indicated.

☐ *Section 00 45 06 Debarment, Suspension, and Other Responsibility Matters* – Complete, Sign and date where indicated.

☐ Documentation showing that the Offeror is currently licensed as a general contractor in the State of North Carolina, including the license limitations and classifications.

END OF SECTION

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BID FORM FOR CONSTRUCTION CONTRACT

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 1—OWNER AND BIDDER

1.01 This Bid is submitted to: City of Fayetteville, North Carolina, located at City Hall, 433 Hay Street, Fayetteville, NC, 28301.

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—ATTACHMENTS TO THIS BID

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

A. Required Bid security;

B. List of Proposed Subcontractors;

C. List of Proposed Suppliers;

D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;

E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;

F. Required Bidder Qualification Statement with supporting data; and

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Unit Price Bids*

A. Bidder will perform the following Work at the indicated unit prices in 00 41 16 Bid Form Exhibit

B. Bidder acknowledges that:

1. each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and

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

3.02 *Total Bid Price (Lump Sum and Unit Prices)*

Total Bid Price (Total of all Lump Sum and Unit Price Bids) in figures:	$
Total Bid Price (Total of all Lump Sum and Unit Price Bids) in writing:	

ARTICLE 4—TIME OF COMPLETION

4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

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

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Bidder has considered the information known to Bidder itself; 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 Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no 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.

8. 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.

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

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

11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. 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.

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

3. Bidder has not solicited or induced any individual or entity to refrain from bidding.

4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:

a. 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.

b. 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.

c. 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.

d. 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.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____

(typed or printed name of organization)

By: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

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

Attest: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

Address for giving notices:

_____

_____

Bidder's Contact:

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Phone: _____

Email: _____

Address:

_____

_____

_____

Bidder's Contractor License No.: (if applicable) _____

00 41 16 Bid Form Exhibit A

Project:	Tryon Drive Drainage Items		**Project No.:**
Owner:	City of Fayetteville		
Engineer:	Kimley-Horn and Associates		
Offeror:			

Base Bid

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Extended Amount
Items in Base Bid (excluding Allowances) per Section 01 29 01 "Measurement and Basis for Payment"					
A-01	MOBILIZATION (MAX 5% OF "A" ITEM TOTAL)	LS	1		
A-02	TRAFFIC CONTROL (MAX 5% OF "A" ITEM TOTAL)	LS	1		
A-03	CLEARING AND GRUBBING	AC	2		
A-04	UNCLASSIFIED AND UNDERCUT EXCAVATION	CY	490		
A-05	STONE CONSTRUCTION ENTRANCE	EA	4		
A-06	ROCK CHECK DAM	EA	1		
A-07	SILT SACK	EA	14		
A-08	DROP INLET PROTECTION	EA	2		
A-09	DEWATERING OF CONSTRUCTION AREA	LS	1		
A-10	STORMWATER BYPASS PUMPING	LS	1		
A-11	SILT FENCE	LF	2,200		
A-12	SELECTED TREE REMOVAL, 10"	EA	5		
A-13	SELECTED TREE REMOVAL, 15"	EA	10		
A-14	REMOVE AND DISPOSE OF EXISTING 15" RCP	LF	10		
A-15	REMOVE AND DISPOSE OF EXISTING 18" RCP	LF	51		
A-16	REMOVE AND DISPOSE OF EXISTING 24" RCP	LF	770		
A-17	REMOVE AND DISPOSE OF EXISTING 30" RCP	LF	304		
A-18	REMOVE AND DISPOSE OF EXISTING 42" RCP	LF	366		
A-19	REMOVE AND DISPOSE OF EXISTING 48" RCP	LF	380		
A-20	REMOVE AND DISPOSE OF EXISTING STORMWATER STRUCTURE	EA	14		
A-21	REMOVE AND DISPOSE OF EXISTING ENDWALL/WINGWALL	EA	4		
A-22	REMOVE AND DISPOSE OF EXISTING OVERSIZED STRUCTURE	EA	1		
A-23	SHED RELOCATION AND DECK REMOVAL (1716 TRYON DR.)	LS	1		
A-24	TEMPORARY SHED RELOCATION (1733 DAISY LN.)	LS	1		
A-25	REMOVE, STORE, AND RESET BLOCK WALL AT 1735 SWANN ST.	LF	136		
A-26	REMOVE, STORE, AND RESET BRICK WALL AT 1730 SWANN ST.	LF	15		
A-27	REMOVE AND DISPOSE OF CHAIN LINK FENCE	LF	611		
A-28	REMOVE AND DISPOSE OF WOOD LATTICE FENCE	LF	75		
A-29	REMOVE AND DISPOSE OF WOOD/PVC PRIVACY FENCE	LF	12		
A-30	CHAIN LINK FENCE (5' HEIGHT)	LF	611		
A-31	WOOD LATTICE FENCE (4' HEIGHT)	LF	75		
A-32	WOOD/PVC PRIVACY FENCE (6' HEIGHT)	LF	12		
A-33	REMOVE, STORE, AND RESET WROUGHT IRON FENCE	LF	300		
A-34	TEMPORARY 4' TALL CHAIN LINK BARRIER FENCE	LF	650		
A-35	SHEET PILE FOUNDATION PROTECTION	SF	5,150		
A-36	STANDARD CATCH BASIN, 0'-6' DEPTH	EA	3		
A-37	STANDARD CATCH BASIN, 6'-8' DEPTH	EA	7		
A-38	OPEN THROAT CATCH BASIN, 0'-6' DEPTH	EA	1		
A-39	OPEN THROAT CATCH BASIN, 6'-8' DEPTH	EA	2		
A-40	OPEN THROAT CATCH BASIN, 8'-10' DEPTH	EA	1		
A-41	JUNCTION BOX, 0'-6' DEPTH	EA	4		
A-42	JUNCTION BOX, 6'-8' DEPTH	EA	2		
A-43	12' x 4' RC BOX CULVERT BEND, 6'-8' DEPTH	EA	3		
A-44	10' x 4' RC BOX CULVERT BEND, 6'-8' DEPTH	EA	1		
A-45	WINGWALLS, ENDWALLS, CURTAIN WALLS ON STRUCTURAL SHEETS	CY	190		
A-46	10' x 4' RC BOX CULVERT	LF	90		
A-47	12' x 4' RC BOX CULVERT	LF	320		
A-48	18" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	30		
A-49	24" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	40		
A-50	30" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	75		
A-51	36" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	155		
A-52	42" RCP STORM SEWER, CLASS III, 0'-6' DEPTH	LF	745		
A-53	42" RCP STORM SEWER, CLASS IV, 0'-6' DEPTH	LF	200		

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Extended Amount
A-54	RIP RAP, CLASS I WITH FILTER FABRIC	TN	500		
A-55	PERMANENT SEEDING	SY	10,000		
A-56	SOD	SY	9,800		
A-57	TOPSOIL	CY	1,000		
A-58	REMOVE AND REPLACE CONCRETE CURB AND GUTTER	LF	1,250		
A-59	REMOVE AND REPLACE EXISTING CONCRETE DRIVEWAYS (NO OVERAGE ALLOWED)	SY	170		
A-60	REMOVE AND DISPOSE OF EXISTING ASPHALT PAVEMENT	SY	1,890		
A-61	TEMPORARY PAVEMENT PATCH	SY	1,890		
A-62	THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)	LF	1,020		
A-63	MILLING BITUMINOUS PAVEMENT	SY	2,000		
A-64	1.5" THICK S9.5B ASPHALT OVERLAY	SY	3,890		
B-01	MOBILIZATION (MAX 5% OF "B" ITEM TOTAL)	LS	1		
B-02	TRAFFIC CONTROL (MAX 5% OF "B" ITEM TOTAL)	LS	1		
B-03	REMOVE AND REPLACE CONCRETE CURB AND GUTTER - PWC	LF	1,230		
B-04	REMOVE AND DISPOSE OF EXISTING ASPHALT PAVEMENT - PWC	SY	2,120		
B-05	TEMPORARY PAVEMENT PATCH - PWC	SY	2,120		
B-06	FLOWABLE FILL AT UTILITY CROSSINGS - PWC	CY	10		
B-07	8" PC350 DI WATER LINE - PWC	LF	1,980		
B-08	DUCTILE IRON WATER PIPE FITTINGS - PWC	LB	4,800		
B-09	6" GATE VALVE - PWC	EA	4		
B-10	8" GATE VALVE - PWC	EA	9		
B-11	8" TAPPING SLEEVE AND VALVE - PWC	EA	5		
B-12	WATER MAIN KILL-OUT - PWC	EA	7		
B-13	FIRE HYDRANT - PWC	EA	4		
B-14	HYDRANT LEG - PWC	LF	60		
B-15	16" STEEL ENCASEMENT PIPE - PWC	LF	50		
B-16	24" STEEL ENCASEMENT PIPE - PWC	LF	21		
B-17	30" STEEL ENCASEMENT PIPE - PWC	LF	25		
B-18	RENEW WATER METER - PWC	EA	31		
B-19	WATER SERVICE LINE - PWC	LF	700		
B-20	8" P-401 DI SANITARY SEWER - PWC	LF	225		
B-21	12" P-401 DI SANITARY SEWER - PWC	LF	51		
B-22	16" P-401 DI SANITARY SEWER - PWC	LF	115		
B-23	RENEW SANITARY SEWER CLEANOUT - PWC	EA	29		
B-24	SEWER SERVICE LINE - PWC	LF	750		
B-25	4' DIA SANITARY SEWER MANHOLE - PWC	EA	4		
B-26	4' DIA MANHOLE WALL - PWC	LF	20		
B-27	6' DIA SANITARY SEWER MANHOLE - PWC	EA	3		
B-28	6' DIA MANHOLE WALL - PWC	LF	20		
B-29	REMOVE FIRE HYDRANT - PWC	EA	2		
B-30	REMOVE MANHOLE - PWC	EA	2		
B-31	ABANDON 8" UTILITY PIPE - PWC	LF	2,150		
B-32	ABANDON 15" UTILITY PIPE - PWC	LF	85		
B-33	CORED CONNECTION TO EXISTING MANHOLE - PWC	EA	2		
B-34	SANITARY SEWER BYPASS PUMPING - PWC	LS	1		
	Total Base Bid Items Amount (Sum of Extended Amounts for each Base Bid Line Item) in Figures: (I.E. 1,727,850.00)				
	Total Base Bid Items Amount (Sum of Extended Amounts for each Base Bid Line Item) in Writing:				
	I.E. One Million Seven Hundred Twenty-Seven Thousand Eight Hundred Fifty Dollars and No Cents				

BID SUBMITTED BY:

Offeror: _____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

BID BOND (PENAL SUM FORM)

Bidder Name: **[Full formal name of Bidder]** Address *(principal place of business)*: **[Address of Bidder's principal place of business]**	**Surety** Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner Name: **[Full formal name of Owner]** Address *(principal place of business)*: **[Address of Owner's principal place of business]**	**Bid** Project *(name and location)*: **[Owner project/contract name, and location of the project]** Bid Due Date: **[Enter date bid is due]**
Bond Penal Sum: **[Amount]** Date of Bond: **[Date]**	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder _____ *(Full formal name of Bidder)* By: _____ *(Signature)* Name: _____ *(Printed or typed)* Title: _____ Attest: _____ *(Signature)* Name: _____ *(Printed or typed)* Title:	Surety _____ *(Full formal name of Surety) (corporate seal)* By: _____ *(Signature) (Attach Power of Attorney)* Name: _____ *(Printed or typed)* Title: _____ Attest: _____ *(Signature)* Name: _____ *(Printed or typed)* Title:
Notes: (1) Note: Addresses are to be used for giving any required notice. (2) 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 will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs 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 will 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 does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will 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 the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must 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 Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will 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 will 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 governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

00 45 01 NONRESIDENT BIDDERS

NCGS §143-59 applies to the award of government contracts to nonresident bidders. This law provides that:

"For the purpose only of determining the low bidder on all contracts for equipment, materials, supplies, and services valued over twenty-five thousand dollars ($25,000), a percent of increase shall be added to a bid of a non-resident bidder that is equal to the percent of increase, if any, that the state in which the bidder is a resident adds to bids from bidders who do not reside in that state.

1. Resident bidder - A bidder that has paid unemployment taxes or income taxes in this State and whose principle place of business is located in this State."
2. Nonresident bidder - A bidder that is not a resident bidder as defined in subdivision (1) of this subsection."
3. Principal place of business - The principal place from which the trade or business of the bidder is directed or managed."

Check the statement that is correct for Offeror:

☐ Offeror (includes parent company or majority owner) qualifies as a resident bidder whose principal place of business is in North Carolina.

☐ Offeror qualifies as a nonresident bidder whose principal place of business or residency is in the state of: _____

Bidder preferences, if any, will be determined in accordance with NCGS §143-59 and the North Carolina Secretary of Administration's annual list of states that give preference to in-state bidders.

Offeror: _____
(typed or printed name of organization)

Signature: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed

Business Address:

_____

_____

_____

Phone: _____ Email: _____

(Attach evidence of authority to sign if Offeror is a corporation, partnership, or a joint venture.)

END OF SECTION

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00 45 02 NON-COLLUSION CERTIFICATION

STATE OF North Carolina §

COUNTY OF Cumberland §

Owner: **City of Fayetteville**
433 Hay Street
Fayetteville, NC 28301

Contract: **Tryon Drive Drainage**

Offeror certifies that it has not been a party to any collusion among Offerors in the restraint of freedom of competition by agreement to submit a Bid or Proposal at a fixed price or to refrain from submitting a Bid or Proposal; or with any official or employee of the Owner as to quantity, quality, or price in the prospective contract, or any other terms of said prospective contract; or in any discussion between Offerors and any official of the Owner concerning exchange of money or other thing of value for special consideration in the letting of a contract.

Certified this _____ day of _____ 20 _____ .

Offeror: _____
(typed or printed name of organization)

Signature: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed

Business Address:

_____

_____

_____

Phone: _____ Email: _____

(Attach evidence of authority to sign if Offeror is a corporation, partnership, or a joint venture.)

END OF SECTION

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00 45 03 E-VERIFY

This E-Verify Certification is provided to Owner by Contractor as a prerequisite to Owner considering Contractor for award of Contract.

1. Contractor understands that:
    a. E-Verify is the federal program operated by the United States Department of Homeland Security and other federal agencies to enable employers to verify the work authorization of newly hired employees pursuant to federal law, as modified from time to time.
    b. Article 2 of Chapter 64 of the North Carolina General Statutes requires employers that transact business in this state and employ 25 or more employees in this state to: (i) verify the work authorization of newly hired employees who will be performing work in North Carolina through E-Verify; and (ii) maintain records of such verification (the "E-Verify Requirements"). Section 126-7.1 of the North Carolina General Statutes requires state agencies to verify their employees' work statuses through E-Verify.
    c. North Carolina General Statute 160A-20.1(b) prohibits Owner from entering into contracts unless Contractor and all Subcontractors comply with the E-Verify Requirements.
2. As a condition of being considered for Contract, Contractor certifies that:
    a. If Contractor has 25 or more employees working in North Carolina (whether now or at any time during the term of the Contract), Contractor has complied and will comply with the E-Verify Requirements with respect to Contractor's employees working in North Carolina; and
    b. Regardless of how many employees Contractor has working in North Carolina; Contractor will take appropriate steps to ensure that each Subcontractor performing work on the Contract that has 25 or more employees working in North Carolina complies with the E-Verify Requirements.
3. Contractor acknowledges that Owner will be relying on this Certification in entering into the Contract, and that Owner may incur expenses and damages if Owner enters into the Contract with Contractor and Contractor, or any Subcontractor, fails to comply with the E-Verify Requirements. Only in the manner and to the extent permitted by the North Carolina Tort Claims Act, N.C.G.S. § 143-291, et seq., and without waiver of its sovereign immunity, Contractor agrees to indemnify and save Owner harmless from and against all losses, damages, costs, expenses obligations, duties, fines and penalties (collectively "Losses") arising directly or indirectly from violation of the E-Verify Requirements by Contractor or any of its Subcontractors, including without limitation any Losses incurred as a result of the Contract being deemed void.

Offeror: _____
(typed or printed name of organization)

Signature: _____
(individual's signature)

Name: _____

_____

(typed or printed)

Title: _____

(typed or printed

Business Address:

_____

_____

_____

Phone: _____ Email: _____

(Attach evidence of authority to sign if Offeror is a corporation, partnership, or a joint venture.)

END OF SECTION

00 45 04 STATE SALES TAX REQUIREMENTS

ARTICLE 1 – PROCEDURE FOR REPORTING NORTH CAROLINA SALES TAX EXPENDITURES

1.01 The following procedure for handling the North Carolina sales tax is applicable to this Project. The Contractor and its Subcontractors must comply fully with the requirements outlined in this Section, so that the Owner may recover the full amount of reimbursable taxes permitted by state law. For the purposes of this Section, "sales taxes" means sales and use taxes paid to the State of North Carolina or to local governments in North Carolina.

1.02 Reimbursable sales taxes are to be excluded from the Bid or Proposal for this Project. Contractor must include all other applicable sales and use taxes and other related costs in its Bid or Proposal.

1.03 Owner is entitled to refunds from the State of North Carolina for these reimbursable sales taxes. The Contractor that performs Work under this Contract is allowed to obtain a reimbursement from the Owner for those sales taxes for which the State will grant a refund to the Owner. The Owner will reimburse the Contractor, and the Owner later obtains a refund from the State.

1.04 Contractor must furnish the Owner documentary evidence showing the materials used and sales tax paid by the Contractor and each Subcontractor. Any county sales tax included in the Contractor's statements must be shown separately from the state sales tax. If more than one county is shown, each county must be listed separately.

1.05 The documentary evidence must be in the form of the Reimbursable Sales and Use Tax Statement provided by the Engineer. This evidence must consist of a certified statement, by the Contractor and each Subcontractor individually, showing total purchases of materials from each separate vendor and total sales taxes by each county paid each vendor. The certified statement must show the invoice number(s) covered and inclusive dates of such invoices. State sales tax must be listed separately from county sales tax. If more than one county is shown, each county must be listed separately. The invoices must be provided to substantiate the information on the statement.

1.06 Materials used from the warehouse stock of the Contractor or its Subcontractors must be shown in a certified statement at warehouse stock prices.

1.07 Contractor will not be required to certify Subcontractor statements. However, any Subcontractor may submit for reimbursement by certifying a Reimbursable Sales and Use Tax Statement, submitting it to the Contractor for the Contractor to submit with the pay application for the properties listed on that form. The Owner will make the reimbursement payable to the Contractor.

1.08 The documentary evidence to be furnished to owners eligible for reimbursable sales tax refunds covers sales and/or use taxes paid on building materials used by contractors and subcontractors in the performance of contracts with churches, orphanages, hospitals not for profit, educational institutions not operated for profit and other charitable or religious institutions or organizations not operated for profit and incorporated cities, towns and counties in this State. The documentary evidence is to be submitted to the above-named institutions, organizations and governmental units to be included in claims for refunds to be prepared and submitted by them to obtain refunds provided by NCGS §105-164.14 and is to include the purchase of building materials, supplies, fixtures and equipment which become a part of or annexed to buildings or

structures being erected, altered or repaired under contracts with such institutions, organizations or governmental units.

1.09 Contractor may seek reimbursement separately from, but at the same time as, the Application for Payment is made for the properties that were taxed. The Contractor must not file for reimbursement for sales taxes before the Contractor has the right to file an Application for Payment for the properties that were taxed.

1.10 If the State refuses to refund any such sales tax to the Owner, or if after a refund is made, the Owner is told to return a refund to the State, the Contractor must upon demand repay the Owner for the amount of the failed refunds.

1.11 Contractor is advised that all requests for payment, partial or final, for Work completed under this Contract must include a sales tax report submitted in accordance with the procedures outlined above.

1.12 Contractor to whom an award is made on this Project will be required to follow the procedure outlined above.

END OF SECTION

Project	Tryon Drive Drainage	**Project Number**	
Owner	City of Fayetteville		
Contractor			
Engineer	Kimley-Horn and Associates, Inc.		

Project County Cumberland **Application No.** _____ **Application Period** _____ to _____

Purchase Date	Vendor	Type of Property	County*	Invoice No.	Invoice Amount	State Tax Paid	County Tax Paid	Total Tax Paid
				Totals				

** For property purchased in N.C., enter the county in which property was purchased. For property purchased in other states, enter the N.C. county in which property was used.*

The undersigned individual certifies that: (1) he or she is an employee or principal of the Contractor that is filing this form with the Owner to request reimbursement for North Carolina state and local sales and use taxes that the Contractor has paid; (2) the above listed vendors were paid sales tax upon purchases of building materials during the period covered by the Application for Payment, and the property upon which such taxes were paid with or will be used in the performance of this Contract; (3) no tax on purchases or rentals of tools and/or equipment is included in the above list; (4) all of the material above became a part of the Work constructed for this Project; and (5) all of the information on this form, and any additional pages added to this page, if any, is true and accurate.

Contractor _____ **Signature** _____ **Date** _____

Project	Tryon Drive Drainage	**Project Number**	
Owner	City of Fayetteville		
Contractor			
Engineer	Kimley-Horn and Associates, Inc.		

Project County Cumberland **Application No.** _____ **Application Period** _____ to _____

Purchase Date	Vendor	Type of Property	County*	Invoice No.	Invoice Amount	State Tax Paid	County Tax Paid	Total Tax Paid
				Totals				

** For property purchased in N.C., enter the county in which property was purchased. For property purchased in other states, enter the N.C. county in which property was used.*

The undersigned individual certifies that: (1) he or she is an employee or principal of the Subcontractor that is submitting this form with the Contractor so that the Contractor may request reimbursement for North Carolina state and local sales and use taxes that the Subcontractor has paid; (2) the above listed vendors were paid sales tax upon purchases of building materials during the period covered by the Application for Payment, and the property upon which such taxes were paid with or will be used in the performance of this Contract; (3) no tax on purchases or rentals of tools and/or equipment is included in the above list; (4) all of the material above became a part of the Work constructed for this Project; and (5) all of the information on this form, and any additional pages added to this page, if any, is true and accurate.

Subcontractor _____ **Signature** _____ **Date** _____

00 45 05 BYRD ANTI-LOBBYING CERTIFICATION

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of and Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form—LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96)].
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including all subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction by 31 U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____ (the “Company”) certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Company understands and agrees that the provisions of 31 U.S.C. A 3801, et seq., apply to this certification and disclosure, if any.

Offeror: _____
(typed or printed name of organization)

Signature: _____
(individual’s signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed

Business Address:

_____

_____

_____

Phone: _____ Email: _____

(Attach evidence of authority to sign if Offeror is a corporation, partnership, or a joint venture.)

END OF SECTION

00 45 06 DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

The Primary Participant, _____ (major third party contractor), certifies to the best of its knowledge and belief, that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

2. Have not within a three-year period preceding this Bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction or records, making false statements, or receiving stolen property;

3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

4. Have not within a three-year period preceding this application/Bid had one or more public transactions (Federal, State or local) terminated for cause or default. (If the primary participant is unable to certify to any of the statements in this certification, the participant shall attach an explanation to this certification.)

THE PRIMARY PARTICIPANT _____ CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Offeror: _____
(typed or printed name of organization)

Signature: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed

Business Address:

_____

_____

Phone: _____ Email: _____

(Attach evidence of authority to sign if Offeror is a corporation, partnership, or a joint venture.)

END OF SECTION

00 45 13 QUALIFICATIONS STATEMENT

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:			
	1.		
	2.		
	3.		
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?	☐ Yes ☐ No ☐ Pending		

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	

Address:	

1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
☐ Disadvantaged Business Enterprise		
☐ Minority Business Enterprise		
☐ Woman-Owned Business Enterprise		
☐ Small Business Enterprise		
☐ Disabled Business Enterprise		
☐ Veteran-Owned Business Enterprise		
☐ Service-Disabled Veteran-Owned Business		
☐ HUBZone Business (Historically Underutilized) Business		
☒ Other		

☐ None

ARTICLE 4—SAFETY

4.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

4.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:		
Business address:		
Date of Business's most recent financial statement:		☐ Attached
Date of Business's most recent audited financial statement:		☐ Attached
Financial indicators from the most recent financial statement		
Contractor's Current Ratio (Current Assets ÷ Current Liabilities)		
Contractor's Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)		

ARTICLE 6—SURETY INFORMATION

6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	☐ Yes ☐ No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury? ☐ Yes ☐ No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		☐ Yes ☐ No	
Does provider have an A.M. Best Rating of A-VII or better?		☐ Yes ☐ No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 8—CONSTRUCTION EXPERIENCE

8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

8.02 Provide information regarding the Business's previous contracting experience.

Years of experience with projects like the proposed project:				
As a general contractor:		As a joint venturer:		
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:				
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been released from a bid in the past 5 years? ☐ Yes ☐ No				
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No				
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No				
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No				
Provide full details in a separate attachment if the response to any of these questions is Yes.				

8.03 List all projects currently under contract in Schedule A and provide indicated information.

8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.

8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.

B. Diverse Business Certifications if required by Paragraph 3.01.

C. Certification of Business's safety performance if required by Paragraph 4.02.

D. Financial statements as required by Paragraph 5.01.

E. Attachments providing additional information as required by Paragraph 8.02.

F. Schedule A (Current Projects) as required by Paragraph 8.03.

G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.

H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.

I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

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

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

Schedule A—Current Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Sign and Attach to Bid

ASSIGNMENT

It is the intent of this Agreement to secure the personal services of Contractor and failure of Contractor for any reason to make the personal services available to the City of Fayetteville for the purposes described in this contract shall be cause for termination of this contract. Contractor shall not assign this contract without prior written consent of the City of Fayetteville.

GOVERNING LAW

The validity, interpretation, and execution of this contract and the performance of and rights accruing under this Contract are all to be governed by the laws of North Carolina.

COMPLIANCE WITH LAWS

Contractor agrees to comply with all applicable statutes, ordinances, and regulations of the United States, the State of North Carolina, the City and units of local government.

SEVERABILITY

The parties agree that if any provision of this contract shall be held invalid for any reason, the remaining provisions shall not be affected if they may continue to conform with the purposes of this contract and the requirements of applicable law.

DEFAULT

In the event of substantial failure by Contractor to perform in accordance with the terms of this contract, City of Fayetteville shall have the right to terminate Contractor upon ten (10) days written notice in which event Contractor shall have neither the obligation nor the right to perform further services under this contract nor shall the City of Fayetteville be obligated to make any further payment for work that has not been performed.

IRAN DIVESTMENT ACT CERTIFICATION

As mandated by N.C.G.S. 147-86.59(a), Vendor hereby certifies that it is not listed on the Final Divestment List created by the North Carolina State Treasurer pursuant to N.C.G.S. 147-86.58. Vendor further certifies that in accordance with N.C.G.S. 147-86.59(b) that it shall not utilize any subcontractor found on the State Treasurer's Final Divestment List. Vendor certifies that the signatory to this Request for Proposals is authorized by the Vendor to make the foregoing statement.

E-VERIFY

Contractor hereby acknowledges that "E-Verify" is the federal E-Verify program operated by the US Department of Homeland Security and other federal agencies which is used to verify the work authorization of newly hired employees pursuant to federal law and in accordance with Article 2, Chapter 64 of the North Carolina General Statutes. Contractor further acknowledges that all employers, as defined by Article 2, Chapter 64 of the North Carolina General Statutes, must use e-verify and after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS §64-26(a). Contractor hereby pledges, attests and warrants through execution of this Agreement that Contractor complies with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes and further pledges, attests and warrants that any subcontractors currently employed by or subsequently hired

by Contractor shall comply with any and all E-Verify requirements. Failure to comply with the above requirements shall be considered a breach of this Agreement.

FORCE MAJEURE

Neither party shall be deemed to be in default of its obligations hereunder if and *so long as* it is prevented from performing such obligations by an act of war, hostile foreign actions, adverse governmental actions, nuclear explosion, earthquake, hurricane, tornado, or other catastrophic natural event or act of God.

MORALITY CLAUSE

If, in the sole opinion of the City, at any time Contractor or any of its owner(s) or employee(s) or agent(s) (collectively referenced as an "Actor") engages in any one or more actions that bring disrepute, contempt, scandal, or public ridicule to the Actor or subject the Actor to prosecution or offend the community or public morals or decency or denigrate individuals or groups in the community served by the City or are scandalous or inconsistent with community standards or good citizenship or may adversely affect the City's finances, public standing, image, or reputation or are embarrassing or offensive to the City or may reflect unfavorably on the City or are derogatory or offensive to one or more employee(s) or customer(s) of the City, the City may immediately upon written notice to Contractor terminate this Agreement, in addition to any other rights and remedies that the City may have hereunder or at law or in equity.

NON APPROPRIATION

Notwithstanding any other provisions of this contract, the parties agree that payments due hereunder from the City are from appropriations and monies from the City Council and any other governmental entities. In the event sufficient appropriations or monies are not made available to the City to pay the terms of this agreement for any fiscal year, this contract shall terminate immediately without further obligation of City.

TERMINATION FOR CAUSE

In the event of substantial failure by Contractor to perform in accordance with the terms of this contract, City of Fayetteville shall have the right to terminate Contractor upon ten calendar (10) days written notice in which event Contractor shall have neither the obligation nor the right to perform further services under this contract nor shall the City of Fayetteville be obligated to make any further payment for work that has not been performed.

TERMINATION FOR CONVENIENCE

Upon thirty (30) calendar days' written notice to Contractor, the City of Fayetteville may, without cause and without prejudice to any other right or remedy legally available to the City of Fayetteville, terminate this Contract. Upon such notice, Contractor shall have neither the obligation nor the right to perform services under this contract nor shall the City of Fayetteville be obligated to make any further payment for work that has not been performed in accordance with the terms stated herein. In such case of termination, Contractor shall be paid for the completed and accepted work executed in accordance with this Contract prior to the written notice of termination. Additionally, upon mutual agreement, Contractor may be paid for any completed and accepted work which takes place in order to achieve a specifically identified item in the scope of services or a milestone of the Contract, between the written notice of termination and the effective date of termination. Unless otherwise stated or agreed upon, the effective date of termination shall automatically occur 30 days' after the written notice is sent by the City of Fayetteville.

PROTEST

Protest related to this procurement must be addressed to the Purchasing Manager for City of Fayetteville, 433 Hay St, Fayetteville, NC 28301 and shall be received, in writing, within 2 calendar days of bid award. Responses will be in writing by email and first-class mail not later than (7) calendar days following receipt of said protest by the Purchasing Manager.

_____

Contractor Name (Print)

_____

Contractor Signature

_____

Date of Signature

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

AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

NSPE®
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Improving Project Delivery

NUCA
We Dig America

EJCDC® C-520, Agreement between Owner and Contractor for Construction Contract (Stipulated Price).
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GUIDELINES FOR USE OF EJCDC® C-520, AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

This Agreement form is specifically intended for stipulated price (fixed price) contracts—that is, contracts in which Owner and Contractor identify specific lump sums and unit prices as Contractor's compensation for performing the Work. For construction contracts in which the Contract Price is primarily based on costs incurred during construction, users should select EJCDC® C-525, Agreement between Owner and Contractor for Construction Contract (Cost-Plus-Fee) (2018).

In construction contracting, as a general matter the "agreement" is the legal instrument executed (signed) by the project owner and the construction contractor, binding the parties to the terms of the contract. See CSI Project Delivery Practice Guide (2011), Section 11.1.2, p. 210, and CSI Construction Specification Practice Guide (2011), Section 5.1, p. 75. This EJCDC Agreement form serves that basic function, by identifying the parties and the Contract Documents, and establishing the Contract Price and Contract Times.

This Agreement form is drafted to be flexible enough to be used on projects that are competitively bid, and for public and private contracts that are negotiated or awarded through a proposal process or otherwise. On competitively bid projects, the following documentary information would typically be made available to bidders:

- Bidding Requirements, which include the Advertisement or invitation to bid, the Instructions to Bidders, and the Bid Form that is suggested or prescribed, all of which provide information and guidance for all Bidders, and Bid Form supplements (if any) such as Bid Bond and Qualifications Statement.
- Contract Documents, which include the Agreement, performance and payment bonds, the General Conditions, the Supplementary Conditions, the Drawings, and the Specifications.
- Documents referred to in the Supplementary Conditions or elsewhere as being of interest to bidders for reference purposes, but which are not Contract Documents.

Together, the Bidding Requirements and the Contract Documents are referred to as the Bidding Documents. (The terms "Bidding Documents," "Bidding Requirements," and "Contract Documents" are defined in Article 1 of the General Conditions.) The Bidding Requirements are not Contract Documents because much of their substance pertains to the relationships prior to the award of the Contract and has little effect or impact thereafter. Many contracts are awarded without even going through a bidding process, and thus have no Bidding Requirements, illustrating that the bidding items are typically superfluous to the formation of a binding and comprehensive construction contract. In some cases, however, a bid or proposal will contain numerous line items and their prices; in such case the actual bid or proposal document may be attached as an exhibit to the Agreement to avoid extensive rekeying.

2.0 OTHER DOCUMENTS

As noted above, before selecting C-520 for a specific project, confirm that the Contract will be based on lump sum (stipulated price) (which may include unit prices), and not on cost plus fee—for cost plus fee contracts, use C-525.

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EJCDC documents are intended to be used as a system and changes in one EJCDC document may require a corresponding change in other documents. Other EJCDC documents may also serve as a reference to provide insight or guidance for the preparation of this document.

While preparing this document for use on a specific project, the user may decide to revise or supplement some of the standard provisions. When such changes are made, the user should review whether corresponding changes are needed in the following related EJCDC documents:

EJCDC Doc. No.	Document Title	Edition
C-200	Instructions to Bidders for Construction Contract	2018
C-410	Bid Form for Construction Contract	2018
C-700	Standard General Conditions of the Construction Contract	2018
C-800	Supplementary Conditions of the Construction Contract	2018

Other documents that provide additional information or guidance for the use of this document include the following:

EJCDC Doc. No.	Document Title	Edition
C-001	Commentary on the 2018 EJCDC Construction Documents	2018

3.0 ORGANIZATION OF INFORMATION

All parties involved in a construction project benefit significantly from a standardized approach in the location of subject matter throughout the documents. Experience confirms the danger of addressing the same subject matter in more than one location; doing so frequently leads to confusion and unanticipated legal consequences. Careful attention should be given to the guidance provided in EJCDC® N-122/AIA® A521, Uniform Location of Subject Matter (2012 Edition) when preparing documents. EJCDC® N-122/AIA® A521 is available at no charge from the EJCDC website, www.ejcdc.org, and from the websites of EJCDC's sponsoring organizations.

If CSI MasterFormat™ is used for organizing the Project Manual, consult CSI MasterFormat™ for the appropriate document number (e.g., under 00 11 00, Advertisements and Invitations), and accordingly number the document and its pages.

4.0 GUIDANCE NOTES AND NOTES TO USER

EJCDC Documents include Guidance Notes and Notes to User to provide guidance regarding the preparation of Project specific documents. These notes are intended for use by the User in the preparation of the document and are not intended to be included in the completed document. Guidance Notes and Notes to User are lightly shaded to distinguish them from the proposed text of the Agreement. As a project-specific Agreement is prepared and made ready for issuance to bidders or execution by the parties, all shaded text (Guidance Notes and Notes to Users) should be deleted.

Guidance Notes provide information regarding the paragraphs which follow, including reasons for the paragraphs, discussions of best practices, and alternate approaches for different situations.

Notes to User provide specific information for editing the document. When alternate paragraphs for different situation are presented, explanations on how to select the most appropriate alternate will be provided, with direction to delete those paragraphs not used.

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5.0 EDITING THIS DOCUMENT

5.1 It is intended that this document be edited for each Contract. Guidelines for editing include:

A. Remove the cover pages which consist of the title pages and these Guidelines for Use.

B. Type in required information as indicated by brackets (**[ ]**). Bracketed text will usually provide instructions for what is to be inserted in place of the brackets. Delete brackets and change formatting to match existing text after project specific text has been added, e.g. change "**[Project Name]**" to "Peach Street Renovation" (without brackets or bold, or quotation marks).

C. Fill in blanks, if any. It will be more common for information to be inserted by user to be indicated by a prompt in brackets, as described in Paragraph B above, rather than by an underline-style blank.

D. Most Notes to User are presented before the text to which they apply; some Notes to Users are interspersed in the text, usually within brackets. Delete all "Notes to User" after reviewing each note and taking appropriate action. Delete all associated numbering and brackets.

E. Complete tables.

F. Delete Guidance Notes.

6.0 LICENSE AGREEMENT

This document is subject to the terms and conditions of the **License Agreement, 2018 EJCDC® Construction Series Documents**. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at www.ejcdc.org and the websites of EJCDC's sponsoring organizations.

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AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between **City of Fayetteville** ("Owner") and **[name of contracting entity]** ("Contractor").

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

Owner and Contractor hereby 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: **CONTRACTOR SHALL COMPLETE ALL WORK AS SPECIFIED OR INDICATED IN THE CONTRACT DOCUMENTS. THE PROJECT IS LOCATED IN CUMBERLAND COUNTY. PROJECT IS LOCATED WITHIN THE CITY LIMITS OF FAYETTEVILLE, NC AND CONSISTS OF INSTALLATION OF DRAINAGE PIPING, BEGINNING AT THE INTERSECTION OF DAISY LANE/WEBSTER AVENUE AND CONTINUES ACROSS PRIVATE LOTS, CROSSING SWANN STREET, PRIVATE PROPERTIES, THEN RUNNING ALONG TRYON DRIVE. THERE ARE TWO TRYON DRIVE CROSSINGS AND ONE ADDITIONAL SWANN STREET CROSSING. THE PROJECT INVOLVES INSTALLATION OF STORM INLETS, MANHOLES, SANITARY SEWER, ASBESTOS CEMENT WATERLINE REPLACEMENT, BOX CULVERTS, ENDWALLS AND WINGWALLS, GRADING, RIP RAP, ENDWALLS, PAVING, CURBING, DRIVEWAYS, EROSION CONTROL, TRAFFIC CONTROL, ETC.**

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: **Excavation, clearing and grubbing, removal and replacement of asphalt, concrete curb and gutter, pipe installation.**

ARTICLE 3—ENGINEER

3.01 The Owner has retained **Kimley-Horn and Associates, Inc** ("Engineer") to act as Owner's representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by **Engineer.**

ARTICLE 4—CONTRACT TIMES

4.01 *Time is 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.

B. As time is of the essence, the Contractor is required to commence work to be performed under this agreement within fifteen (15) days after written notice (Notice to Proceed) from the Owner to proceed with the construction. Failure by the Contractor to complete the work within the contract time will cause considerable damage to the Owner. Therefore, a

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liquidated damage charge will be assessed for each day of overrun as specified in the Special Provisions. The Contractor hereby agrees by executing the contract that such liquidated damages are considered a just and reasonable compensation to the Owner and is not a penalty.

4.03 *Contract Times: Days*

A. The Work will be substantially complete within **420 calendar** days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **480 calendar** days after the date when the Contract Times commence to run.

4.05 *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 and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. 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. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion:* Contractor shall pay Owner $**1000** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.

2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner $**1000** for each day that expires after such time until the Work is completed and ready for final payment.

3. *Milestones:* Contractor shall pay Owner $**1000** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved, or until the time specified for Substantial Completion is reached, at which time the rate indicated in Paragraph 4.05.A.1 will apply, rather than the Milestone rate.

4. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.

B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.06 *Special Damages*

A. Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract

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Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.

B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

C. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.

1.07 Actual Damages

A. The Contractor will be required to compensate the Owner for losses if they occur due to the Contractor's failure to reach Substantial Completion by the date specified in this Agreement.

1.08 Weather

A. Any adjustments of the Contract Time due to weather will be evaluated according to Section C-800 "Supplementary Conditions" SC-4.05.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

A. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item).

Unit Price Work					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Price**
				$	$
				$	$
				$	$
				$	$
				$	$
				$	$
				$	$
Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					$

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The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

B. Total of Lump Sum Amount and Unit Price Work (subject to final Unit Price adjustment) $**[number]**.

C. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions. A draft of the Applications for Payment should be submitted to the Engineer for review on or around the 25th day of the month in which the work was completed. Applications for Payments must be submitted to the City of Fayetteville on or before the tenth day of the month following the month in which the work was completed.

6.02 *Progress Payments; Retainage*

A. The Owner will make progress payments on net 30-day terms. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 25th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in 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 elsewhere in the Contract.

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 Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

a. **97.5** percent of the value of the Work completed (with the balance being retainage).

1) If 50 percent or more of the Work has been 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; and

b. **0** percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to **95** percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less **100** percent of

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Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

6.05 *Interest*

A. The Owner is not obligated to pay interest on monies not paid except as provided in Chapter 143 of the North Carolina General Statutes.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

A. The Contract Documents consist of all of the following:

1. This Agreement.
2. Bonds:
    a. 00 52 15 Performance bond (together with power of attorney).
    b. 00 52 14 Payment bond (together with power of attorney).
3. 00 72 00 "2018 EJCDC General Conditions."
4. 00 73 00 "C-800 2018 Supplementary Conditions."
5. Specifications as listed in the table of contents of the project manual, 00 01 10 "Table of Contents."
6. Drawings listed on the attached sheet index 00 01 15
7. Addenda (00 91 [XX] to 00 91 [XX], inclusive).
8. 00 41 00 "Small Disadvantaged Business Enterprise Program and Affidavits
9. 00 45 02 "Non-Collusion Certification."
10. 00 45 03 "E-Verify Affidavit."
11. 00 45 06 "Debarment, Suspension, and Other Responsibility Matters."
12. 00 45 13 "Qualifications Statement."
13. 00 73 01 "Dispute Resolution Process – Rules Implementing Mediated Settlement Conferences"
14. Exhibits to this Agreement (enumerated as follows):
    a. Exhibit A: 00 41 16 "Bid Form Exhibit A"

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

    a. Notice to Proceed.

    b. Work Change Directives.

    c. Change Orders.

    d. Field Orders.

    e. Warranty Bond, if any.

16. The following Federal Requirements are Contract Documents:

    00 45 05 Byrd Anti-Lobbying Certification

B. The Contract Documents listed in Paragraph 7.01.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 7.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:

1. Contractor has examined and carefully studied the Contract Documents, including Addenda.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Contractor has considered the information known to Contractor itself; 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 Technical Data identified in the Supplementary Conditions or by definition, with respect to the

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effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no 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.

8. 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.

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

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

11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

17. Contractor is not on the North Carolina State Treasurer's list of persons engaging in business activities in Iran, nor will Contractor utilize any Subcontractor on such list on this Project in violation of NCGS §147-86.55, et seq.

18. Contractor is not on the North Carolina State Treasurer's list of companies engaged in a boycott of Israel, nor will Contractor utilize any Subcontractor on such list on this Project in violation of NCGS §147-86.80, et seq.

19. Contractor has not been suspended by the State of North Carolina or any agency or department thereof for conviction or indictment of any of the offenses enumerated in NCGS §133-27 nor will award subcontracts of any tier to firms that have been suspended for conviction or indictment of any of the offenses enumerated in NCGS §133-27.

20. Contractor shall comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes. Further, if Contractor utilizes a subcontractor, Contractor shall require the subcontractor to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes.

8.02 *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 8.02:

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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.

8.03 *Standard General Conditions*

A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

8.04 ACCOUNTING RECORDS

A. ACCOUNTING RECORD AVAILABILITY: THE CONTRACTOR IS TO ESTABLISH AND MAINTAIN, IN ACCORDANCE WITH GENERALLY ACCEPTED ACCOUNTING PRACTICES, FULL AND DETAILED ACCOUNTING RECORDS OF MATERIALS INCORPORATED INTO THE PROJECT, AND LABOR, TOOLS, MATERIALS, AND EQUIPMENT USED FOR THE WORK, CONSISTENT WITH THE REQUIREMENTS OF THE GENERAL CONDITIONS AND AS NECESSARY FOR PROPER FINANCIAL MANAGEMENT UNDER THIS AGREEMENT. SUBJECT TO PRIOR WRITTEN NOTICE, PROVIDE OWNER REASONABLE ACCESS DURING NORMAL BUSINESS HOURS TO CONTRACTOR'S RECORDS, BOOKS, CORRESPONDENCE, INSTRUCTIONS, DRAWINGS, RECEIPTS, VOUCHERS, MEMORANDA, AND SIMILAR DATA RELATING TO THE COST OF THE WORK AND THE CONTRACTOR'S FEE. PRESERVE ALL SUCH DOCUMENTS FOR A PERIOD OF 3 YEARS AFTER THE FINAL PAYMENT BY THE OWNER.

8.05 Venue

A. Contractor agrees that venue lies exclusively in Cumberland County, North Carolina for any legal action.

8.06 Further Provisions

A. Owner's Right to Do Work

1. If, during the progress of the work or during the period of guarantee, the Contractor fails to prosecute the work properly or to perform any provision of the contract, the Owner, after fifteen (15) days written notice sent by certified mail return receipt requested to the Contractor from the Engineer, may perform or have performed that

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portion of the work. The cost of the work may be deducted from any amounts due or to become due to the Contractor, such action and cost of same having been first approved by the Engineer. Should the cost of such action of the Owner exceed the amount due or to become due the Contractor, then the Contractor or his surety, or both, shall be liable for and shall pay to the Owner the amount of said excess.

8.07 Force Account Work

A. Should unforeseen circumstances arise which, in the opinion of the Engineer, require work to be done which no price can be agreed upon, the Engineer may require that the work be accomplished under a negotiated contract with another Contractor or with Owner's forces or on a force account basis as follows:

1. Skilled and common labor at the regular rate of pay. Pay for the Foreman may be included, provided in the judgment of the Engineer a Foreman is required.

2. To the foregoing shall be added such social security and old age benefits made by the Contractor.

3. Materials used are to be listed on invoices. Copies of vendor invoices to the Contractor which show all materials, quantities, costs, etc., shall be forwarded to the City with the prime Contractor's pay estimate.

4. Equipment used shall be paid for at an hourly rate schedule mutually agreed upon, but in no case shall it exceed the hourly rate schedule established for such units by Associated General Contractors or other published rental rate schedules which are acceptable to the City. To the sums of a), b), c), and d) the Contractor may add up to 7.5% for overhead and up to 7.5% for profit. When force account work has been authorized, such authority shall be in writing to the City.

8.08 Morality Clause

A. If, in the sole opinion of the Owner, at any time Contractor or any of its owner(s) or employee(s) or agent(s) (collectively references as an "Actor") engages in any one or more actions that bring disrepute, contempt, scandal, or public ridicule to the Actor or subject the Actor to prosecution or offend the community or public morals or decency or denigrate individuals or groups in the community served by the Owner or are scandalous or inconsistent with community standards or good citizenship or may adversely affect the Owner's finances, public standing, image, or reputation or are embarrassing or offensive to the Owner or may reflect unfavorably on the Owner or are derogatory or offensive to one or more employee(s) or customer(s) of the Owner, the Owner may immediately upon written notice to the Contractor terminate this Agreement, in addition to any other rights and remedies that the Owner may have hereunder or at law or in equity.

8.09 **NON APPROPRIATION**

A. Notwithstanding any other provisions of this contract, the parties agree that payments due hereunder from the City are from appropriations and monies from the City Council and any other governmental entities. In the event sufficient appropriations or monies are not made available to City to pay the terms of this agreement for any fiscal year, this contract shall terminate immediately without further obligation of City.

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IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on **[indicate date on which Contract becomes effective]** (which is the Effective Date of the Contract).

Owner:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

*(If **[Type of Entity]** is a corporation, attach evidence of authority to sign. If **[Type of Entity]** is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)*

Contractor:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

*(If **[Type of Entity]** is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

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00 61 13 PERFORMANCE BOND

PLEASE ATTACH PERFORMANCE BOND PURSUANT TO NORTH CAROLINA GENERAL STATUTES

END OF SECTION

00 61 16 PAYMENT BOND

PLEASE ATTACH PAYMENT BOND PURSUANT TO NORTH CAROLINA GENERAL STATUTES

END OF SECTION

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

WARRANTY BOND

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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GUIDELINES FOR USE OF EJCDC® C-612
WARRANTY BOND

1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

A warranty bond (sometimes referred to as a maintenance bond) provides assurance that Contractor (or if necessary the surety) will meet the contractual correction period obligations during a specified period of time after construction has been completed.

C-612 is intended to be used to provide bonding for a period of time greater than one year after Substantial Completion. A warranty bond is typically not used if the correction period remains the standard one year after Substantial Completion, and the Contractor has furnished a performance bond.

Note that on the first page of C-612, the user or issuer of the bond must specify the duration of the Bond Period by inserting a number where indicated by the bracketed prompt. EJCDC recommends an endpoint for the warranty bond of either two years after Substantial Completion (essentially extending the bonded coverage by one additional year) or three years after Substantial Completion (extending the bonded coverage by two additional years).

For additional information regarding C-612, see the Guidance Notes preceding Paragraph SC-6.01.B in EJCDC® C-800, Supplementary Conditions of the Construction Contract (2018); and EJCDC® C-001, Commentary on the 2018 EJCDC Construction Documents (2018). The user should also refer to the terms of EJCDC® C-700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.08, concerning Contractor's correction period obligations.

2.0 ORGANIZATION OF INFORMATION

All parties involved in a construction project benefit significantly from a standardized approach in the location of subject matter throughout the documents. Experience confirms the danger of addressing the same subject matter in more than one location; doing so frequently leads to confusion and unanticipated legal consequences. Careful attention should be given to the guidance provided in EJCDC® N-122/AIA® A521, Uniform Location of Subject Matter (2012 Edition) when preparing documents. EJCDC® N-122/AIA® A521 is available at no charge from the EJCDC website, www.ejcdc.org, and from the websites of EJCDC's sponsoring organizations.

If CSI MasterFormat™ is used for organizing the Project Manual, consult CSI MasterFormat™ for the appropriate document number (e.g., under 00 11 00, Advertisements and Invitations), and accordingly number the document and its pages.

3.0 EDITING THIS DOCUMENT

3.1 It is intended that this document be edited before being furnished as a form to prospective Bidders or Contractors, and for each actual issuance of a Payment Bond. Guidelines for editing include:

A. Remove the cover pages which consist of the title pages, and these Guidelines for Use.

B. Type in required information as indicated by brackets (**[ ]**). Bracketed text will usually provide instructions for what is to be inserted in place of the brackets. Delete brackets and change formatting to match existing text after project specific text has been added, e.g. change

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"**[Project Name]**" to "Peach Street Renovation" (without brackets or bold, or quotation marks).

C. Fill in blanks, if any. It will be more common for information to be inserted by user to be indicated by a prompt in brackets, as described in Paragraph B above, rather than by an underline-style blank.

D. Modify check-boxes as required by clicking in the box.

4.0 LICENSE AGREEMENT

This document is subject to the terms and conditions of the **License Agreement, 2018 EJCDC® Construction Series Documents**. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at www.ejcdc.org and the websites of EJCDC's sponsoring organizations.

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WARRANTY BOND

Contractor	**Surety**
Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Insert address of Surety's principal place of business]**
Owner	**Construction Contract**
Name: **[Full formal name of Owner]** Address *(principal place of business)*: **[Address of Owner's principal place of business]**	Description *(name and location)*: **[Owner's project/contract name, and location of the project]** Contract Price: **[Amount from Contract]** Effective Date of Contract: **[Date from Contract]** Contract's Date of Substantial Completion: **[Date from Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

Modifications to this Bond form:
☐ None ☐ See Paragraph 9

Bond Period: Commencing 364 days after Substantial Completion of the Work under the Construction Contract, and continuing until **[insert number of years, typically either two or three]** years after such Substantial Completion.

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

Contractor as Principal	Surety
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature) (Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
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 is considered plural where applicable.

EJCDC® C-612, Warranty Bond.
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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's Correction Period Obligations. The Construction Contract is incorporated herein by reference.

2. If the Contractor performs the Correction Period Obligations, the Surety and the Contractor shall have no obligation under this Warranty Bond.

3. If Owner gives written notice to Contractor and Surety during the Bond Period of Contractor's obligation under the Correction Period Obligations, and Contractor does not fulfill such obligation, then Surety shall be responsible for fulfillment of such Correction Period Obligations. Surety shall either fulfill the Correction Period Obligations itself, through its agents or contractors, or, in the alternative, Surety may waive the right to fulfill the Correction Period Obligations itself, and reimburse the Owner for all resulting costs incurred by Owner in performing Contractor's Correction Period Obligations, including but not limited to correction, removal, replacement, and repair costs.

4. The Surety's liability is limited to the amount of this Warranty Bond. Renewal or continuation of the Warranty Bond will not modify such amount, unless expressly agreed to by Surety in writing.

5. The Surety shall have no liability under this Warranty Bond for obligations of the Contractor that are unrelated to the Construction Contract. No right of action will accrue on this Warranty Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

6. Any proceeding, legal or equitable, under this Warranty 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 must be instituted within two years after the Surety refuses or fails to perform its obligations under this Warranty Bond.

7. Written notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown in this Warranty Bond.

8. Definitions

    8.1. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page of this Warranty Bond, including all Contract Documents and changes made to the agreement and the Contract Documents.

    8.2. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

    8.3. *Correction Period Obligations*—The duties, responsibilities, commitments, and obligations of the Contractor with respect to correction or replacement of defective Work, as set forth in the Construction Contract's Correction Period clause, EJCDC® C-700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.08, as duly modified.

    8.4. *Substantial Completion*—As defined in the Construction Contract.

    8.5. *Work*—As defined in the Construction Contract.

9. Modifications to this Bond are as follows: **[Describe modification or enter "None"]**

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00 61 20 MAINTENANCE BOND REQUIREMENTS

ARTICLE 1 – MAINTENANCE BOND REQUIREMENTS

1.01 Provide a maintenance bond that complies with the requirements of this Section. A maintenance bond is defined as a performance bond that extends the correction period for a specified period of time beyond the one-year correction period described in the General Conditions.

1.02 Provide a maintenance bond that begins at the end of the one-year correction period and continues for the period stated in Section 00 61 19 “Maintenance Bond.”

1.03 Provide a maintenance bond in the amount stated in Section 00 61 19 “Maintenance Bond.”

1.04 Provide a maintenance bond that meets the same requirements for bonds as the Contractor’s performance bond as described in the Contract Documents.

1.05 Surety for the maintenance bond must meet the same requirements for the performance and payment bonds as set forth in the General Conditions.

1.06 Indemnification provisions of the General Conditions apply to the maintenance bond period.

ARTICLE 2 – DOCUMENTATION

2.01 Provide a maintenance bond using the form provided in Section 00 61 19 “Maintenance Bond.”

2.02 Comply with the requirements of Section 01 70 00 “Execution and Closeout Requirements.”

ARTICLE 3 – CORRECTIVE ACTION DURING THE MAINTENANCE BOND PERIOD

3.01 Correct Defective Work during the one-year correction period in accordance with the General Conditions.

3.02 Correct Defective Work during the maintenance bond period just as required for the one-year correction period specified in the General Conditions. Provide labor and materials required to correct Defective Work or correct Work that does not function as required by the Contract Documents.

3.03 Correction of Defective Work during the maintenance bond period does not extend the correction period as is required under the provisions of the one-year correction period described in the General Conditions.

3.04 Promptly correct damages to the Site or adjacent areas that Contractor has arranged to use through construction easements or other agreements. Promptly correct damages to the Work or the work of others. Make the corrections without cost to Owner.

3.05 Owner may correct Defective Work without notice to the Contractor in an emergency where delay would cause serious risk of loss or damage.

3.06 Include the cost for correcting Defective Work during the maintenance bond period in the Contract Price. Include all costs associated with providing the maintenance bond in the Contract Price.

3.07 Reimburse the Owner for engineering and special services required to be furnished by the Owner which are directly attributable to the corrective Work.

3.08 Remedy for Failure to Correct Defective Work:

A. Owner may correct Defective Work if the Contractor fails or refuses to perform corrective Work within 10 days after Owner notifies the Contractor of Defective Work.

B. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this paragraph are to be paid by the Contractor or its surety. These claims, costs, losses, and damages include costs of repair and the cost of replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's Defective Work. Owner is not required to obtain the lowest price for the Work performed when exercising its rights or remedies under this paragraph.

ARTICLE 4 – INSURANCE REQUIREMENTS

4.01 Provide insurance as required by the Contract Documents during the maintenance bond period. Provide evidence of insurance prior to beginning corrective Work if evidence of insurance is not current.

END OF SECTION

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, “Paragraph SC-4.05.”

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01 Defined Terms

A. Supplement Paragraph 1.01.A by inserting the following defined terms as numbered items in their proper alphabetical positions:

1. *Bid Security*—The financial security provided by Offeror at the time the Bid is submitted and held by Owner until the Agreement is executed and the evidence of insurance and bonds required by the Contract Documents are provided.

2. *Contract Amendment*—A document issued on or after the Effective Date of the Contract and signed by Owner and Contractor which:

    a. Authorizes new phases of the Work and establishes the Contract Price, Contract Times, or terms and conditions of the Contract for the new phase of Work; or

    b. Modifies the terms and conditions of the Contract, but does not make changes in the Work.

3. *Contractor’s Team*—Contractor, Subcontractors, Suppliers, and individuals or entities directly or indirectly employed or retained by Contractor, Subcontractors, or Suppliers to perform part of the Work, or anyone for whose acts they may be liable.

4. *Defective*—When applied to Work, refers to Work that is unsatisfactory, faulty, or deficient in that it:

    a. Does not conform to the Contract Documents;

    b. Does not meet the requirements of applicable inspections, reference standards, tests, or approvals referred to in the Contract Documents; or

    c. Has been damaged prior to Engineer’s recommendation of final payment unless responsibility for the protection of the Work has been assumed by Owner at Substantial Completion in accordance with Paragraphs 15.03 or 15.04.

5. *Final Completion*—The point where the Work is complete in accordance with the Contract Documents, items and documents required by the Contract Documents have been accepted by the Owner and the Project is ready for Final Payment.

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6. *Indemnified Costs*—All costs, losses, judgments, and damages resulting from claims or demands against Owner's Indemnitees. These costs include fees for Engineers, attorneys, and other professionals and any legal, court, arbitration, or other dispute resolution costs.

7. *Manufacturer*—The individual or entity that designs, casts, fabricates, manufactures, assembles, tests, and provides materials or equipment to be incorporated in the Work.

8. *Modification*—Change made to the Contract Documents by Contract Amendment, Change Order, Field Order, or Work Change Directive.

9. *Offeror*—An individual or entity that submits a Bid or Proposal to Owner. When used in the Bidding Documents, Proposal Documents, or Contract Documents, the term Bidder has the same meaning as the term Offeror.

10. *Owner's Budget*—The amount budgeted by the Owner for the construction of the Project.

11. *Owner's Indemnitees*—The Owner's team, including but not limited to the Engineer and their officers, directors, members, partners, employees, agents, consultants, and subcontractors.

12. *Project Management Information System (PMIS)*—The online project management system that will be used by Owner and Contractor to submit and share documentation and other related communications and information for this Project.

SC-1.02 Terminology

A. Supplement Paragraph 1.02 by adding the following paragraphs:

"H. The terms "includes" and "including" are used as terms of enlargement and not of limitation or exclusive enumeration, and use of these terms does not create a presumption that components not expressed are excluded. The terms "consist of" or "consisting of" limits the interpretation to only those items specifically listed."

"I. It is understood that the cost of providing Work is included in the Contract Price and no additional compensation is to be paid by Owner unless specifically stated otherwise in the Contract Documents. Expressions like "at no additional cost to Owner," "at Contractor's expense," or similar words mean that the Contractor is to include the cost of this Work in their Contract Price and perform or provide specified Work without an increase in the Contract Price."

"J. Written documents are required where reference is made to notices, reports, approvals, consents, statements, instructions, opinions, or other types of documentation or communications required by the Contract Documents. Approval and consent documents must be received by Contractor prior to the action or decision for which approval or consent is given. These may be made in printed or electronic format through the Owner's Project Management Information System or other electronic media as required by the Contract Documents or approved by the Engineer."

"K. Giving notice as required by the Contract Documents may be by printed or electronic media using a method that requires acknowledgment of the receipt of that notice."

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ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

B. *Evidence of Contractor's Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

C. Delete Paragraph 2.01.C in its entirety.

2.02 *Copies of Documents*

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor **one** printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and **one copy** in electronic portable document format (PDF).

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

A. Owner shall furnish to Contractor one printed copy of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

2.06 *Electronic Transmittals*

SC-2.06 Delete Paragraphs 2.06.B and 2.06.C in their entirety and insert the following in their place:

B. "B. Electronic Documents Protocol: The parties shall conform to the provisions in Section 01 33 00 "Document Management" for exchange of electronic transmittals."

Electronic Documents Protocol: The parties shall conform to the following provisions in Paragraphs 2.06.B and 2.06.C, together referred to as the Electronic Documents Protocol ("EDP" or "Protocol") for exchange of electronic transmittals.

1. *Basic Requirements*

a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.

b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.

c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and

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methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.

d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.

e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party's use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.

f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of the General Conditions.

2. *System Infrastructure for Electronic Document Exchange*

a. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.

1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is 10 MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.

2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.

b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with the party's individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.

c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.

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d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.

e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.

f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.

g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.

h.

C. *Software Requirements for Electronic Document Exchange; Limitations*

1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this section of the EDP.

a. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.

2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.

3. Software and data formats for exchange of Electronic Documents will conform to the requirements set forth in Exhibit A to this EDP, including software versions, if listed.

SC-2.06 Supplement Paragraph 2.06 of the General Conditions by adding the following paragraph:

D. *Requests by Contractor for Electronic Documents in Other Formats*

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1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.

2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Contractor ("Request") in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner's response to the Request, and to the following conditions to which Contractor agrees:

    a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working document for Engineer's purposes solely, and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor's application, or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

    b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and the Contractor waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.

    c. Contractor shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys' fees and defense costs arising out of or resulting from Contractor's use, adaptation, or distribution of any Electronic Documents provided under the Request.

    d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to Contractor's subcontractors. Contractor warrants that subsequent use by Contractor's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.

3.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. Delete Paragraph 3.01.A in its entirety and insert the following in its place:

"A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all. The Drawings and Specifications do not

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indicate or describe all of the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer. Provide any work, materials, or equipment required for a complete and functional system even if they are not detailed or specified.

1. The Contract requirements described in the General Conditions, Supplementary Conditions, and General Requirements apply to each and all Sections of the Specifications unless specifically noted otherwise.

2. Organization of Contract Documents is not intended to control or to lessen the responsibility of the Contractor when dividing Work among Subcontractors, or to establish the extent of Work to be performed by any trade, Subcontractor, or Supplier. Specifications or details do not need to be indicated or specified in each specification or drawing. Items shown in the Contract Documents are applicable regardless of location in the Contract Documents.

3. Standard paragraph titles and other identifications of subject matter in the Specifications are intended to aid in locating and recognizing various requirements of the Specifications. Titles do not define, limit, or otherwise restrict specification text."

B. Supplement Paragraph 3.01.D by adding the following sentence:

"The Contract Documents comprise the entire Agreement between Owner and Contractor and may be modified only by Field Order, Change Order, Contract Amendment, or Work Change Directive."

C. Supplement Paragraphs 3.01 by adding the following paragraphs:

"H. Where compliance with two or more standards is specified and they establish different or conflicting requirements for minimum quantities or quality levels, Contractor shall comply with the most stringent requirements unless the Contract Documents indicate otherwise.

1. Quantity or quality level shown or indicated shall be the minimum to be provided or performed in every instance.

2. Actual installation shall comply exactly with minimum quality indicated or may exceed that minimum within reasonable limits.

3. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for context of requirements.

4. Refer instances of uncertainty to the Engineer for a decision before proceeding."

"I. Provide materials and equipment comparable in quality to similar materials and equipment incorporated in the Project or as required to meet the minimum requirements of the application if the materials and equipment are shown in the Drawings but are not included in the Specifications."

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SC-3.02 Reference Standards

A. Supplement Paragraph 3.02.A by adding the following subparagraph:

"3. Comply with applicable construction industry standards as if bound or copied directly into the Contract Documents regardless of lack of reference in the Contract Documents. Apply provisions of the Contract Documents where Contract Documents include more stringent requirements than the referenced standards.

a. Standards referenced directly in the Contract Documents take precedence over standards that are not referenced but recognized in the construction industry as applicable.

b. Comply with standards not referenced but recognized in the construction industry as applicable for performance of the Work except as otherwise limited by the Contract Documents. Engineer will determine whether codes or standards are applicable to the performance of the Work.

c. Make copies of reference standards available as requested by Engineer or Owner."

SC-3.03 Reporting and Resolving Discrepancies

A. Delete Paragraph 3.03.A.3 in its entirety and insert the following in its place:

"3. In the event of a conflict in the Drawings, Specifications, or other portions of the Contract Documents which were not reported prior to the bidding of the Contract, the Contractor shall be deemed to have included the most expensive item, system, procedure, etc. in its Bid or Proposal."

SC-3.05 Reuse of Documents

A. Delete the last sentence of Paragraph 3.05.B and insert the following in its place:

"Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes, unless specifically prohibited in writing by the Owner for security reasons. If the Owner so directs, Contractor shall surrender all copies of the construction Contract Documents and other related documents, in paper or digital format and remove these documents from computer equipment or storage devices as a condition of final payment."

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.04 Progress Schedule

A. Supplement Paragraph 4.04 by adding the following paragraph:

"C. Contractor assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents."

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SC-4.05 Delays in Contractor's Progress

A. Delete Paragraph 4.05.C.2 in its entirety and insert the following in its place:

" 2. Abnormal Weather Conditions

a. If Contractor's progress is delayed by "abnormal weather conditions," as defined below, then the Contractor shall be entitled to an adjustment in Contract Time. Such an adjustment shall be the sole and exclusive remedy for the Contractor due to weather and its impacts. The Contractor shall understand that there is a potential for unusually severe weather or high stream levels which may impact construction.

b. The Contractor's entitlement to an adjustment of the Contract Time is conditioned on the delay adversely affecting an activity on the critical path to completion at the time of the delay.

c. No time extensions will be allowed for foreseeable inclement weather conditions. Contractor shall include the number of foreseeable inclement weather days shown in the table below in their project schedule.

d. If "abnormal weather conditions" are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following:

a. that weather conditions were abnormal for the period of time in which the delay occurred,

b. that such weather conditions could not have been reasonably anticipated,

c. that such weather conditions had an adverse effect on a scheduled activity on Contractor's then-current Progress Schedule's critical path for the Project,

d. that such weather or stream levels actually caused a delay to the completion of those scheduled activities, and

e. that the delay was beyond the control and without the fault or negligence of the Contractor.

3. The existence of abnormal weather conditions, beyond inclement weather conditions, will be determined on a month-by-month basis in accordance with the following:

a. Every workday on which one or more of the following conditions exist will be considered an "inclement weather day":

i. Total precipitation (as rain equivalent) occurring between 7:00 p.m. on the preceding day (regardless of whether such preceding day is a workday) through 7:00 p.m. on the workday in question equals or exceeds **0.25"** of precipitation (as rain equivalent, based on the snow/rain conversion using the following conversion factors for rain equivalent):

1. Two inches of sleet equal 1 inch of rain;

2. Five inches of wet, heavy snow equal 1 inch of rain; and

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3. Fifteen inches of “dry” powder snow equals 1 inch of rain.

b. Determination of actual inclement weather days during performance of the Work will be based on the weather records measured and recorded by **National Oceanic & Atmospheric Administration** weather monitoring station FAYETTEVILLE PWC, NC US (GHCND:USC00313017).

c. Website for Monitoring Station: [https://www.ncdc.noaa.gov/cdo-web/datasets/GHCND/stations/GHCND:USC00313017/detail]

d. Contractor shall anticipate the number of foreseeable inclement weather days per month indicated in the following table:

Month	Number of Days
January	8
February	8
March	8
April	8
May	8
June	5
July	9
August	9
September	5
October	5
November	8
December	9
Total	90

4. In each month, every inclement weather day exceeding the number of foreseeable inclement weather days as established in the table above will be considered as “abnormal weather conditions.” The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

5. The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Contractor’s then-current Progress Schedule’s critical path for the Project.

6. Tropical Storms and Hurricanes

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a. When NOAA, or its affiliates such as the National Hurricane Center, issue a Tropical Storm Watch, Tropical Storm Warning, Hurricane Watch, or Hurricane Warning for the project location, then the following may be considered:

   i. Preparation: up to and including two calendar days will be considered for preparing the project site to mitigate Tropical Storm or Hurricane impacts to the site and work.

   ii. Event: the provisions in this section regarding "abnormal weather conditions" are applicable during the Tropical Storm or Hurricane.

   iii. After-Event: Contractor will be under the obligation to demonstrate and document the delays directly caused by the Tropical Storm or Hurricane that are specific to the planned work activities on Contractor's then-current Progress Schedule's critical path for the Project.

b. At the conclusion of the storm event and subsequent clean-up, but within 60 calendar days of the Tropical Storm or Hurricane, the Contractor shall present their request for Contract Time adjustment (preparation, event, after-event) to the Owner and Engineer for consideration. "

ARTICLE 5—SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.01 Availability of Lands

A. Supplement Paragraph 5.01.C by adding the following sentence:

"A copy of the written agreements for the use of such land shall be provided to the Owner for record purposes."

SC-5.02 Use of Site and Other Areas

A. Delete Paragraph 5.02.A.2 in its entirety and insert the following in its place:

"2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ANY SUCH CLAIM, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY CLAIM OR ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY SUCH OWNER OR OCCUPANT AGAINST OWNER, ENGINEER, OR ANY OTHER PARTY INDEMNIFIED HEREUNDER TO THE EXTENT CAUSED DIRECTLY OR INDIRECTLY, IN**

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WHOLE OR IN PART BY, OR BASED UPON, CONTRACTOR'S PERFORMANCE OF THE WORK, OR BECAUSE OF OTHER ACTIONS OR CONDUCT OF THE CONTRACTOR OR THOSE FOR WHICH CONTRACTOR IS RESPONSIBLE."

B. Delete Paragraph 5.06I in its entirety

C. Delete Paragraph 5.06.J in its entirety and insert the following in its place:

"J. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL IDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONS AND ALL COURT OR ARBITRATION OR OTHER DISPUTERRESOLUTION COSTS) ARISING OUT OF OR RELATING TO THE FAILURE TO CONTROL, CONTAIN, OR REMOVE A CONSTITUENT OF CONCERN BROUGHT TO THE SITE BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE, OR TO A HAZARDOUS ENVIRONMENTAL CONDITION CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 5.06.J OBLIGATES CONTRACTOR TO INDEMNIFY ANY INDIVIDUAL OR ENTITY AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE."

SC-5.07 Sedimentation Pollution Control Act of 1973

A. Add a new Paragraph 5.07 as follows:

"5.07 *Sedimentation Pollution Control Act of 1973*

A. Any land-disturbing activity performed by the Contractor or any principal trade or specialty contractor in connection with the Project shall comply with all erosion control measures set forth in the Contract Documents and any additional measures which may be required in order to ensure that the Project is in full compliance with the North Carolina Sedimentation Pollution Control Act of 1973, as implemented by N.C. Gen. Stat Chapter 113A, Article 4 and Title 15A, N.C. Admin. Code, Chapter 4.

B. Upon receipt of notice that a land-disturbing activity is in violation of said act, the Contractor shall be responsible for ensuring that all steps or actions necessary to bring the Project in compliance with said act are promptly taken.

C. The Contractor will be responsible for defending any legal actions instituted pursuant to NCGS §113A-64.

D. **TO THE FULLEST EXTENT PERMITTED BY LAW, THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS AND INDEMNIFIED COSTS ARISING OUT OF OR RESULTING FROM THE PERFORMANCE OF WORK OR FAILURE OF PERFORMANCE OF WORK, PROVIDED THAT ANY SUCH CLAIM OR INDEMNIFIED COST IS ATTRIBUTABLE TO A VIOLATION OF THE SEDIMENTATION POLLUTION CONTROL ACT. SUCH OBLIGATION SHALL NOT BE CONSTRUED TO NEGATE, ABRIDGE, OR OTHERWISE REDUCED ANY OTHER RIGHT OR OBLIGATION OF INDEMNITY WHICH WOULD OTHERWISE EXIST AS TO ANY PARTY OR PERSONS DESCRIBED IN THIS PARAGRAPH."**

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ARTICLE 6—BONDS AND INSURANCE

SC-6.01 Performance, Payment, and Other Bonds

A. Delete Paragraph 5.06.J in its entirety and insert the following in its place:

"6.01. Performance, Payment, and other Bonds

A. Contractor shall furnish a performance bond and a payment bond equal to 100% of the contract price and in accordance and conformity with the requirements of Chapter 44A of the North Carolina General Statutes. Contractor shall also furnish such other bonds, if any, as may be required by the Supplementary Conditions or other provisions of this contract."

SC-6.02 Insurance—General Provisions

A. Delete Paragraph 6.02.A in its entirety and insert the following in its place:

"A. Obtain and maintain insurance in accordance with Section 00 73 16 'Insurance Requirements.'"

SC-6.05 Property Losses; Subrogation

A. Delete the words "Owner and Contractor waive" in the first sentence of Paragraph 6.05.A.1 and replace it with the words "Contractor waives".

B. Delete Paragraph 6.05.B.1 in its entirety.

SC-6.06 Receipt and Application of Property Insurance Proceeds

A. Delete Paragraph 6.06 in its entirety.

SC-6.07 Owner's Insurance for Project

A. Add a new Paragraph 6.08 as follows:

"6.07 *Owner's Insurance for Project*

A. Owner shall not be responsible for purchasing and maintaining any insurance to protect the interest of the Contractor, Subcontractors, or others in the Work. The stated limits of insurance required are minimum only. Contractor shall determine the limits that are adequate. These limits may be basic policy limits or any combination of basic limits and umbrella limits. In any event, Contractor is fully responsible for all losses arising out of, resulting from or connected with operations under this Contract whether or not said losses are covered by insurance. The acceptance of certificates or other evidence of insurance by the Owner Engineer, and/or others listed as an additional insured, that in any respect do not comply with the Contract requirements does not release the Contractor from compliance herewith."

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ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

SC-7.03 Labor; Working Hours

A. Delete Paragraph 7.03.C in its entirety and insert the following in its place:

"C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, no Work shall be performed at the Site between 6:00 p.m. and 7:00 a.m. Contractor will not permit the performance of Work on a Saturday, Sunday, or any Owner holiday without Owner's written consent. Should Contractor desire to work on these days, Contractor shall contact the Owner, in writing, for approval at least 48 hours in advance. Emergency work may be done without prior permission. Tie ins and connections to existing facilities will be made at time authorized by the Owner. Owner's legal holidays are those recognized by the City of Fayetteville**."**

B. Supplement Paragraph 7.03 by adding the following paragraph:

"D. **Contractor** shall be responsible for the cost of overtime pay or other expense incurred by the Owner for Construction Management Services, Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable Set-off against payments due under Article 15. For purposes of administering the foregoing requirement, additional overtime costs will be billed at rates shown in SC-15.01.E."

SC-7.08 Patent Fees and Royalties

A. Delete Paragraph 7.08.B in its entirety.

B. Delete Paragraph 7.08.C in its entirety and insert the following in its place:

"C. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY INFRINGEMENT OF PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY INVENTION, DESIGN, PROCESS, PRODUCT, OR DEVICE NOT SPECIFIED IN THE CONTRACT DOCUMENTS."

SC-7.10 Taxes

A. Add a new paragraph immediately after Paragraph 7.10.A:

"A. Owner qualifies as an exempt agency as defined by the statutes of the State of North Carolina**.** Contractor shall pay all sales, consumer, use, and other similar taxes

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required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work."

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

SC-7.11 Laws and Regulations

A. Delete Paragraph 7.11.B in its entirety and insert the following in its place:

"B. IF CONTRACTOR PERFORMS ANY WORK OR TAKES ANY OTHER ACTION KNOWING OR HAVING REASON TO KNOW THAT IT IS CONTRARY TO LAWS OR REGULATIONS, CONTRACTOR SHALL BEAR ALL RESULTING COSTS AND LOSSES, AND SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH WORK OR OTHER ACTION. IT IS NOT CONTRACTOR'S RESPONSIBILITY TO MAKE CERTAIN THAT THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS IS IN ACCORDANCE WITH LAWS AND REGULATIONS, BUT THIS DOES NOT RELIEVE CONTRACTOR OF ITS OBLIGATIONS UNDER PARAGRAPH 3.03."

SC-7.15 Emergencies

A. Amend Paragraph 7.15.A by deleting the last sentence and inserting the following in its place:

"Contractor may submit a Change Proposal if the incident giving rise to the emergency action was not the responsibility of the Contractor and a change in the Contract Documents is required because of the emergency or the action taken by Contractor in response to such an emergency."

SC-7.16 Submittals

A. Delete Paragraph 7.16.A.3 in its entirety and insert the following in its place:

"3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents on a Shop Drawing Deviation Request form provided by the Engineer and request that a Field Order or Change Order be issued for each of the specific variations submitted for approval. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation."

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B. Delete Paragraph 7.16.C.4 in its entirety and insert the following in its place:

"4. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A and Engineer has given written approval of each such variation by issuing a Field Order or Change Order. If the proposed Modification is approved by the Engineer, the submittal will be considered to be in strict compliance with the Contract Documents and it will be reviewed in accordance with the Contract Documents. If the proposed Modification is not approved, the submittal will be returned to the Contractor with appropriate comments. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A."

C. Delete Paragraph 7.16.D.1 in its entirety and insert the following in its place:

"1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Resubmittals shall reference and respond directly to Engineer's previous comments. Any variations from strict compliance with the Contract Documents will be identified in the same manner as required in Paragraph 7.16.A and will require the same approvals."

SC-7.18 Indemnification

A. Delete Paragraph 7.18.A in its entirety and insert the following in its place:

"A. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, AND IN ADDITION TO ANY OTHER OBLIGATIONS OF CONTRACTOR UNDER THE CONTRACT OR OTHERWISE, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM LOSSES, DAMAGES, COSTS, AND JUDGMENTS (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF DESIGN PROFESSIONALS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING FROM THIRD-PARTY CLAIMS OR ACTIONS RELATING TO OR RESULTING FROM THE PERFORMANCE OR FURNISHING OF THE WORK, PROVIDED THAT ANY SUCH CLAIM, ACTION, LOSS, COST, JUDGMENT OR DAMAGE IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE, OR DEATH, OR TO DAMAGE TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF), INCLUDING THE LOSS OF USE RESULTING THEREFROM, BUT ONLY TO THE EXTENT CAUSED BY ANY NEGLIGENT ACT OR OMISSION OF CONTRACTOR, ANY SUBCONTRACTOR, ANY SUPPLIER, OR ANY INDIVIDUAL OR ENTITY DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM ANY OF THE WORK, OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE."

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *SC-8.02 Coordination*

A. Supplement Paragraph 8.02 by adding the following paragraph:

"C. Work to be performed by others is listed in Section 01 11 00 "Summary of Work."

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8.02 *SC-8.03 Legal Relationships*

A. Delete Paragraph 8.03.C in its entirety and insert the following in its place:

"C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) **INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ANY SUCH CLAIMS, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH DAMAGE, DELAY, DISRUPTION, OR INTERFERENCE**."

8.03 *SC-8.04 Claims Between Contractors*

A. Supplement Article 8 by adding the following paragraph:

"8.04 *Claims between Contractors*

A. Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner, or Engineer, then Contractor (without involving Owner or Engineer) shall either (1) remedy the damage, (2) agree to compensate the other contractor for remedy of the damage, or (3) remedy the damage and attempt to settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.

B. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS AND INDEMNIFIED COSTS ARISING DIRECTLY, INDIRECTLY OR CONSEQUENTIALLY OUT OF ANY ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY OTHER CONTRACTOR AGAINST THE OWNER, AND ENGINEER TO THE EXTENT SAID CLAIM IS BASED ON OR ARISES OUT OF CONTRACTOR'S PERFORMANCE OF THE WORK. SHOULD ANOTHER CONTRACTOR CAUSE DAMAGE TO THE WORK OR PROPERTY OF CONTRACTOR OR SHOULD THE PERFORMANCE OF WORK BY ANY OTHER CONTRACTOR AT THE SITE GIVE RISE TO ANY OTHER CLAIM, CONTRACTOR SHALL NOT INSTITUTE ANY ACTION, LEGAL OR EQUITABLE, AGAINST OWNER'S INDEMNITEES OR PERMIT ANY ACTION AGAINST ANY OF THEM TO BE MAINTAINED AND CONTINUED IN ITS NAME OR FOR ITS BENEFIT IN ANY COURT OR BEFORE ANY ARBITER WHICH SEEKS TO IMPOSE LIABILITY ON OR TO RECOVER DAMAGES FROM THE OWNER AND ENGINEER ON ACCOUNT OF ANY SUCH DAMAGE OR CLAIM.**

C. Contractor may submit a Change Proposal for an extension of Contract Times, in accordance with Article 11, if Contractor is delayed at any time in performing or furnishing the Work by any act or neglect of another contractor. An extension of the

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Contract Times will be Contractor's exclusive remedy with respect to the Owner and Engineer for any delay, disruption, interference, or hindrance caused by any other contractor."

ARTICLE 9—OWNER'S RESPONSIBILITIES

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:

1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.

3. *Liaison*

    a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

    b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

    c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.

4. *Review of Work; Defective Work*

    a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.

    b. Observe whether any Work in place appears to be defective.

    c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.

5. *Inspections and Tests*

    a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.

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b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.

6. *Payment Requests:* Review Applications for Payment with Contractor.

7. *Completion*

a. Participate in Engineer's visits regarding Substantial Completion.

b. Assist in the preparation of a punch list of items to be completed or corrected.

c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.

d. Observe whether items on the final punch list have been completed or corrected.

D. The RPR will not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.

5 Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *SC-11.02 Change Orders*

A. Supplement Paragraph 11.02 by adding the following paragraph:

"C. Contractor assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents unless the variation is specifically approved by Change Order."

11.02 *SC-11.11 No Damage for Delays*

A. Supplement Article 11 by adding the following paragraph:

"11.11 *No Damage for Delays*

A. Contractor agrees to make no Claims for damage for delay in the performance of the Contract occasioned by any act or omission to act of the Owner, Engineer, or any of the Engineer's or Owner's agents, and agrees that any such Claim shall be fully

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compensated by an extension of time, as set forth in a Change Order, to complete performance of the Work as provided herein."

ARTICLE 12—CLAIMS

12.01 *SC-12.01 Claims*

A. Delete Paragraph 12.01 in its entirety and insert the following in its place:

"A. *Initial Decision.* All claims by either the Owner or the Contractor must be initiated by written notice to the other party and the Engineer or initial decision maker within 21 days of the occurrence of the event giving rise to such claim or within 21 days after the claimant first recognizes the condition giving rise to the claim. All claims shall be referred to the Engineer or other designated decision maker for initial decision. The Engineer or initial decision maker shall review the submitted claim. During the review, the Engineer or initial decision maker may request additional information from the parties in support or opposition to the claim under review. Within 30 days of the receipt of the claim, the Engineer or initial decision maker shall render an initial, written decision approving or rejecting the claim, in whole or in part.

B. *Mediation.* Either party may, within 30 days of the date of the initial decision, demand mediation of the initial decision. After demand for mediation has been made, either party may initiate mediation, but in no event later than 60 days from the date of the initial decision. Mediation shall be in accordance with the statutes and procedures governing mediation in the Superior Court of Cumberland County, North Carolina. The exclusive venue of mediation shall be Cumberland County, North Carolina. Mediation of a claim shall be a condition precedent to any binding dispute resolution. Failure to demand or initiate mediation of an initial decision within the foregoing lime limits shall convert the initial decision to a final decision and waive all parties' rights to mediation or any binding dispute resolution process.

C. *Binding Dispute Resolution.* If, after mediation, the claim remains unresolved, claimant shall submit the disputed claim to binding dispute resolution by the filing a complaint, within the time limits specified by statute, in the Superior Court of Cumberland County, North Carolina. Said action in Superior Court shall be decided by a Judge without a jury; the parties hereto having knowingly waived their right to a jury."

ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

13.01 *Cost of the Work*

SC-13.01

SC-13.01 Cost of the Work

A. Amend Paragraph 13.01.B by deleting the following words in the first sentence:

"commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:"

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and insert the following in its place:

"those paid for the Work included in the Contract Price, and shall not include any of the costs itemized in Paragraph 13.01.C. Contractor shall provide certified payroll records listing personnel classifications and salaries for all individuals involved in additional Work. Salaries for those not included in the certified payroll will be considered as being compensated under Paragraph 13.01.C, and shall include only the following items:"

B. Amend Paragraph 13.01.B.1 by deleting the following words in the second sentence:

", without limitation, superintendents, foremen"

and inserting the following in its place:

"one foreman (unless agreed upon prior to beginning Work)"

C. Amend Paragraph 13.01.B.1 by deleting the following words in the last sentence:

"be included in the above"

and inserting the following in its place:

"not exceed 1.5 times regular pay and shall be included in the above"

D. Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

"The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current revision of https://equipmentwatch.com/blue-book-cost-recovery/.

E. Amend Paragraph 13.01.C.1 by adding "superintendents" to the list of excluded personnel in the first sentence.

13.03 *Unit Price Work*

SC-13.03 Unit Price Work

A. Delete Paragraph 13.03.E in its entirety and insert the following in its place:

"E. *Adjustments in Unit Price*

1. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

a. If the total cost of a particular item of Unit Price Work amounts to 20 percent or more of the total Contract Price or the variation in the quantity of that particular item of Unit Price Work performed by the Contractor differs by more than 20 percent from the estimated quantity of such item indicated in the Agreement; and

b. If there is no corresponding adjustment with respect to any other item of Work; and

c. If Contractor believes that Contractor has incurred additional expense as a result thereof; or if Owner believes that the quantity variation entitles Owner to an adjustment in the Unit Price, either the Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance

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with Article 11 if the parties are unable to agree as to the effect of any such variation in the quantity of the Unit Price Work performed."

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCCEPTANCE OF DEFECTIVE WORK

No suggested Supplementary Conditions in this Article.

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

SC-15.01 Progress Payments

A. Delete Paragraph 15.01.B.1 in its entirety and insert the following in its place:

"1. On the first working day following the 25th of each month, Contractor shall submit to Engineer for review an Application for Payment, filled out and signed by Contractor, covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents."

B. Amend Paragraph 15.01.C.1 by deleting "10" and inserting "30" in its place.

C. Amend Paragraph 15.01.E.1 by deleting Subparagraph 15.01.E.1.l and adding the following in its place:

"l. Owner has been notified of failure to make payments to Subcontractors or Suppliers or for labor;"

"m. failure to submit up to date record documents as required by the Contract Documents;"

"n. failure to submit monthly Progress Schedule updates or revised schedules as requested by the Owner or Engineer;"

"o. failure to provide Project videos or photographs required by the Specifications;"

"p. Other items entitle Owner to a set off against the amount recommended."

D. Amend Paragraph 15.01.E.3 by deleting "and subject to interest as provided in the Agreement."

E. Supplement Paragraph 15.01.E by adding the following subparagraph:

"4. Owner may permanently withhold payment from Contract Price for:

a. Liquidated damages incurred by Contractor.

b.

c. Costs for tests performed by the Owner to verify that Work previously tested and found to be defective has been corrected. Verification testing is to be provided at the Contractor's expense to verify products or constructed works are in compliance after corrections have been made."

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F. Supplement Paragraph 15.01 by adding the following paragraph:

"F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment."

SC-15.03 Substantial Completion

A. Supplement Paragraph 15.03.B by adding the following subparagraph:

"1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable Set-off against payments due under this Article 15."

SC-15.06 Final Payment

A. Delete Paragraph 15.06.E in its entirety and insert the following in its place:

"E. *Final Payment Becomes Due*: The first working day following the 10th day of the second month following the submittal of the final Application for Payment and accompanying documentation, the amount recommended by the Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set offs for liquidated damages and set offs allowed under the provisions above with respect to progress payments) will become due and will be paid by Owner to Contractor."

SC-15.08 Correction Period

A. Supplement Paragraph 15.08 by adding the following paragraph:

"G. When early acceptance of a Substantially Completed portion of the Work is accomplished in the manner indicated in the Contract Documents, the correction period for that portion of the Work shall commence at the time of Substantial Completion of that Work."

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ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *SC-16.02 Owner May Terminate for Cause*

A. Delete Subparagraphs 16.02.A.3 and 16.02.A.4 in their entirety and replace them with the following:

"3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;"

"4. Contractor's repeated disregard of the authority of Owner or Engineer;"

"5. Contractor fails to provide a replacement bond or insurance coverage as required by the General Conditions and as amended by the Supplementary Conditions; or"

"6. If any petition of bankruptcy is filed by or against Contractor, or if Contractor is adjudged as bankrupt or insolvent or makes a general assignment for the benefit of creditors, or if a receiver is appointed for the benefit of Contractor's creditors, or if a receiver is appointed on account of Contractor's insolvency, upon the occurrence of any such event, Owner shall be entitled to request of Contractor or its successor in interest adequate assurance of future performance in accordance with the terms and conditions hereof. Failure to comply with such request within 7 days of delivery of the request shall entitle Owner to terminate this Agreement and to the accompanying rights set forth in Article 16 of the General Conditions. In all events pending receipt of adequate assurance of performance and actual performance in accordance therewith, Owner shall be entitled to proceed with the Work with its own forces or with other contractors on a time and material or other appropriate basis. The cost of work by Owner or other contractors will be back charged against the Contract Sum hereof."

B. Delete Paragraph 16.02.G in its entirety.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

SC-17.01 Methods and Procedures

A. Delete Paragraph 17.01 in its entirety and insert the following in its place:

"17.01 *Methods and Procedures*

A. The Owner and Contractor may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Law."

B. The following method of dispute resolution is identified as required by Paragraph 17.01.B of the General Conditions:

1. In accordance with NCGS §143-128(f1), any claim, dispute, or other matter in question involving greater than $15,000 arising out of or related to this Agreement shall be subject to mediation as a condition precedent to the institution of legal or equitable proceeding by either party. Owner has adopted the North Carolina State Building Commission's dispute resolution process. The process entitled "Rules Implementing Mediated Settlement Conferences in North Carolina Construction Projects" is attached to this Section.

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2. For any claim, dispute, or other matter in question involving less than $15,000, the Owner and Contractor may agree to submit the matter to the dispute resolution process or exercise such rights or remedies as either may otherwise have under the Contract Documents or by Law.

ARTICLE 18—MISCELLANEOUS

SC-18.02 Computation of Times

A. Supplement Paragraph 18.02 by adding the following paragraph:

"B. All references and conditions for a "Calendar Day Contract" in the General Conditions and Supplementary Conditions shall apply for a "Fixed Date Contract." A "Fixed Date Contract" is one in which the calendar dates for reaching Substantial Completion and/or final completion are specified in lieu of identifying the actual calendar days involved."

SC-18.10 Headings

A. Delete Paragraph 18.08.A in its entirety and insert the following in its place:

"A. The Article and paragraph headings in this Agreement are inserted for convenience only and do not constitute parts of these General Conditions or act as a limitation of the scope of the particular section to which they refer. This Agreement will be fairly interpreted in accordance with its terms and conditions and not for or against either party."

SC-18.09 Independent Contractor

A. Supplement Article 18 by adding the following paragraph:

"18.11 *Independent Contractor*

A. Each Party will perform its duties under this Agreement as an independent contractor. The Parties and their personnel will not be considered to be employees or agents of the other Party. Nothing in this Agreement will be interpreted as granting either Party the right or authority to make commitments of any kind for the other. This Agreement will not constitute, create, or be interpreted as a joint venture, partnership, or formal business organization of any kind."

SC-18.12 Severability

A. Supplement Article 18 by adding the following paragraph:

"18.12 *Severability*

A. If a court of competent jurisdiction renders any part of this Agreement invalid or unenforceable, that part will be severed and the remainder of this Agreement will continue in full force and effect."

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SC-18.13 No Third Party Beneficiaries

A. Supplement Article 18 by adding the following paragraph:

"18.13 *No Third Party Beneficiaries*

A. Nothing in this Agreement shall be construed to create any right in any third party not a signatory to this Agreement, and the parties do not intend to create any third party beneficiaries by entering into this Agreement."

SC-18.14 Sovereign Immunity

A. Supplement Article 18 by adding the following paragraph:

"18.14 *Sovereign Immunity*

A. The parties agree that the Owner has not waived its sovereign immunity by entering into and performing its obligations under this Agreement."

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00 73 16 INSURANCE REQUIREMENTS

ARTICLE 1 – GENERAL PROVISIONS

1.01 CONTRACTOR'S INSURANCE

A. Obtain and maintain insurance that complies with this Section with coverage amounts equal to or greater than the amounts specified in Article 2 or greater where required by Laws and Regulations.

B. Coverage is to remain in effect at least until the Work is complete and longer if expressly required elsewhere in this Contract, and when Contractor may be correcting, removing, or replacing Defective Work as a warranty or correction obligation, or returning to the Site to conduct other tasks arising from the Contract.

C. Coverage is to apply with respect to the performance of the Work, whether performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.

D. Obtain insurance from companies that are duly licensed or authorized in the state in which the Project is constructed to issue insurance policies for the required limits and coverages and that have an A.M. Best rating of A-VIII or better.

E. Alternative forms of insurance coverage, including self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not acceptable to meet the insurance requirements of this Contract.

F. Owner will not purchase or maintain insurance to protect the interest of the Contractor, Subcontractors, or others in the Work. Owner does not represent that the insurance coverage and limits established in this Contract are adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary and including the cost of this insurance in the offered Contract Price.

G. Contractor is fully responsible for all losses arising out of, resulting from or connected with operations under this Contract whether or not these losses are covered by insurance. The acceptance of evidence of insurance by the OWNER, or others listed as an additional insured, that does not comply with the Contract requirements does not release the Contractor from the requirement to comply with Contract requirements.

H. The required insurance and insurance limits do not limit the Contractor's liability under the indemnities granted to Owner's Indemnitees in the Contract Documents.

I. Do not perform any Work on the Project unless the required insurance policies are in effect. Owner may exclude the Contractor from the Site and exercise Owner's termination rights under the General Conditions if Contractor fails to obtain or maintain the required insurance.

J. Policies must provide notice before cancellation, non-renewal or any material change in the policy's terms and conditions as described in Paragraph **[1.04.D]**. Contractor is to notify Owner and the additional insured of any notice received within 3 days of receipt of a notice

by Contractor. Contractor is to cease all Work covered by cancelled or non-renewed insurance if suitable coverage is not in place in time to prevent a lapse in coverage. Contractor is solely responsible for any delays associated with lapsed coverage.

K. Owner may elect, but is in no way obligated, to obtain equivalent insurance to protect Owner's interests without prejudice to any other right or remedy if the Contractor fails to obtain or maintain the required insurance. Owner may impose a reasonable set-off against payments to recover the cost of the insurance.

L. Owner's policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's policies to meet any of Contractor's obligations to the Owner, Engineer, or third parties.

1.02 SUBCONTRACTOR OR SUPPLIER INSURANCE

A. Require Subcontractors to purchase and maintain workers' compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project. Include OWNER as additional insureds on Subcontractor's policies in accordance with Paragraph **[1.03]**.

B. Require Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

C. Contractor is liable for all losses that would have been covered by Subcontractor or Supplier insurance if Subcontractor or Supplier fails to provide coverage.

1.03 ADDITIONAL INSURED

A. The following are to be named as an additional insured on all insurance policies, except workers' compensation insurance, builder's risk insurance, and the Contractor's professional liability insurance:

1. **City Of Fayetteville**
   Attn: **Purchasing Department**
   433 Hay Street
   Fayetteville, NC 28301

B. All insurance related notices are to be sent to the addresses listed above.

C. Notify the Owner and additional insured if the Contractor fails to purchase or maintain the insurance required by the Contract Documents.

D. All insurance policies must include a waiver of subrogation in favor of each additional insured.

E. Provide for an endorsement that the "other insurance" clause will not apply to the OWNER where the OWNER is an additional insured. Contractor's insurance is primary and non-contributory with respect to any insurance or self-insurance carried by the OWNER for liability arising out of operations under this Contract.

1.04 EVIDENCE OF INSURANCE

A. Deliver evidence of insurance, in accordance with this Section, to the Owner with the signed Contract Documents to demonstrate that Contractor has obtained the policies, coverages, and endorsements required by the Contract.

1. Continue to provide evidence Contractor is maintaining the required insurance for the duration of the Contract Times and such extended periods as required by the Contract Documents.
2. Provide this evidence of insurance to Owner and each additional insured.
3. Contractor may block out (redact) any confidential premium or pricing information and wording specific to a project or jurisdiction in any policy or endorsement furnished under this paragraph not applicable to this Contract.

B. Owner's failure to demand evidence of insurance or verify the Contractor's full compliance with insurance requirements or failure to identify a deficiency in compliance from the evidence provided is not a waiver of the Contractor's obligation to obtain and maintain the insurance required by the Contract Documents.

C. Provide evidence of insurance acceptable to the Owner with the executed Contract Documents. Provide the following as evidence of insurance:
1. Copy of insurance policies;
2. Certificates of insurance on an acceptable form;
3. Full disclosure of exclusions;
4. Declaration pages, riders, or endorsements to policies;
5. Documentation of deductibles;
6. List of named and additional insureds for each policy; and
7. Evidence that waivers of subrogation are provided on applicable policies.

D. Provide evidence of a requirement in the policy that at least 10 days' notice will be given before cancellation, non-renewal or any material change in the policy's terms and conditions including:
1. Type of coverage provided;
2. Riders or endorsements to policies;
3. Policy limits of coverage;
4. Change in deductible amount;
5. Status of named or additional insured; or
6. Waivers of subrogation.

E. Certificates of Insurance:
1. Submit certificates of insurance meeting the applicable requirements of the applicable state department of insurance. No requirement of this Contract may be interpreted as requiring the issuance of a certificate of insurance on a form that has not first been filed with and/or approved by the applicable state department of insurance.
2. Include the name of the Project in the description of operations box on the certificate of insurance, and the name of each additional insured.

F. Continuing Evidence of Coverage:

1. Provide updated, revised, or new evidence of insurance prior to the expiration of existing policies. A certificate of insurance is acceptable as evidence of renewal of insurance policies, provided no changes are made in the policy originally provided with signed Contract Documents.

2. Provide evidence of continuation of insurance coverage at final payment and for the following 3 years.

ARTICLE 2 – INSURANCE COVERAGE AMOUNTS AND POLICY REQUIREMENTS

2.01 CONTRACTOR'S INSURANCE

A. Workers' Compensation and Employer's Liability Insurance:

1. Purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation, including off-site operations.

2. Provide the following coverage with not less than the minimum limits indicated:

Workers' Compensation and Related Insurance	Policy Limits
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshore)	Statutory
Foreign Voluntary Workers' Compensation (Employer's Responsibility Coverage), if Applicable	Statutory
Jones Act (if applicable)	
Bodily Injury by Accident – Each Accident	$
Bodily Injury by Accident – Aggregate	$
Bodily Injury by Disease – Each Occurrence	$
Bodily Injury by Disease – Aggregate	$
Employers' Liability	
Each Accident	$500,000.00
Each Employee	$500,000.00
Policy Limit	$500,000.00
Stop-Gap Liability Coverage	
For Work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the workers' compensation or commercial general liability policy with a minimum limit of:	$

B. Commercial General Liability

1. Purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:

a. Damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

b. Damages insured by reasonably available personal injury liability coverage; and

c. Damages because of injury to or destruction of tangible property wherever located, including loss of use resulting from the damage.

2. Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form).

   a. Provide additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). Equivalent endorsements may be used if Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available.

   b. Provide ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent for Engineer additional insured.

3. Provide the following coverages and endorsements:

   a. Products and completed operations coverage.

      1) Maintain coverage for 3 years after final payment.

      2) Provide Owner and each other additional insured evidence of continuation of such insurance at final payment and for 3 years thereafter.

   b. Blanket contractual liability coverage, including coverage of Contractor's contractual indemnity obligations in the General Conditions.

   c. Severability of interests and no insured-versus-insured or cross-liability exclusions.

   d. Underground, explosion, and collapse coverage.

   e. Personal injury coverage.

4. The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

   a. Modifications of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).

   b. Exclusion for water intrusion or water damage.

   c. Provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.

   d. Exclusion of coverage relating to earth subsidence or movement.

   e. Exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than workers' compensation).

   f. Limitations or exclusions based on the nature of Contractor's work.

   g. Professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

5. Provide the following coverage with not less than the minimum limits indicated:

Commercial General Liability Insurance	Policy Limits
General Aggregate	$2,000,000.00
Products - Completed Operations	$2,000,000.00
Personal and Advertising Injury (Limit Per Person)	$
Bodily Injury and Property Damage – Each Occurrence	$1,000,000.00

C. Automobile Liability:

1. Purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis. Coverage can be provided through individual limits for bodily injury and for property damage or a combined single limit covering both bodily injury and property damage.

2. Provide the following coverage with not less than the minimum limits indicated:

Automobile Liability Insurance	Policy Limits
Bodily Injury	
Each Person	$250,000.00
Each Accident	$500,000.00
Property Damage	
Each Accident	$1,000,000.00
Combined Single Limit	
Combined Single Limit for Bodily Injury and Property Damage	$

END OF SECTION

00 73 20 CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____,
the duly authorized and acting legal representative of _____
_____, do hereby certify as follows:

I have examined the attached Contract(s) and Performance and Payment Bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions, and provisions thereof.

_____

Date _____

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00 73 21 CERTIFICATE OF FINANCE OFFICER

Provisions for the payment of the monies to fall due under this agreement has been made by appropriation duly made or by bonds or notes duly authorized, as required by the "Local Government Budget and Fiscal Control Act".

_____
Finance Officer

_____
Date

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00 73 30 LIST OF FORM TEMPLATES

Form Title
Notice of Award
Notice to Proceed
Application for Payment
Certification of Substantial Completion
Notice of Acceptability
Work Change Directive
Change Order
Field Order

END OF SECTION

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Tryon Drive Drainage Improvements

DIVISION 01

FAYETTEVILLE NC

AMERICA'S CAN DO CITY

01 11 00 SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY

A. Construct Work as described in the Contract Documents.

1. Provide the materials, equipment, and incidentals required to make the Project completely and fully operable.
2. Provide the labor, equipment, tools, and consumable supplies required for a complete Project.
3. Provide the civil, architectural, structural, mechanical, electrical, instrumentation, and all other Work required for a complete and operable Project.
4. Test and place the completed Project in operation.
5. Provide the special tools, spare parts, lubricants, supplies, or other materials as indicated in the Contract Documents for the operation and maintenance of the Project.
6. The Contract Documents do not indicate or describe all Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer

B. Owner may pre-select or pre-purchase goods for this Project per Section 01 64 00 "Owner-Furnished Goods and Special Services." Install these goods and coordinate the performance of specified special services.

1.02 DESCRIPTION OF WORK

A. Work is described in general, non-inclusive terms as:

1. **Removal and disposal of existing drainage infrastructure**
2. **Provide new drainage inlets, structures, and piping (approximately 1,250 feet)**
3. **Provide new 10'x4' (approximately 90 feet) and 12'x4' (approximately 320 feet) precast reinforced concrete box culvert, endwalls, wingwalls, etc.**
4. **Provide 8" PC350 DI Water Line (approximately 2,100 feet) with fittings, valves, hydrants, new service laterals, etc.**
5. **Abandonment of AC waterline.**
6. **Renewal of water and sewer laterals.**

1.03 WORK UNDER OTHER CONTRACTS

A. The Owner has no knowledge of work, other than the Work included in this Contract, which may impact construction scheduling, testing, and startup.

1.04 WORK BY OWNER

A. The Owner has no knowledge of work, other than the Work included in this Contract that may impact construction scheduling, testing, and startup.

B. Owner will provide normal operation and maintenance of the existing facilities during construction, unless otherwise stated.

1.05 CONSIDERATION AND COOPERATION WITH UTILITIES

A. Prior to the beginning of construction, the City of Fayetteville will notify all utility owners known to have facilities affected by the construction of the project and will make arrangements for the necessary adjustments of all affected public or private utility facilities. The utility adjustments may be made either before or after the beginning of construction of the project. The adjustments will be made by the utility owner or their representative or by the Contractor when such adjustments are identified on the contract drawings or in the summary of work.

B. The Contractor shall include the cost of any coordination and cooperation with utilities in their bid.

1. Prior to submission of bid, the Contractor shall make their own determination as to the following:

a. the nature and extent of the utility facilities including but not limited to proposed adjustments, new facilities, or temporary work to be performed by the utility owner or their representative.

b. whether or not any utility work is planned by the utility owner in conjunction with the project construction.

2. The Contractor shall consider in their bid all of the permanent and temporary utility facilities in their present or relocated positions, whether or not specifically shown in the plans or covered in the special provisions. It will be the Contractor's responsibility to anticipate additional costs to them resulting from such utilities and to reflect these costs in their bid for the various items in the contract.

3. No additional compensation shall be allowed for delays or inconvenience sustained by the Contractor due to utility relocation or adjustments.

C. The Contractor shall use NC811 to locate utilities and shall use special care working in, around, and near all existing utilities.

1. Protect all utilities encountered (see 01 31 00 "Project Management and Coordination").

2. No additional compensation will be made for excavating near or around existing utilities, for purposes of locating or preservation. Not all utilities (above ground or underground) will be relocated – the Contractor shall consider any mechanized and/or hand-digging necessary to preserve the integrity of utilities in their bid price.

3. Damage to Existing Utilities

a. If the Work is delayed as a result of damage to an **improperly** marked utility, the Contractor may request an extension of the Contract Time in accordance with these Contract Documents. Should the Contractor determine compensation for the damages is also warranted, the Contractor will follow the change management process as outlined in these documents.

b. If the Work is delayed as a result of damage to a **properly** marked utility, no additional Contract Time or compensation shall be granted.

D. Unforeseen conditions and utilities are the responsibility of the contractor to remove or relocate. Contractor shall follow the change management process for potential adjustments to Contract Time or Contract Price.

E. Any changes to utilities made solely for the convenience of the Contractor shall be the Contractor's responsibility to arrange for and bear all costs pertaining to and resulting from such changes.

1.06 CONSTRUCTION OF UTILITIES

A. Power and Electrical Services:

1. Contractor shall provide permanent power connections for the Site through the power utility unless indicated otherwise in the Contract Documents.

2. Contractor shall procure and pay for permits and for providing permanent power.

3. Coordinate and cooperate with others performing this Work.

4. Provide conduit, conductors, pull boxes, manholes, and other appurtenances for the installation of power cable between the property line and the transformer and between the transformer and the main power switch unless the Contract Documents indicate otherwise.

5. Test conductors in accordance with the Specifications and requirements of the power utility and coordinate with the power utility to energize the system when ready.

6. Pay for temporary power including construction cost, meter connection, fees, and permits.

7. Contractor may request to use the permanent power source in lieu of temporary power source when permanent power is available at the Site. Requests to use the permanent power source may be submitted to the Engineer and City of Fayetteville. If approved, arrange with the power utility and pay the charges for connections and monthly charges for use of this power.

8. Pay for the power consumed until the Project has been accepted as Substantially Complete unless noted otherwise.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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01 26 00 CHANGE MANAGEMENT

PART 1 - GENERAL

1.01 REQUESTS FOR CHANGE PROPOSAL – OWNER INITIATED

A. Engineer will initiate Modifications by issuing a Request for Change Proposal ("RCP").

1. Engineer will prepare a description of proposed Modifications.

2. Engineer will issue the RCP form to Contractor. A number will be assigned to the Request for an RCP when issued.

3. Contractor will return a Change Proposal in accordance with Paragraph **[1.02]** for evaluation by the Owner.

1.02 CHANGE PROPOSALS – CONTRACTOR INITIATED

A. Submit a Change Proposal ("CP") to the Engineer for Contractor-initiated changes in the Contract Documents or in response to a RCP. Submit the Change Proposal and attach the forms provided by the Engineer.

1. Use the Change Proposal form provided by the Engineer.

2. Include with the Change Proposal:

a. A complete description of the proposed Modification if Contractor-initiated or proposed changes to the description of the proposed Modification.

b. The reason the Modification is requested, if not in response to a RCP.

c. A detailed breakdown of the cost of the change if the Modification requires a change in Contract Price. The itemized breakdown is to include:

1) List of materials and equipment to be installed;

2) Man hours for labor by classification;

3) Equipment used in construction;

4) Consumable supplies, fuels, and materials;

5) Royalties and patent fees;

6) Bonds and insurance;

7) Overhead and profit;

8) Field office costs;

9) Home office cost; and

10) Other items of cost.

d. Provide the level of detail outlined in the paragraph above for each Subcontractor or Supplier actually performing the Work if Work is to be provided by a Subcontractor or Supplier. Indicate appropriate Contractor mark-ups for Work provided through Subcontractors and Suppliers. Provide the level of detail outlined in the paragraph above for self-performed Work.

e. Submit CPs that comply with the General Conditions for Cost of Work.

f. Provide a revised schedule. Show the impact of the change on the Project Schedule and the Contract Times.

B. Submit a CP to the Engineer to request a Field Order.

C. A Change Proposal is required for all substitutions or deviations from the Contract Documents.

D. Request changes to products in accordance with Section 01 33 02 “Shop Drawings.”

1.03 ENGINEER WILL EVALUATE THE REQUEST FOR A MODIFICATION

A. Engineer will issue a Modification per the General Conditions if the CP is acceptable to the Owner. Engineer will issue a Change Order or Contract Amendment for any changes in Contract Price or Contract Times.

1. Change Orders and Contract Amendments will be sent to the Contractor for execution with a copy to the Owner recommending approval. A Work Change Directive may be issued if Work needs to progress *before* the Change Order or Contract Amendment can be authorized by the Owner.

2. Work Change Directives, Change Orders, and Contract Amendments can only be approved by the Owner.

a. Work performed on the CP prior to receiving a Work Change Directive or approval of the Change Order or Contract Amendment is performed at the Contractor’s risk.

b. No payment will be made for Work on Change Orders or Contract Amendments until approved by the Owner.

B. Contractor may be informed that the CP is not approved and construction is to proceed in accordance with the Contract Documents.

1.04 EQUAL NON-SPECIFIED PRODUCTS

A. The products of the listed manufacturers are to be furnished where the Specifications list several manufacturers and do not specifically list “or equal” or “or approved equal” products. Use of any products other than those specifically listed is a substitution. Follow the procedures in Paragraph **[1.05]** for a substitution.

B. Contractor may submit other manufacturers’ products that are in full compliance with the Specifications where Specifications list one or more manufacturers followed by the phrase “or equal” or “or approved equal.”

1. Submit a Shop Drawing as required by Section 01 33 02 “Shop Drawings” to document that the proposed product is equal or superior to the specified product.

2. The burden of proof for equality rests with the Contractor:

a. Indicate on a point-by-point basis for each specified feature that the product is equal to the Contract Document requirements.

b. Make a direct comparison with the specified manufacturer's published data sheets and available information. Provide this printed material with the Shop Drawing.

c. The decision of the Engineer regarding the acceptability of the proposed product is final.

3. Provide a certification that, in furnishing the proposed product as an equal, the Contractor:

a. Has thoroughly examined the proposed product and has determined that it is equal or superior in all respects to the product specified.

b. Has determined that the product will perform in the same manner and result in the same process as the specified product.

c. Will provide the same warranties and/or bonds as for the product specified.

d. Will assume all responsibility to coordinate any modifications that may be necessary to incorporate the product into the construction and will waive all claims for additional Work which may be necessary to incorporate the product into the Project which may subsequently become apparent.

e. Will maintain the same time schedule as for the specified product.

C. A CP is not required for any product that is in full compliance with the Contract Documents. If the product is not in full compliance, it may be offered as a Substitution.

1.05 SUBSTITUTIONS

A. Substitutions are defined as any product that the Contractor proposes to provide for the Project in lieu of the specified product. Submit a Change Proposal per Paragraph **[1.02]** along with documents required for a Shop Drawing as required by Section 01 33 02 "Shop Drawings" to request approval of a substitution.

B. Prove that the product is acceptable as a substitute. It is not the Engineer's responsibility to prove the product is not acceptable as a substitute.

1. Indicate on a point-by-point basis for each specified feature that the product is acceptable to meet the intent of the Contract Documents requirements.

2. Make a direct comparison with the specified Suppliers published data sheets and available information. Provide this printed material with the Shop Drawing.

3. The decision of the Engineer regarding the acceptability of the proposed substitute product is final.

C. Provide a certification that, in making the substitution request, the Contractor:

1. Has determined that the substituted product will perform in substantially the same manner and result in the same ability to meet the specified performance as the specified product;

2. Will provide the same warranties and/or bonds for the substituted product as specified or as would be provided by the manufacturer of the specified product;

3. Will assume all responsibility to coordinate any modifications that may be necessary to incorporate the substituted product into the Project and will waive all claims for additional Work which may be necessary to incorporate the substituted product into the Project which may subsequently become apparent; and
4. Will maintain the same time schedule as for the specified product.

D. Pay for review of substitutions in accordance with Section 01 33 02 “Shop Drawings.”

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 29 00 APPLICATION FOR PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Submit Applications for Payment for completed Work and for materials and equipment in accordance with the General Conditions, the Supplementary Conditions, the Agreement, and this Section. The Contract Price is to include costs for:

1. Providing the Work in accordance with the Contract Documents;
2. Installing Owner furnished equipment and materials, if any;
3. Providing Work for alternates and allowances, if any;
4. Providing Work for extra work items, if any and if authorized
5. Commissioning, startup, training, and initial maintenance and operation;
6. Acceptance testing at the manufacturer's facilities or at the Site;
7. All home office overhead costs and expenses, including profit made directly or indirectly from the Project;
8. Project management, contract administration, and field office and field operations staff including supervision, clerical support, and technology system support;
9. Professional services including design fees, legal fees, and other professional services;
10. Bonds and insurance;
11. Permits, licenses, patent fees, and royalties;
12. Taxes;
13. Providing all documentation and Samples required by the Contract Documents;
14. Facilities and equipment at the Site including:
    a. Field offices, office furnishings, and all related office supplies, software, and equipment,
    b. Storage facilities for Contractor's use and storage facilities for stored materials and equipment including spare parts storage,
    c. Shops, physical plant, construction equipment, small tools, vehicles, and technology and telecommunications equipment,
    d. Safety equipment and facilities to provide safe access and working conditions for workers and for others working at the Site,
    e. Temporary facilities for power and communications,
    f. Potable water and sanitation facilities, and
    g. Mobilization and demobilization for all these facilities and equipment.
15. Products, materials, and equipment stored at the Site or other suitable location in accordance with Section 01 31 00 "Project Management and Coordination";

16. Products, materials, and equipment permanently incorporated into the Project;
17. Temporary facilities for managing water including facilities for pumping, storage, and treatment as required for construction and protection of the environment;
18. Temporary facilities for managing environmental conditions and Constituents of Concern;
19. Temporary facilities such as sheeting, shoring, bracing, formwork, embankments, storage facilities, working areas, and other facilities required for construction of the Project;
20. Temporary and permanent facilities for protection of all overhead, surface, or underground structures or features;
21. Temporary and permanent facilities for removal, relocation, or replacement of any overhead, surface, or underground structures or features;
22. Products, materials, and equipment consumed during the construction of the Project;
23. Contractor labor and supervision to complete the Project including that provided through Subcontractors or Suppliers;
24. Correcting Defective Work during the Contract Times, during the Correction Period, or as required to meet any warranty provision of the Contract Documents;
25. Risk associated with weather and environmental conditions, startup, and initial operation of facilities including equipment, processes, and systems;
26. Contractor safety programs, including management, administration, and training;
27. Maintenance of facilities including equipment, processes, and systems until operation is transferred to Owner;
28. Warranties, extended or special warranties, or extended service agreements;
29. Cleanup and disposal of any and all surplus materials; and
30. Demobilization of all physical, temporary facilities not incorporated into the Project.

B. Include the cost not specifically set forth as an individual payment item but required to provide a complete and functional system in the Contract Price.

C. Provide Sales Tax Certificates

1. Complete City of Fayetteville forms certifying sales tax paid on all materials used in construction. The Contractor may use his own forms as long as the information requested by the City certificated is supplied.
2. The certificate shall be furnished with each pay request, regardless of amount, and list taxes for all items included in the pay request.
3. In the event the pay request does not include any taxable items, the certificate is still required and must certify this fact.
4. Pay requests without required certificate may be denied approval and payment until the certificate is provided.

D. Provide written approval of the surety company providing performance and payment bonds for the Schedule of Values, Application for Payment form, and method of payment prior to submitting the first Application for Payment. Submit approval using the "Consent of Surety Company to Payment Procedures" form provided by the Engineer. Payment will not be made without this approval.

E. Engineer may withhold processing the Applications for Payment if any of the following processes or documentation is not up to date:

1. Progress Schedule per Section 01 33 05 "Construction Progress Schedule." Failure to submit Progress Schedules will cause delay in the review and approval of subsequent Applications for Payment.

2. Project videos and photographs per Section 01 33 06 "Graphic Documentation."

3. Record Documents per Section 01 31 13 "Project Coordination."

4. Documentation required to comply with Section 00 41 00 "SDBE Program."

F. Submit, via a separate submittal, updated red-line drawings every month in conjunction with the pay application. Failure to submit Monthly Red-Line Drawings will cause delay in the review and approval of subsequent Applications for Payment. See 01 31 13 "Project Coordination" Paragraph 1.11 for reference.

1.02 SCHEDULE OF VALUES

A. Divide the Contract Price into an adequate number of line items to allow more accurate determination of the earned value for each line item when evaluating progress payments. Submit a detailed Schedule of Values for the Project at least 10 days prior to submitting the first Application for Payment using forms provided by the Engineer.

B. Do not apply for payment until the Schedule of Values has been approved by the Engineer.

C. Divide the cost associated with each line item in the Schedule of Values into installation and materials components.

1. Installation cost is to include all cost associated with the line item except materials cost.

2. Materials cost is the direct cost (as verified by invoice values) for products, materials, and equipment to be permanently incorporated into the Project associated with the line item.

3. Installation cost is to include all direct costs and a proportionate amount of the indirect costs for the Work associated with each line item. Include costs not specifically set forth as an individual payment item but required to provide a complete and functional system.

4. The sum of materials and installation costs for all line items must equal the Contract Price.

D. Use each unit price line item in the Agreement as a line item in the Schedule of Values. The sum of materials and installation costs for each line item for unit price contracts must equal the value of the line item in the Agreement. In addition to the installation cost described in

Paragraph **[1.02.C.3]**, installation costs for unit price items are to include costs for waste and overages.

1. Installation and materials cost may be left as a single installation component if:
    a. Contractor does not intend to request payment for stored materials for that line item; or
    b. Work in the line item will be completed within a single payment period.
2. Provide adequate detail to allow a more accurate determination of the earned value for installation costs, expressed as a decimal fraction of Work completed, for each line item.
3. Installation cost line items may not exceed $50,000.00. Items that are not subdivided into smaller units may only be included in the Application for Payment when Work on the entire unit is complete.
4. Lump sum items may be divided into an estimated number of units to estimate earned value. The estimated number of units times the cost per unit must equal the lump sum amount for that line item.
5. Include Contractor's overhead and profit in the installation costs each line item in proportion to the value of the line item to the Contract Price.
6. Include cost not specifically set forth as an individual payment item but required to provide a complete and functional system in the Contract Price for each item.
7. Line items may be used to establish the value of Work to be added or deleted from the Project.

E. Include a breakdown of both mobilization and demobilization costs in the Schedule of Values. The total cost for both mobilization and demobilization may not exceed five percent (5%) of the total Contract Price. Payment for mobilization and demobilization will be made over the first two payments. Payment for these costs will only be made for Work completed for the following:
    1. Bonds and insurance;
    2. Transportation and setup for equipment;
    3. Transportation and/or erection of all field offices, sheds, and storage facilities;
    4. Salaries for preparation of documents required before the first Application for Payment; and
    5. Salaries for field personnel directly related to the mobilization of the Project.

1.03 SCHEDULE OF ANTICIPATED PAYMENTS

A. Submit a schedule of the anticipated Application for Payments showing the anticipated application numbers, submission dates, and the amount to be requested for each Application for Payment on the form provided by the Engineer.

B. Update the schedule of anticipated payments as necessary to provide a reasonably accurate indication of the funds required to make payments each month to the Contractor for Work performed.

1.04 ALTERNATES, ALLOWANCES, AND EXTRA WORK ITEMS

A. Include line items and amounts for specified alternate Work and allowances for Work in the Agreement, if any, and as described in Section 01 23 10 “Alternates and Allowances.”

B. Include line items and amounts for Extra Work items in the Agreement, if any, and as described in Section 01 29 01 “Measurement and Basis for Payment.”

1.05 RETAINAGE AND SET-OFFS

A. Retainage will be withheld from each Application for Payment per the Agreement.

B. Reduce payments for set-offs per the General Conditions as directed by the Engineer.

1.06 PROCEDURES FOR SUBMITTING AN APPLICATION FOR PAYMENT

A. Submit a draft Application for Payment to the Engineer each month on the twenty-fifth (25th) day of the month. Do not submit Applications for Payment more often than monthly unless approved by the City of Fayetteville. Review the draft Application for Payment with the Engineer to determine concurrence with:

1. Values requested for materials and equipment, stored or incorporated into the Project as documented by invoices;

2. The earned value for installation costs for each line item in the Application for Payment form expressed as a percent complete for that line item;

3. The quantity of Work completed for each unit price item;

4. Amount of retainage to be held; and

5. Set-offs included in the Application for Payment.

B. Submit Applications for Payment to the Engineer after agreement has been reached on the draft Application for Payment with the Engineer.

C. Provide all information requested in the Application for Payment form. Do not leave any blanks incomplete. If information is not applicable, enter “N/A” in the space provided.

1. Number each application sequentially and include the dates for the application period.

2. Complete the “Contract Time Summary” section on the Application for Payment form. If the Final Completion date shows the Project is more than 30 days behind schedule, revise the Schedule of Anticipated Payments to correspond to the updated schedule required per Section 01 33 05 “Construction Progress Schedule.”

3. Complete the “Summary of Earned Value and Set-offs” section on the Application for Payment form. Show the total amounts for earned value of original Contract performed, earned value for Work on approved Contract Amendments and Change Orders, retainage and set-offs.

4. Sign and date the Contractor’s Certification on the Application for Payment form that all Work, including materials, covered by this Application for Payment have been completed or delivered and stored in accordance with the Contract Documents, that all amounts have been paid for Work, materials, and equipment for which previous

Payment has been made by the Owner, and that the current payment amount shown in this Application for Payment is now due.

5. Include “Attachment A - Tabulation of Earned Value of Original Contract Performed” to show the value of materials stored and successfully incorporated into the Project and the earned value for installation of the Work for each line item in the Application for Payment for Work. Attachment A includes Work on the original Contract Price and on approved Contract Amendments and Change Orders.
6. Include “Attachment B - Tabulation of Values for Materials and Equipment” to track invoices used to support amounts requested as materials in Attachment A. Enter materials to show the amount of the invoice assigned to each item in Attachment A if an invoice includes materials used on several line items.
7. Include “Attachment C - Summary of Set-offs” to document set-offs made per the Contract Documents. Show each set-off as it is applied. Show a corresponding line item to reduce the set-off amount if a payment held by a set-off is released for payment.
8. Include “Attachment D - Retainage Calculation” to show method for calculating retainage. The amount of retainage with respect to progress payments is stipulated in the Agreement. Any request for a reduction in retainage must be accompanied by a Consent of Surety to Reduction or Partial Release of Retainage.
9. Include “Attachment E - EVA Calculation” and the EVA Chart showing the anticipated and actual total earned value of fees, Work, and materials. Create a graphic representation (curve) of the anticipated progress on the Project each month. Compare the anticipated cumulative total earned value of fees, Work, and materials to the actual total earned value of fees, Work, and materials to determine performance on budget and schedule. Adjust the table and curve to incorporate Modifications.
10. Include Sales Tax Certificate.

D. Submit attachments in Portable Document Format (PDF).

1. Generate attachments to the Application for Payment using the Excel spreadsheet provided by the Engineer.
2. Submit PDF documents with adequate resolution to allow documents to be printed in a format equivalent to the document original. Documents are to be scalable to allow printing on standard 8-1/2 x 11 or 11 x 17 paper.

1.07 ADJUSTMENTS TO THE SCHEDULE OF VALUES IN THE APPLICATION FOR PAYMENT

A. Submit a Change Proposal to request any changes to the Schedule of Values incorporated into the Application for Payment once approved. A Field Order will be issued by the Engineer to modify the Application for Payment form if approved.

B. Payment for materials and equipment shown in the Application for Payment will be made for the total of associated invoice amounts, up to the value shown for materials in the Application for Payment for that line item.

1. If the total amount for invoices for materials and equipment for a line item are less than the amount shown for the materials component of that line item in the

Application for Payment, and it can be demonstrated that no additional materials or equipment are required to complete Work described in that item, the difference between the total invoice for materials and equipment and the materials component for that line item can be added to the installation component of that Work item.

2. Costs for material and equipment in excess of the value shown in the Schedule of Values may not be paid for under other line items.

1.08 ENGINEER'S RESPONSIBILITY

A. Engineer will review each draft Application for Payment with Contractor to reach an agreement on the amount to be recommended to Owner for payment. Contractor is to revise the Application for Payment to incorporate changes, if any, resulting from this review process.

B. Engineer will review the Application for Payment to determine that the Application for Payment has been properly submitted and is in accordance with the agreed to draft Application for Payment.

C. Engineer will either recommend payment of the Application for Payment to Owner or notify the Contractor of the reasons for not recommending payment. Contractor may make necessary corrections and resubmit the Application for Payment. Engineer will review resubmitted Application for Payment and reject or recommend payment of the Application for Payment to Owner as appropriate.

D. Engineer's recommendation of the Application for Payment constitutes a representation that based on its experience and the information available:

1. The Work has progressed to the point indicated;

2. The quality of the Work is generally in accordance with the Contract Documents; and

3. Requirements prerequisite to payment have been met.

E. This representation is subject to:

1. Further evaluation of the Work as a functioning whole;

2. The results of subsequent tests called for in the Contract Documents; or

3. Any other qualifications stated in the recommendation.

F. Engineer does not represent by recommending payment that:

1. Inspections made to check the quality or the quantity of the Work as it was performed were exhaustive or extended to every aspect of the Work in progress; or

2. Other matters or issues that might entitle Contractor to additional compensation or entitle Owner to withhold payment to Contractor exist.

G. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of payment imposes responsibility on the Engineer or Owner:

1. To supervise, direct, or control the Work;

2. For the means, methods, techniques, sequences, or procedures of construction, or safety precautions and programs;

3. For Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
4. To make examinations to ascertain how or for what purposes Contractor has used the monies paid on account of the Contract Price; or
5. To determine that title to the Work, materials, or equipment has passed to Owner free and clear of Liens.

1.09 FINAL APPLICATION FOR PAYMENT

A. Include adjustments to the Contract Price in the final Application for Payment for:
1. Approved Change Orders and Contract Amendments;
2. Allowances not previously adjusted by Change Order;
3. Deductions for Defective Work that have been accepted by the Owner;
4. Penalties and bonuses;
5. Deduction for all final set-offs; and
6. Other adjustments if needed.

B. Engineer will prepare a final Change Order reflecting the approved adjustments to the Contract Price which have not been covered by previously approved Change Orders and, if necessary, to reconcile estimated unit price quantities with actual quantities.

C. Submit the final Application for Payment per the General Conditions, including the final Change Order. Provide the following with the final Application for Payment:
1. Evidence of payment or release of Liens on the forms provided by the Engineer and as required by the General Conditions.
2. Consent from surety to final payment.

D. Final payment will also require additional procedures and documentation per Section 01 70 00 "Execution and Closeout Requirements."

1.10 PAYMENT BY OWNER

A. Owner is to pay the amount recommended for monthly payments within 30 days after receipt of the Engineer's recommended Application for Payment.

B. Final payment may take longer than 30 days since Owner's **City Council** must approve final payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 29 01 MEASUREMENT AND BASIS FOR PAYMENT

PART 1 - GENERAL

1.01 PAYMENT FOR MATERIALS AND EQUIPMENT

A. Payment will be made for materials and equipment materials properly stored and successfully incorporated into the Project less the specified retainage.

B. Provide a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of Liens. Provide documentation of payment for materials and equipment with the next Application for Payment. Remove items from the tabulation of materials and equipment if this documentation is not provided with the next Application for Payment.

C. Provide evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest.

D. The Work covered by progress payments becomes the property of the Owner at the time of payment. The Contractor's obligations with regard to proper care and maintenance, insurance, and other requirements are not changed by this transfer of ownership until final acceptance in accordance with the General Conditions.

E. Payment for materials and equipment does not constitute acceptance of the product.

1.02 MEASUREMENT AND BASIS FOR PAYMENTS ON LUMP SUM ITEMS

A. Measurement for progress payments is the invoice value for stored materials and the earned value for all other cost for constructing each item. Earned value is expressed as the value of the Work completed divided by the total value of installation cost. The total amount paid will be equal to the total lump sum amount for that item.

1.03 MEASUREMENT AND BASIS FOR PAYMENTS ON UNIT PRICE ITEMS

A. Measure the Work using the unit of measure indicated in this Section for each unit price line item. Payment will be made only for the actual measured unit and/or computed length, area, solid contents, number, and weight unless other provisions are made in the Contract Documents. Payment on a unit price basis will not be made for Work outside dimensions shown in the Contract Documents.

B. Payment will be made for the actual quantity of Work completed and for materials and equipment stored during the payment period. Payment amount is the Work quantity measured per Paragraph A above multiplied by the unit price for that line item in the Agreement.

1.04 MEASUREMENT AND BASIS FOR PAYMENT FOR BASE ITEMS

A. Item A-01. – Mobilization (max 5% of "A" or "B" item total):

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.

2. The Unit Price and Extended Amount provided for this item shall apply to "A" series Item Numbers only.

B. Item A-02. – Traffic Control (max 5% of "A" or "B" item total):

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.
2. The Unit Price and Extended Amount provided for this item shall apply to "A" series Item Numbers only.

C. Item A-03.– Clearing and Grubbing:

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.

D. Item A-04.– Unclassified and Undercut Excavation:

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.
2. Undercutting / removal of soil beneath reinforced concrete piping trench bottom shall be included in this item.
3. Undercutting / removal of soil beneath box culvert shall be considered part of the cost of the box culvert. See Paragraph UU.

Erosion Control "Each" Measurement items

Measurement: The quantity to be paid for under the following items shall be the actual number of each item provided, as shown on the Drawings or as directed by the Engineer, and counted during construction.

Work: The unit price per each for the following items shall include providing the item named, including all materials called for on the Drawings, excavation/grading as required, maintenance during construction, removal, disposal, cleanup, and other work specified in Section 00127 for each item. These items will be paid in partial payments as follows:

1. 50% of the each price after initial installation.
2. 50% of the each price after removal.

E. Item A-05.– Stone Construction Entrance

F. Item A-06.– Rock Check Dam

G. Item A-07.– Silt Sack

H. Item A-08.– Drop Inlet Protection

--End Erosion Control "Each" Measurement items--

I. Item A-09.– Dewatering of Construction Area:

1. Measurement: Measurement shall not be made for this item.
2. Payment: Dewatering shall be billed and compensated as a lump sum item based on the following percentage schedule:
   a. 40% of lump sum on first partial pay application following delivery and setup of all necessary equipment and start of dewatering operations (including installation of pumps, suction and discharges, impervious dikes, dirt bags, discharge stabilization, etc. as described in "Work")
   b. 20% of lump sum on completion of first of three of the box culvert crossings
   c. 20% of lump sum on completion of second of three box culvert crossings

d. 20% of lump sum on completion of third of three box culvert crossing

3. Work: Shall include labor, material, equipment, pumps, piping, discharge stabilization, fuel, dirt bags, impervious dikes and maintenance of equipment as required to dewater work areas during construction to accomplish dry conditions for excavation, grading, backfilling, culvert installation, endwall installation, and grading.

J. Item A-10.– Stormwater Bypass Pumping:

1. Measurement: Measurement shall not be made for this item.

2. Payment: Stormwater bypass pumping shall be billed and compensated as a lump sum item based on the following percentage schedule:

a. 40% of lump sum on first partial pay application following delivery and setup of all necessary equipment and start of bypass pumping operations (including installation of pumps, suction and discharges, discharge stabilization, etc. as described in “Work”)

b. 20% of lump sum on completion of first of three of the box culvert crossings

c. 20% of lump sum on completion of second of three box culvert crossings

d. 20% of lump sum on completion of third of three box culvert crossing

3. Work: Shall include labor, material, equipment, pumps, piping, discharge stabilization, fuel, and maintenance of equipment as required to ensure that active stream flows are routed around the work area to accomplish dry conditions for excavation, grading, backfilling, culvert installation, endwall installation, and grading.

K. Item A-11.– Silt Fence:

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.

L. Item A-12.– Selected Tree Removal, 10”:

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.

M. Item A-13.– Selected Tree Removal, 15”:

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.

N. Item A-14. – See Paragraph S

O. Item A-15. – See Paragraph S

P. Item A-16. – See Paragraph S

Q. Item A-17. – See Paragraph S

R. Item A-18. – See Paragraph S

S. Item A-19. – Remove and Dispose of Existing XX” RCP

1. “XX” denotes the size listed on the bid form

2. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of pipe of any material pipe removed and disposed of properly, as measured along the horizontal centerline of the pipe.

3. Work: The unit price per linear foot for this item shall include providing proper removal and disposal of the pipe to the limits as shown on the Drawings, including but not limited to: excavation; trench shoring; backfilling; proper disposal of removed pipe sections; bypass pumping of stormwater flows as necessary; backfilling; drainage and dewatering; and placement of steel plates and beams for temporary access over excavation.

T. Item A-20. – Remove and Dispose of Existing Stormwater Structure

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of storm structures (inlets and manholes) removed and properly disposed as shown on the Drawings.

2. Work: The unit price per structure for this items shall include providing proper removal and disposal of the storm structure as shown on the Drawings and as specified herein, including but not limited to: excavation; trench shoring; temporary stockpiling of suitable backfill material and temporary stabilization of stockpiles; backfilling; onsite hauling; proper disposal of removed structure; bypass pumping of stormwater flows as necessary; drainage and dewatering; temporary disconnection and reconnection of existing active connections; and placement of steel plates and beams for temporary access over excavation.

U. Item A-21. – Remove and Dispose of Existing Endwall/Wingwall

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of headwalls or endwalls removed and disposed of properly, regardless of size or material.

2. Work: The unit price per each for this item shall include providing proper removal and disposal of the existing culvert headwall or endwall to the limits as shown on the Drawings, including but not limited to: excavation; trench shoring; headwall/endwall removal and stone drainage layer removal; backfilling; proper disposal of removed headwall/endwalls and surplus material; bypass pumping of stormwater flows as necessary; and drainage and dewatering.

V. Item A-22. – Remove and Dispose of Existing Oversized Structure

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of storm structures (inlets and manholes) removed and properly disposed as shown on the Drawings.

2. Work: The unit price per structure for this items shall include providing proper removal and disposal of the storm structure as shown on the Drawings and as specified herein, including but not limited to: excavation; trench shoring; temporary stockpiling of suitable backfill material and temporary stabilization of stockpiles; backfilling; onsite hauling; proper disposal of removed structure; bypass pumping of stormwater flows as necessary; drainage and dewatering; temporary disconnection and reconnection of existing active connections; and placement of steel plates and beams for temporary access over excavation.

W. Item A-23. – Shed Relocation and Deck Removal (1716 Tryon Dr.)

1. Measurement: Measurement shall not be made for this item.

2. Payment: Shed Relocation and Deck Removal (1716 Tryon Dr.) shall be billed and compensated as a lump sum item. Lump sum shall be billed on a single pay application

following completion of work and acceptance by the Owner.

X. Item A-24. – Temporary Shed Relocation (1733 Daisy Ln.)

1. Measurement: Measurement shall not be made for this item.

2. Payment: Temporary Shed Relocation (1733 Daisy Ln.) shall be billed and compensated as a lump sum item based on the following percentage schedule:

   a. 50% of lump sum following initial shed relocation

   b. 50% of lump sum following shed replacement at original location and acceptance by the Owner

Y. Item A-25. – Remove, Store, and Reset Block Wall at 1735 Swann St.

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of block wall removed, stored, and reset, as measured along the base of the wall prior to removal.

2. Work: The unit price per linear foot for this item shall include providing removal, storage, and resetting of the block wall in its entirety, including but not limited to: removal; storage; protection and security; and resetting. This item will be paid in partial payments as follows:

   a. 50% of the extended amount after initial removal.

   b. 50% of the extended amount after resetting.

Z. Item A-26.– Remove, Store, and Reset Brick Wall at 1730 Swann St.

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of brick wall removed, stored, and reset, as measured along the base of the wall prior to removal.

2. Work: The unit price per linear foot for this item shall include providing removal, storage, and resetting of the brick wall in its entirety, including but not limited to: removal; storage; protection and security; and resetting. This item will be paid in partial payments as follows:

   a. 50% of the extended amount after initial removal.

   b. 50% of the extended amount after resetting.

AA. Item A-27. – see Paragraph CC

BB. Item A-28. – see Paragraph CC

CC. Item A-29. – Remove and Dispose of Material Fence

1. “Material” denotes the fence material listed on the bid form

2. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of the specified material fence removed and disposed of offsite as measured along the base of the fence prior to removal.

3. Work: The unit price per linear foot for this item shall include providing removal, disposal of specified material fence and gates to the limits shown on the Drawings and where in conflict with proposed work, including but not limited to: removal; excavation; backfilling, and disposal.

DD. Item A-30. – see Paragraph FF

EE. Item A-31. – see Paragraph FF

FF. Item A-32. – Material Fence X' Height

1. "Material" denotes the fence material listed on the bid form
2. "X" denotes the fence height listed on the bid form
3. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of new chain link fence provided as measured along the base of the fence after installation.
4. Work: The unit price bid per linear for this item shall include providing chain link fence as shown on the Drawings, including but not limited to: excavation; placement; posts; concrete anchorage; proper connection to existing fence; gates; and all related hardware required for complete installation.

GG. Item A-33. – Remove, Store, and Reset Wrought Iron Fence

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of wrought iron fence removed, stored, and reset, as measured along the base of the fence prior to removal.
2. Work: The unit price per linear foot for this item shall include providing removal, storage, and resetting of fence and gates to the limits shown on the Drawings, including but not limited to: removal; storage; protection and security; resetting; excavation; concrete anchorage; backfill; hardware; and hauling. This item will be paid in partial payments as follows:
    a. 50% of the extended amount after initial removal.
    b. 50% of the extended amount price after resetting.

HH. Item A-34. – Temporary 4' Tall Chain Link Barrier Fence

1. Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of temporary 4-foot tall chain link fence provided and removed as measured along the base of the fence.
2. Work: The unit price bid per linear foot for this item shall include providing and removing temporary 4-foot tall chain link fence as shown on the Drawings or directed by the Engineer, including but not limited to: excavation, placement, anchorage; gates, and all related hardware required for complete installation. This item will be paid in partial payments as follows:
    a. 50% of the extended amount after initial installation.
    b. 50% of the extended amount after removal.

II. Item A-35. – Sheet Pile Foundation Protection

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of sheet pile foundation protection provided as measured in the field.
2. Work: The unit price bid per square foot for this item shall include providing sheet file foundation protection as shown on the plans, including vibration monitoring, piles, pile placement, secondary cutting of piles to match finished grade less 1 foot, and diggable flowable fill along the pipe to pipe spring line. All work described in Special Provision 31 41 40 shall be included in this item.

JJ. Item A-36. - See paragraph KK

KK. Item A-37. – Standard Catch Basin X'-X' Depth

1. "X" denotes depth listed on the bid form
2. City of Fayetteville details DR-3 and DR-3.1 apply
3. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of each structure provided, as shown on the Drawings and counted during construction.
4. Work: The unit price per each structure shall include providing the specific drainage structure listed, as shown on the Drawings; including but not limited to: drainage and dewatering; trench shoring; location, protection, and support of all known and unknown utilities; structure materials; excavation; placement and compaction of suitable foundation and backfill material to subgrade or finished grade elevations; bypass pumping of stormwater flows as necessary; placement of steel plates and beams for temporary access over excavation; grouted water tight connections; castings; manhole adjusting rings and rim adjustment (for manholes), repair/restoration of existing utilities, structure and castings to the elevations and grades as shown on the Drawings, and other work specified in Section 00127 for this item.

LL. Item A-38. – See paragraph NN

MM. Item A-39.– See paragraph NN

NN. Item A-40. – Open Throat Catch Basin X'-X' Depth

1. "X" denotes depth listed on the bid form
2. City of Fayetteville detail DR-16 applies
3. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of each structure provided, as shown on the Drawings and counted during construction.
4. Work: The unit price per each structure shall include providing the specific drainage structure listed, as shown on the Drawings; including but not limited to: drainage and dewatering; trench shoring; location, protection, and support of all known and unknown utilities; structure materials; excavation; placement and compaction of suitable foundation and backfill material to subgrade or finished grade elevations; bypass pumping of stormwater flows as necessary; placement of steel plates and beams for temporary access over excavation; grouted water tight connections; castings; manhole adjusting rings and rim adjustment (for manholes), repair/restoration of existing utilities, structure and castings to the elevations and grades as shown on the Drawings, and other work specified in Section 00127 for this item.

OO. Item A-41. - See paragraph PP

PP. Item A-42. – Junction Box, X'-X' Depth

1. "X" denotes depth listed on the bid form
2. City of Fayetteville details DR-6 and DR-6.1 apply for up to 42" pipe. Junction boxes for pipes greater than 42" diameter shall be designed by Contractor to bear traffic.
3. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of each structure provided, as shown on the Drawings and counted

during construction.

4. Work: The unit price per each structure shall include providing the specific drainage structure listed, as shown on the Drawings; including but not limited to: drainage and dewatering; trench shoring; location, protection, and support of all known and unknown utilities; structure materials; excavation; placement and compaction of suitable foundation and backfill material to subgrade or finished grade elevations; bypass pumping of stormwater flows as necessary; placement of steel plates and beams for temporary access over excavation; grouted water tight connections; castings; manhole adjusting rings and rim adjustment (for manholes), repair/restoration of existing utilities, structure and castings to the elevations and grades as shown on the Drawings, and other work specified in Section 00127 for this item.

QQ. Item A-43. – See paragraph RR

RR. Item A-44. – X' x X' RC Box Culvert Bend, 6'-8' Depth

1. "X" denotes the dimensions listed on the bid form
2. These items are design by Contractor
3. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of precast RC culvert bends provided. Measurement will be on a on a per each basis. A bend is defined as a change in direction from zero to ninety degrees. A bend can be composed of a single or multiple sections. A bend starts at the first joint initializing the bend and stops at the last joint completing the bend.
4. Work: Unit price per bend for this item shall include providing precast RC box culvert bend as shown on the Drawings, including but not limited to: furnishing all materials; filter fabric; equipment; excavation; foundation excavation; bedding/foundation conditioning material; trench shoring; backfill to finished grade; invert fill material; flowable fill; installation; constructing joints and connections; baffles/sills if shown on Drawings; furnishing project submittals; and other incidentals necessary to complete this work.

SS. Item A-45.– Wingwalls, Endwalls, Curtain Walls On Structural Sheets

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of cubic yards of cast-in-place concrete placed in the construction of wingwalls, endwalls, and curtain walls (including all footers) as detailed on the Structural Sheets. Measurement will be based on the neat lines of the structures as shown on the Drawings, with no additional payment for over-excavation, waste, or forming.
2. Work: Unit price per cubic yard for this item shall include furnishing all labor, materials, and equipment necessary to construct cast-in-place concrete wingwalls, endwalls, and curtain walls as shown on the Structural Sheets. This includes, but is not limited to: excavation; subgrade preparation; formwork; reinforcing steel; concrete placement and finishing; concrete curing and protection; embedded items; joint materials; backfill and compaction; coordination with adjacent structures; and all incidental work required to complete the installation in accordance with the Drawings and Specifications.

TT. Item A-46. – See paragraph UU

UU. Item A-47. – X' x X' RC Box Culvert

1. "X" denotes the dimensions listed in the bid form

2. Determination of Measurement: The quantity to be paid for under this item shall be the actual linear feet of precast RC culvert shown as shown on the Drawings. Measurement will be made horizontally along the centerline of the installed culvert. The linear feet of each cell of a multi-cell culverts shall be measured individually. Measurement will not be made across precast bends, transitions, or other drainage structures.

3. Work: The unit price per linear foot for this item shall include providing the RC box culvert at the size and location shown on the Drawings, including but not limited to: furnishing all materials; filter fabric; equipment; excavation; foundation excavation; bedding/foundation conditioning material; trench shoring; backfill to finished grade; invert fill material; flowable fill; installation; constructing joints and connections; baffles/sills if shown on Drawings; furnishing project submittals; and other incidentals necessary to complete this work.

VV. Item A-48.– See paragraph AAA

WW. Item A-49.– See paragraph AAA

XX. Item A-50.– See paragraph AAA

YY. Item A-51.– See paragraph AAA

ZZ. Item A-52.– See paragraph AAA

AAA. Item A-53.– XX" RCP Storm Sewer, Class XXX, X'-X' Depth

1. "XX", "XXX", and "X" denote dimensions listed on the bid form

2. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of pipe provided, measured in place along the horizontal centerline of the installed pipe with no deduction for fittings. Measurement will be to the inside terminal wall of the structures and to the nearest whole foot.

3. Work: The unit price bid per linear foot for this item shall include providing pipe as shown on the Drawings, including but not limited to: pipe at designated lines and grades, fittings and pipe sealant; drainage and dewatering; trench shoring; location, protection, and support of all known and unknown utilities; pipe materials; trench excavation; bypass pumping of stormwater flows as necessary; pipe bedding; placement and compaction of suitable backfill material to roadway subgrade or finished grades outside of roadway; placement of steel plates and beams for temporary access over excavation; grouted water tight connections to new or existing storm structures; and repair/restoration of existing utilities. Item shall include other work as specified in Section 00127 for this item.

BBB. Item A-54.– Rip rap, Class I with Filter Fabric

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of tons of rip rap provided, as measured by weighing rip rap in trucks.

2. Work: The unit price per ton for this item shall include providing rip rap and geotextile for drainage to the limits as shown on the Drawings, including but not limited to: fine grading and providing, transporting, and placing rip rap, bedding stone, geotextile underlay, wire staples, and anchor pins. Item shall include other work as specified in Section 00127 for this item.

CCC. Item A-55. – Permanent Seeding

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of square yards of permanent seeding, fertilizing, and mulching provided, as measured by determining the application area of the seed mixture in the field.

2. Work: The unit price per square yard for this item shall include providing permanent seeding, fertilizing, mulching, and mowing in all denuded areas not being stabilized by pavement, concrete, or stone, including but not limited to: seed; mulch; addition of soil amendments; fertilizer/lime; and watering for the duration of construction. No payment will be made for seeded areas until the establishment of a sufficient growth of grass as examined and approved by the Engineer. Item shall include other work as specified in Section 00127 for this item.

DDD. Item A-56. – Sod

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of square yards of sod provided, as measured by determining the application area of the sod in the field. Note: All sod shall have 2-4" of topsoil placed beneath, paid for under paragraph EEE.

2. Work: The unit price per square yard for this item shall include providing healthy sod, as shown on the Drawings or directed by the Engineer, including but not limited to: addition of soil amendments; sod matching the site's existing grass species, fertilizer/lime; mowing and watering for the duration of construction. No payment will be made for sodded areas where sod does not survive in a healthy and vigorous manner as examined and approved by the Engineer. Item shall include other work as specified in Section 00127 for this item.

EEE. Item A-57.– Topsoil

1. Determination of Measurement: The quantity of material to be paid for under this item shall be the actual number of cubic yards of clean topsoil placed to reach finished grade elevations as required in the Contract Documents. Measurement shall be based on the volume of material delivered to the site and spread satisfactorily.

2. Work: The unit price per cubic yard for this item shall include providing clean topsoil to achieve finished grades as required in the Specifications and Drawings, including but not limited to: supplying suitable topsoil material from offsite borrow; and loading, hauling, placing, and grading of topsoil material.

FFF. Item A-58.– Remove and Replace Concrete Curb and Gutter

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of linear feet of curb and gutter removed and replaced, as measured in the field.

2. Work: The unit price per linear foot for this item shall include removing and replacing curb and gutter (including Vertical Curb, Roll Curb, etc.) as shown on the on the Drawings, including but not limited to: saw cutting of curb and gutter and breaking up; removal (to soil subgrade); hauling; and proper disposal of the concrete curb and gutter and stone base; subgrade preparation; ABC underlay including to 1 foot behind curb; installation; backfilling behind curb; finishing; cleaning; and protective measures to include fences, barricades, or other measure necessary to prevent vehicles and pedestrians from entering freshly poured concrete areas. Item shall include other work as specified in Section 00127 for this item.

GGG. Item A-59. – Remove and Replace Existing Concrete Driveways (No Coverage Allowed)

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of square yards of concrete paved driveway removed and replaced, as measured in the field.

2. Work: The unit price per square yard for this item shall include providing concrete paved driveway as shown on the on the Drawings, including but not limited to: saw cutting of driveway and breaking up; removal (to soil subgrade); hauling, and proper disposal of the concrete driveway apron and stone base; subgrade preparation; reinforcing; installation; backfilling adjacent to driveway; finishing; cleaning; and protective measures to include fences, barricades, or other measure necessary to prevent vehicles and pedestrians from entering freshly poured concrete areas. Item shall include other work as specified in Section 00127 for this item.

HHH. Item A-60.– Remove and Dispose of Existing Asphalt Pavement

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of square yards of pavement removed and disposed of properly, as measured in the field prior to removal.

2. Work: The unit price per square yard for this item shall include, but is not limited to: saw cutting of pavement; breaking up, removal (to soil subgrade), hauling, and proper disposal of the pavement, stone base, and any other pavement structure placed during construction to serve as a temporary detour; and protection of existing structures.

III. Item A-61. – Temporary Pavement Patch

1. Determination of Measurement: Measurement shall be to the nearest one-tenth square yards. The designated number of square yards to be removed shall be on the plan or as directed by the City.

2. Basis for Payment: Payment shall be on a contract unit price bid per square yard completed and accepted with a minimum thickness of two (1) inch or matching existing asphalt thickness, whichever is greater and eight (8) inches of Aggregate Base Course or matching existing, whichever is greater.

3. Work: Labor, materials, tools, and equipment necessary to complete the work which shall include saw cutting (NO WHEEL CUTTING ALLOWED) pavement to straight uniform widths parallel and perpendicular to the road with no jagged edges, removal and disposal of asphalt offsite, re-compaction, removing and disposing of excess soil base course, re-compaction of pavement sub-grade, placement and compaction of ten (10) inches of ABC, maintaining ABC as necessary to maintain stone at pavement grade until removal of upper two (2) inches of stone for paving, adjusting castings as required, tack coat, placing and compacting asphalt material, cleanup and all other incidental work as shown on the details.

JJJ. Item A-62. – Thermoplastic Pavement Marking Lines (4”, 120 MILS)

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.

KKK. Item A-63. – Milling Bituminous Pavement

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.

LLL. Item A-64. – 1.5" Thick S9.5B Asphalt Overlay

1. Determination of Measurement: The quantity to be paid for under this item shall be the actual number of square yards of asphalt overlay provided as measured in the field.
2. Work: The unit price bid per square yard for this item shall include providing SF9.5B asphalt to the specified thickness, including but not limited to: all hauling, placing, asphalt binder, fine grading, rolling, and thermoplastic pavement markings to match existing pavement markings.

The following items are utility related items. All work shall be furnished and installed in accordance with applicable PWC standards and specifications. PWC Master Specifications are included as an Appendix.

MMM. Item B-01 – Mobilization (maximum 5% of total contract price) - PWC:

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.
2. The Unit Price and Extended Amount provided for this item shall apply to "B" series Item Numbers only.

NNN. Item B-02 – Traffic Control (maximum 5% of total contract price) – PWC:

1. See 00127 and applicable technical specification for measurement, payment, and work included for this item.
2. The Unit Price and Extended Amount provided for this item shall apply to "B" series Item Numbers only.

OOO. Item B-03 – Remove and Replace Concrete Curb and Gutter - PWC

1. See paragraph FFF

PPP. Item B-04 – Remove and Dispose of Existing Asphalt Pavement - PWC

1. See paragraph HHH

QQQ. Item B-05 – Temporary Pavement Patch – PWC

1. See paragraph III

RRR. All other "B" series items – see Appendix B – **Utility Construction Project Special Provisions**

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 31 00 PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish resources required to complete the Project in accordance with the Contract Documents and within the Contract Times.

B. Construct Project in accordance with current safety practices.

C. Manage Site to allow access to Site and control both construction operations and traffic.

1.02 STANDARDS

A. Perform Work to comply with:

1. Requirements of the Contract Documents;

2. Laws and Regulations; and

3. Specified industry standards.

1.03 DOCUMENTATION

A. Provide documents and permits in accordance with Section 01 33 00 “Document Management.”

B. Provide copies of Supplier’s printed storage instructions prior to furnishing materials or products and installation instructions prior to beginning the installation.

C. Incorporate field notes, sketches, recordings, and computations made by the Contractor in Record Drawings per Section 01 31 13 “Project Coordination.”

D. Prepare a Plan of Action per Section 01 31 13 “Project Coordination” for Utility work if required.

E. Provide a Plan of Action in accordance with Section 01 35 00 “Special Procedures” if facilities must be taken out of operation.

F. Provide a project-specific Site Safety Program.

G. Provide the City of Fayetteville Traffic Engineer with a Traffic Control Plan within fourteen (14) days of being declared the lowest responsible bidder. See “Traffic Control” Section 00497 for further information.

1.04 PERMITS

A. Obtain permits for the Project from the local authorities having jurisdiction. Contractor shall pay all permit fees and include these costs in the Contract Price.

B. Verify and obtain copies of North Carolina Division of Environmental Quality (“NCDEQ”) environmental permits required for construction at the Site from the Engineer.

C. Apply and obtain a Truck Route Permit from the City of Fayetteville.

D. Apply and obtain a Temporary Use Permit from the City of Fayetteville.

E. Apply and obtain approval for any intended street closures at least five (5) working days in advance. See “Traffic Control” Section 00497.

F. Provide other permits required to conduct any part of the Work. The Contractor shall procure and bear the costs of all permits, licenses, fees, and inspections, and give all notices necessary and incidental to the due and lawful prosecution of the work.

G. Arrange for inspections and certification by agencies having jurisdiction over the Work and include the cost for these inspections and certifications in the Contract Price.

H. Make arrangements with private utility companies and pay fees associated with obtaining services or inspections.

I. Retain copies of permits and licenses at the Site and comply with all regulations and conditions of the permit or license.

1.05 SAFETY REQUIREMENTS

A. Contractor shall submit a project-specific Site Safety Program. Corporate Safety handbooks or programs are not acceptable.

B. Manage safety to protect the safety and welfare of persons at the Site.

C. Provide safe access to move through the Site. Provide protective devices to warn and protect from hazards at the Site.

D. Provide safe access for those performing tests and inspections.

E. Maintain a supply of personal protective equipment for visitors to the Site.

F. Comply with latest provisions of the Occupational Health and Safety Administration (“OSHA”) and other Laws and Regulations.

G. Cooperate with accident investigations. Provide two copies of all reports, including insurance company reports, prepared concerning accidents, injuries, or deaths related to the Project to the Engineer as Record Data per Section 01 31 13 “Project Coordination.”

H. Secure the area and contact the City of Fayetteville Public Services Department (910) 433-1656 if any materials considered or suspected of being hazardous are encountered.

I. Fire hydrants on or adjacent to the street shall be kept accessible to fire apparatus at all times.

J. If the Engineer, or City of Fayetteville shall stop the prosecution of the work at any time because of life safety issues, such stoppage shall not relieve the Contractor of his responsibility under this paragraph.

K. The Contractor shall adhere to all applicable regulations and follow accepted safety procedures when working in the vicinity of utilities in order to ensure the safety of construction personnel and the public.

1.06 ACCESS TO THE SITE

A. Maintain access to the facilities at all times.

1. Do not obstruct roads, pedestrian walks, or access to the various buildings, structures, stairways, or entrances. Contractor shall also, at their expense, construct and maintain any necessary ramps, boardwalks, or other means to maintain pedestrian traffic.
2. Provide safe access for vehicle and pedestrian access (which may include temporary bridges and their maintenance) to all properties, both public and private and conduct operations in such a manner that inconvenience to the property owners will be held to a minimum.
3. Provide safe access for normal operations during construction. The Contractor is required to leave the project in a manner that will be safe to the traveling public and which will not impede motorists unless approved.
4. The Contractor shall so schedule their work as to keep all storefronts open to their prospective customers.
5. Contractor shall at all times cooperate with the public and merchants affected by their operations and shall endeavor to maintain good public relations at all times.
6. Any lighting or other special facilities required to carry on work shall be furnished by the Contractor.

B. Provide adequate and safe access for inspections. Leave ladders, bridges, scaffolding, and protective equipment in place until inspections have been completed. Construct additional safe access if required for inspections.

C. Use roadways for construction traffic only with written approval of the City of Fayetteville.
1. A Traffic Control Plan is required within fourteen (14) days of being declared the lowest responsible bidder. See “Traffic Control” Section 00497 for further.
2. Contractor shall comply with the City of Fayetteville’s Truck Route Ordinance. The Contractor shall make a thorough examination of the individual streets and establish all haul routes to comply with the Truck Route Ordinance.
3. The Contractor is required to leave the project in a manner that will be safe to the traveling public and which will not impede motorists unless otherwise approved in writing by the City of Fayetteville.
4. Furnish copies of all written approvals to the Engineer as Record Data per Section 01 31 13 “Project Coordination.”

1.07 CONTRACTOR’S USE OF THE SITE

A. Limit the use of Site for Work and storage to those areas designated on the Drawings or approved by the Engineer. Coordinate the use of the Site with the Engineer.

B. Provide security at the Site as necessary to protect against vandalism and loss by theft.

C. Park construction equipment in designated areas only and provide spill control measures as discussed in Section 01 57 00 “Temporary Controls.”

D. Park employees’ vehicles in designated areas only.

E. Obtain written permission of the property owner before entering privately-owned land outside of the Owner’s property, rights-of-way, or easements.

F. The Contractor(s) shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.

G. Cooperate with public and private agencies with facilities operating within the limits of the Project. Contractor shall use 811 to provide notice to any applicable agency when Work is anticipated to proceed in the vicinity of any facility.

H. Conduct of Contractor's or Subcontractor's Employees:

1. Do not permit alcoholic beverages or illegal substances on the Site. Do not allow persons under the influence of alcoholic beverages or illegal substances to enter or remain on the Site at any time. Persons on Site under the influence of alcoholic beverages or illegal substances will be permanently prohibited from returning to the Site. Criminal or civil penalties may also apply.

2. Do not allow the use of offensive language or sexual harassment in any form. These actions will cause immediate and permanent removal of the offender from the premises. Criminal or civil penalties may apply.

3. Require workers to wear clothing that is inoffensive and meets safety requirements. Do not allow sleeveless shirts, shorts, or any exceedingly torn, ripped, or soiled clothing to be worn on the Site.

4. Do not allow the use, possession, concealment, transportation, promotion, or sale of the following prohibited items anywhere on the Site:

a. Firearms (including air rifles and pistols and BB or pellet guns) and ammunition;

b. Bows, crossbows, arrows, bolts, or any other projectile weapons;

c. Explosives of any kind, including fireworks;

d. Illegal knives;

e. Other weapons prohibited by state Laws and Regulations; and

f. Any other item that has been designed or intended to be used as a weapon.

5. No exceptions will be made for the possession of a firearm by a person that has a valid state-issued license to carry a firearm. Remove any of the prohibited items listed above from the Site immediately and permanently. Any person found to be in possession of any prohibited item must also be removed from the Site and may be reported to local law enforcement.

1.08 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. Examine the Site and review the available information concerning the Site. Locate utilities, underground facilities, and existing structures. Verify the elevations of the structures adjacent to excavations. Contractor has a duty to report any discrepancies from information in the Contract Documents to the Engineer before beginning construction.

B. It shall be the responsibility of the Contractor to contact all affected utility owners and determine the precise location of all utilities prior to beginning construction. Utility owners shall be contacted a **minimum of 48 hours** prior to the commencement of operations.

C. Protect utilities, underground facilities and existing structures unless they are shown to be replaced or relocated on the Drawings.

1. In the event that any utility service is interrupted, the Contractor shall notify the utility owner immediately and shall cooperate with the owner, or his representative, in the restoration of service in the shortest time possible.
2. Restore damaged items to the satisfaction of the City of Fayetteville, the utility, or the property owner.

D. Carefully support and protect all structures and/or utilities so that there will be no failure or settlement where excavation or demolition endangers adjacent structures and utilities. Do not take existing utilities out of service unless required by the Contract Documents or approved by the Engineer.

E. Protect existing trees and landscaping at the Site. Mark trees that may be removed during construction and review with the Engineer for approval before removing. Protect trees to remain from damage limiting activity, including stockpiling of materials within the drip line of the tree.

F. Protect buildings from damage when handling material or equipment. Protect finished surfaces, including floors, doors, and jambs. Remove doors and install temporary wood protective coverings over jambs, if needed.

1.09 DISRUPTION TO SERVICES/CONTINUED OPERATIONS

A. Owner's facilities are to continue in service as usual during the construction unless noted otherwise. Owner or utilities must be able to operate and maintain the facilities. Keep disruptions to existing utilities, piping, process piping, or electrical services to a minimum.
1. Do not restrict access to critical valves, operators, or electrical panels.
2. Do not store material or products inside structures unless authorized by the Engineer.
3. Limit operations to the minimum amount of space needed to complete the specified Work.
4. Maintain storm sewers and sanitary sewers in service at all times. Provide temporary service around the construction or otherwise construct the Work in a manner that flow is not restricted.

B. Provide a Plan of Action in accordance with Section 01 35 00 "Special Procedures" if facilities must be taken out of operation.

1.10 FIELD VERIFICATION

A. Perform complete field measurements prior to purchasing products or beginning construction for products required to fit existing conditions.

B. Verify property lines, control lines, grades, and levels indicated on the Drawings.

C. Verify pipe class, equipment capacities, existing electrical systems, and power sources for existing conditions.

D. Check Shop Drawings and indicate the actual dimensions available where products are to be installed.

E. Include field measurements in Record Documents as required in Section 01 31 13 "Project Coordination."

1.11 CONSTRUCTION STAKING, REFERENCE DATA, AND CONTROL POINTS

A. The City Public Services Department will do all construction staking.

1. Staking will be done only during normal office hours, Monday through Friday. All stakes knocked out by the Contractor will be replaced by the Public Services Department at a charge to the Contractor of $5 per stake.

2. The Contractor must give at least two days (48 hours) notice prior to requiring staking or restaking.

3. If control points or benchmarks are damaged, disturbed or destroyed as a result of the Contractor's negligence, then Owner will impose a set-off as compensation for the effort required to reestablish. The Contractor may be charged a minimum of $15 for replacing control points, P.C., etc., and $50 for replacing monuments.

B. Locate and protect control points prior to starting the Work and preserve permanent reference points during construction.

1. Designated control points may be on an existing structure or monument. Do not change or relocate points without prior approval of the Engineer.

2. Notify Engineer when a reference point is lost, destroyed, or requires relocation. Replace Project control points on the basis of the original survey.

1.12 DELIVERY AND STORAGE

A. Deliver products and materials to the Site in time to prevent delays in construction.

B. Deliver packaged products to Site in original undamaged containers with identifying labels attached. Open cartons as necessary to check for damage and to verify invoices. Reseal cartons and store properly until used. Leave products in original packages or other containers until installed. If original packages or containers are damaged, repackage in containers and include packing slips, labels and other information from the original packaging.

C. Deliver products that are too large to fit through openings to the Site in advance of the time enclosing walls and roofs are erected. Set in place, raised above floor on cribs or pallets.

D. Assume full responsibility for the protection and safekeeping of products stored at the Site.

E. Store products at locations acceptable to the Engineer and to allow Owner access to maintain and operate existing facilities.

F. Store products in accordance with the Supplier's storage instructions immediately upon delivery. Leave seals and labels intact. Arrange storage to allow access for maintenance of stored items and for inspection. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.

G. Provide additional storage areas as needed for construction. Store products subject to damage by elements in substantial weather-tight enclosures or storage sheds. Provide and maintain storage sheds as required for the protection of products. Provide temperature, humidity control, and ventilation within the ranges stated in the Supplier's instructions. Remove storage facilities at the completion of the Project.

H. Protect the pipe interior. Keep all foreign materials such as dirt, debris, animals, or other objects out of the pipe during the Work.

I. Provide adequate exterior storage for products that may be stored out-of-doors.

1. Provide substantial platforms, blocking, or skids to support materials and products above ground which has been sloped to provide drainage. Protect products from soiling or staining.

2. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet materials. Provide ventilation to prevent condensation below covering.

3. Store loose, granular materials on clean, solid surfaces, or on rigid sheet materials, to prevent mixing with foreign matter.

4. Provide surface drainage to prevent erosion and ponding of water.

5. Prevent mixing of refuse or chemically injurious materials or liquids with stored materials.

6. Pipes and conduits stored outdoors are to have open ends sealed to prevent the entrance of dirt, moisture, and other injurious materials. Protect PVC pipe from ultraviolet light exposure.

7. Store products to prevent wind damage.

J. Protect and maintain mechanical and electrical equipment in storage.

1. Provide Supplier's service instructions on the exterior of the package.

2. Service equipment on a regular basis as recommended by the Supplier. Maintain a log of maintenance services. Submit the log as Record Data per Section 01 31 13 "Project Coordination" when Owner assumes responsibility for maintenance and operation.

3. Provide power to and energize space heaters for all equipment for which these devices are provided.

4. Provide temporary enclosures for all electrical equipment, including electrical systems on mechanical devices. Provide and maintain heat in the enclosures until equipment is energized.

K. Maintain storage facilities. Inspect stored products on a weekly basis and after periods of severe weather to verify that:

1. Storage facilities continue to meet specified requirements;

2. Supplier's required environmental conditions are continually maintained; and

3. Products that can be damaged by exposure to the elements are not adversely affected.

L. Replace any stored item damaged by inadequate protection or environmental controls.

M. Payment may be withheld for any products not properly stored.

1.13 CLEANING DURING CONSTRUCTION

A. Provide positive methods to minimize raising dust from construction operations and provide positive means to prevent air-borne dust from disbursing into the atmosphere. Control dust and dirt from demolition, cutting, and patching operations.

B. Clean the Site as Work progresses and dispose of waste materials, keeping the Site free from accumulations of waste or rubbish. Provide containers at the Site for waste collection. Do not allow waste materials or debris to blow around or off of the Site. Control dust from waste materials. Transport waste materials with as few handlings as possible.

C. Comply with Laws and Regulations. Do not burn or bury waste materials. Remove waste materials, rubbish, and debris from the Site and legally dispose of these at public or private disposal facilities.

1.14 MAINTENANCE OF ROADS, DRIVEWAYS, AND ACCESS

A. Maintain roads and streets in a manner that is suitable for safe operations of public vehicle during all phases of construction unless the City of Fayetteville approves a street closing. See “Traffic Control” Section 00497 for further.

B. Approval is required for any intended street closures at least five (5) working days in advance. See “Traffic Control” Section 00497.

1. Submit a Street Closure Request, in writing, to the City of Fayetteville Traffic Engineer. The request must state the elements outlined in “Traffic Control” Section 00497, Part 3.01(A).

2. No work shall begin until all the traffic devices required for the particular work activity have been installed, inspected, and approved by the City of Fayetteville Traffic Engineer or their representative.

C. Do not close public roads overnight without written permission from the City of Fayetteville Traffic Engineer. Coordinate and arrange for emergency vehicle access when streets are to be closed.

D. If the roads are not within the jurisdiction of the City of Fayetteville, obtain permits and permissions of the entity that owns the road prior to any Work and provide a copy of the permit or permission Record Data per Section 01 31 13 “Project Coordination.”

E. Contractor assumes responsibility for any and all damage resulting from construction along roads or drives.

F. Comply with all Erosion and Sedimentation Control plans. Clean off sediment transported onto roadways within the project site and public roads at the end of each day. Sediment shall be removed by shoveling or sweeping and be transported to a controlled disposal area. Street washing shall be allowed *after* sediment is removed in this manner. See Section 01 57 23 “NC Erosion and Sedimentation Control” for further.

G. The Contractor shall control dust throughout the life of the project in all areas within and affected by the construction, including but not limited to unpaved secondary roads, haul roads, access roads, disposal sites, borrow and material sources and production sites. Dust control shall not be considered effective where the amount of dust creates a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or

appearance of any property. Dust control shall be incidental to the work and no additional compensation will be made.

1.15 BLASTING

A. Blasting is not allowed for any purpose.

1.16 ARCHAEOLOGICAL REQUIREMENTS

A. Cease operations immediately and contact the Owner for instructions if historical or archaeological artifacts are found during construction.

B. Conduct all construction activities to avoid adverse impact of the sites where significant historical or archaeological artifacts are found or identified as an area where other artifacts could be found.

1. Obtain details for working in these areas from regulatory agencies.

2. Maintain confidentiality regarding the site(s) of artifacts.

3. Adhere to the requirements of applicable local, state, and federal Laws and Regulations.

4. Notify the City of Fayetteville, the Engineer and any local, state, or federal agency as required by applicable Laws and Regulations.

C. Do not disturb archaeological sites.

1. Obtain the services of a qualified archaeological specialist to instruct construction personnel on how to identify and protect archaeological finds on an emergency basis.

2. Coordinate activities to permit archaeological work to take place within the area.

a. Attempt to archaeologically clear areas needed for construction as soon as possible.

b. Provide a determination of priority for such areas.

D. Assume responsibility for any unauthorized destruction that might result to such sites by construction personnel, and pay all penalties assessed by state or federal agencies for non-compliance with these requirements.

E. Contract Times will be modified to compensate for delays caused by such archaeological finds. No additional compensation will be paid for delays.

1.17 ENDANGERED SPECIES RESOURCES

A. Do not perform any activity that is likely to destroy or adversely modify the habitat or jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the Federal Endangered Species Act (“ESA”) or applicable North Carolina Laws and Regulations.

B. Cease Work immediately in the area of the encounter and notify the Engineer if a threatened or endangered species is encountered during construction. Engineer will implement actions in accordance with the ESA and applicable North Carolina statutes. Only

resume construction in the area of the encounter when authorized to do so by the Engineer.

C. Contract Times will be modified to compensate for delays caused by such encounters. No additional compensation will be paid for delays.

1.18 BUILDING COORDINATION

A. Coordinate the efforts of various trades having interdependent responsibilities for Work.

B. Conceal ducts, pipes, wiring, and other non-finish items in finished areas, except as otherwise shown. Coordinate locations of concealed items with finish elements. Install access panel or doors where units requiring access for maintenance or operation are concealed behind finished surfaces.

C. Coordinate architectural reflected ceiling plans with the exact location of items installed in suspended ceilings. Request clarification from the Engineer prior to proceeding with fabrication or installation of an item if it appears that a conflict exists.

D. Coordinate the installation of items to be installed later, including:

1. Accepted alternates.
2. Products purchased using allowances.
3. Work by others.
4. Owner-supplied, Contractor-installed items.

E. Sequence, coordinate, and integrate the various elements of mechanical, electrical, and other systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical and electrical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction.
4. Coordinate the installation of required supporting devices, sleeves, embedded items, and other structural components to be set in concrete before concrete is placed.
5. Install systems, materials, and equipment to provide the maximum headroom possible where mounting heights are not detailed or dimensioned.
6. Coordinate the connection of systems with exterior underground and overhead utilities and services. Comply with the Laws and Regulations and requirements of franchise service companies. Provide required connection for each service.
7. Install systems, materials, and equipment to conform with approved Shop Drawings, Product Data, and Operation and Maintenance Data. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Adjust routing of piping, ductwork, utilities, and location of equipment as needed to resolve spatial conflicts between the various trades. Document changes in the indicated routings in the Record Documents per Section 01 31 13 “Project Coordination.”

8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
9. Install systems, materials, and equipment to facilitate servicing, maintenance, and repair or replacement of components.
10. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

1.19 BUILDING CUTTING AND PATCHING

A. Perform cutting, fitting, and patching required to complete the Work or to:
   1. Uncover Work to provide for installation of new Work or the correction of Defective Work.
   2. Provide routine penetrations of non-structural surfaces for installation of mechanical, electrical, and plumbing Work.
   3. Uncover Work that has been covered prior to observation by the Engineer.

B. Submit Notification by Contractor in accordance with Section 01 31 13 “Project Coordination” to the Engineer in advance of performing any cutting which affects:
   1. Work of any other contractor or the Owner;
   2. Structural integrity of any structure or system of the Project;
   3. Integrity or effectiveness of weather exposed or moisture resistant structure or systems;
   4. Efficiency, operational life, maintenance, or safety of any structure or system; or
   5. Appearance of any structure or surfaces exposed occasionally or constantly to view.

C. Include in request:
   1. Location and description of affected Work;
   2. Reason for cutting, alteration, or excavation;
   3. Effect on the Work of any separate contractor or Owner;
   4. Effect on the structural or weatherproof integrity of the Work;
   5. Description of proposed Work, including:
      a. Scope of cutting, patching, or alteration;
      b. Trades that will perform the Work;
      c. Products proposed for use; and
      d. Extent of refinishing to be performed.
   6. Alternatives to cutting and patching;
   7. Written authorization from any separate Contractor whose Work would be affected; and
   8. Date and time Work will be uncovered or altered.

D. Inspect existing conditions prior to starting the Work, including elements subject to damage or movement during cutting and patching. Uncover elements where required for an adequate inspection. Notify the Engineer of any conditions that negatively impact the ability to perform cutting and patching. Contractor is deemed to have accepted the existing conditions and assumed the risk associated with completing the Work when cutting or patching is started after the inspection.

E. Provide adequate support to maintain the structural integrity of facilities, structures, or elements that could be affected by cutting, patching or installing new Work. Provide devices and methods to protect facilities, structures, or elements from damage that could be affected by Contractor's efforts. Provide protection from the weather for portions of the Project that may be exposed by cutting and patching.

F. Make cuts or penetrations using methods that prevent damage to other Work and provide proper surfaces for patching and repairs.

G. Fit and adjust installed products to comply with specified products, functions, tolerances, and finishes.

H. Patch or repair facilities, structures or elements to provide completed Work per the Contract Documents.

I. Fit Work air-tight to pipes, sleeves, ducts, conduit, and other penetrations through the surfaces. Where fire rated separations are penetrated, fill the space around the pipe with materials with physical characteristics equivalent to fire resistance requirements of penetrated surface. Provide firestop inserts inside pipes, sleeves, ducts, conduit, and other penetrations when required by fire resistance requirements.

J. Patch finished surfaces and building components using new products specified for the original installation. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

    1. For continuous surfaces, refinish to the nearest intersection.

    2. For an assembly, refinish the entire unit.

1.20 BUILDING PRELIMINARY OCCUPANCY

A. Owner may deliver, install, and connect equipment, furnishings, or other apparatus in buildings or other structures. These actions do not indicate acceptance of any part of the building or structure and does not affect the start of warranties or correction periods.

B. Protect the Owner's property after installation is complete.

C. Owner may use any product for testing or to determine that the product meets the requirements of the Contract Documents. This use does not constitute acceptance by Owner. These actions do not indicate acceptance of any part of the product and does not affect the start of warranties or correction periods.

1.21 OCCUPANCY

A. Owner has the right to occupy or operate any portion of the Project that is ready for use after notifying the Contractor of its intent to do so.

B. Testing of equipment and appurtenances including specified test periods, training, and startup does not constitute acceptance for operation.

C. Owner may accept the facility for continued use after startup and testing at the option of the Owner. If acceptance is delayed at the option of the Owner, shut down facilities per approved operation and maintenance procedures.

D. The execution of bonds is understood to indicate the consent of the surety to these provisions for occupancy of the structures and use of equipment.

E. Provide an endorsement from the insurance carrier permitting occupancy of the structures and use of equipment during the remaining period of construction.

F. Conduct operations to ensure the least inconvenience to the Owner and general public.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 31 01 FEDERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section is incorporated into the Contract between the City of Fayetteville (hereinafter, "City") and the contractor (hereinafter, "Contractor").

B. Capitalized terms not defined in this Section shall have the meanings assigned to such terms in the § 00 72 00 "General Conditions" and § 00 73 00 "Supplementary Conditions."

C. This Contract may be funded in whole or in part with federal funding. Federal laws, regulations, policies, and related administrative practices apply to this Contract. The most recent of such federal requirements, including any amendments made after the execution of this Contract shall govern the Contract, unless the federal government determines otherwise.

D. The Contractor is responsible for complying with all applicable provisions, updates or modifications that occur in the future relating to these clauses. To the extent possible, the federal requirements contained in the most recent version of the Uniform Administrative Requirements for federal awards (Uniform Rules) codified at 2 C.F.R Part 200, including any certifications and contractual provisions required by any federal statutes or regulation referenced therein to be included in this contract are deemed incorporated into this contract by reference and shall be incorporated into any sub-agreement or subcontract executed by the Contractor pursuant to its obligations under this Contract.

E. The Contractor and its sub-contractors, if any, hereby represent and covenant that they have complied and shall comply in the future with the applicable provisions of the original contract then in effect and with all applicable federal, state, and local laws, regulations, and rules and local policies and procedures, as amended from time to time, relating to Work to be performed under this contract.

1.02 DOCUMENTATION

A. Provide documentation of compliance with all required provisions as requested by the Owner's Project Team in accordance with Section 01 33 00 "Document Management."

1.03 DRUG FREE WORKPLACE

A. The Contractor, by submitting a Bid, shall adhere Federal Drug Free Workplace requirements as outlined in 2 C.F.R. 182. Contractor shall make good faith efforts to maintain a drug-free workplace, publish workplace statement and establish drug-free awareness programs for employees. Contractor should take action concerning who are convicted of violating drug statutes in the workplace. Contractor shall contact the City if Contractor cannot adhere to the requirements of the Federal Regulations noted above. Failure to comply provisions shall be considered a breach of contract.

1.04 CONTRACTOR COMPLIANCE

A. The Contractor shall comply with all uniform administrative requirements, cost principles, and audit requirement for federal awards.

1.05 CONFLICT OF INTEREST

A. The Contractor must disclose in writing any potential conflict of interest to the City or pass through entity in accordance with federal policy.

1.06 MANDATORY DISCLOSURES

A. The Contractor must disclose in writing all violations of federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the federal award.

1.07 ENERGY CONSERVATION

A. The Contractor and Subcontractors agrees to comply with 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 (42 U.S.C. §6321 *et seq.*).

1.08 ACCESS TO RECORDS

A. The Contractor agrees to provide the City, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

B. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

C. The Contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

D. The City and the Contractor acknowledge and agree that no language in this contract is intended to prohibit audits or internal reviews by the FEMA Administrator or the Comptroller General of the United States.

E. All Contractors and their successors, transferees, assignees, and subcontractors acknowledge and agree to comply with applicable provisions governing Department and FEMA access to records, accounts, documents, information, facilities, and staff.

1.09 NO OBLIGATION BY FEDERAL GOVERNMENT

A. The Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the City, the Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

B. The Contractor agrees to include the above clause in each subcontract financed in whole or in part with federal assistance. It is further agreed that the clause shall not be modified, except to identify the sub-contractor who will be subject to its provisions.

1.10 CLEAN AIR ACT

A. The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 *et seq*.

B. The contractor agrees to report each violation to the City and understands and agrees that the City of Fayetteville will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

C. The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

1.11 FEDERAL WATER POLLUTION CONTROL ACT.

A. The contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 *et seq*.

B. The contractor agrees to report each violation to the City and understands and agrees that the City will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

C. The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

1.12 DEBARMENT AND SUSPENSION

A. Contractor certifies compliance by submitting Section 00 45 06 “Debarment Suspension and Other Responsibility Matters” with their bid package.

B. This contract is a covered transaction for purposes of 2 CFR Part 180 and 2 CFR Part. 3000. As such, the Contractor is required to verify that none of the Contractor, its principals (defined at 2 CFR § 180.995), or its affiliates (defined at 2 CFR § 180.905) are excluded (defined at 2 CFR§ 180.940) or disqualified (defined at 2 CFR § 180.935).

C. The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

D. This certification is a material representation of fact relied upon by the City of Fayetteville. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to (insert name of recipient/subrecipient/applicant), the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

E. The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions

1.13 BYRD ANTI-LOBBYING AMENDMENT, 31 U.S.C. § 1352 (AS AMENDED)

A. Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any

Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

B. Contractor certifies compliance by submitting Section 00 45 05 “Byrd Anti-Lobbying Certification” with their bid package.

1.14 PROGRAM FRAUD OR FRAUDULENT STATEMENTS OR RELATED ACTS

A. The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor’s actions pertaining to this contract. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the Federally assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

B. The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

C. The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance. It is further agreed that the clauses shall not be modified, except to identify the sub-contractors who will be subject to the provisions.

1.15 POST-AWARD CHANGES

A. Any change in the contract cost, modification, change order, or constructive change must be allowable, allocable, within the scope of its funding, grant or cooperative agreement, and reasonable for the completion of project scope. All changes and/or amendments to the contract will be outlined in detail, formalized in writing, and signed by the authorized representative of each party pursuant to Section 01 26 00 “Change Management.”

1.16 EQUAL EMPLOYMENT OPPORTUNITY

A. During the performance of this Agreement, Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

a. Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

b. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of Contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.

3. The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.

4. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

5. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

6. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

7. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

8. The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965,

so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States. The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

1.17 NONDISCRIMINATION

A. The Contractor agrees to comply with all applicable Federal statutes relating to non-discrimination, including but not limited to the following:

1. Age Discrimination Act of 1975 (42 U.S.C. § 6101 *et seq.*)
2. Americans with Disabilities Act of 1990 (42 U.S.C. §§ 12101-12213)
3. Civil Rights Act of 1964 – Title VI (42 U.S.C. §2000d *et seq.*)
4. Civil Rights Act of 1964 – Title VII (42 U.S.C. §2000e *et seq.*)
5. Civil Rights Act of 1968 – Title VIII (42 U.S.C. §3601 *et seq.*)

1.18 DAVIS-BACON REQUIREMENTS

A. If applicable to this contract, all transactions regarding this contract shall be done in compliance with the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable. The contractor shall comply with 40 U.S.C. 3141-3144, and 3146-3148 and the requirements of 29 C.F.R. pt. 5 as applicable.

B. Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.

C. Additionally, contractors are required to pay wages not less than once a week.

1.19 HATCH ACT

A. If applicable to this contract, the Contractor agrees to comply with all provisions of the Hatch Act pursuant to 5 C.F.R §§ 7321-7326.

1.20 COMPLIANCE WITH COPELAND ACT REQUIREMENTS

A. If applicable, the Contractor must comply with the requirements of the Copeland "Anti-Kickback" Act (18 U.S.C. § 874 and 40 U.S.C. § 3145) and the requirements of 29 CFR Part 3 as may be applicable, which are incorporated by reference into this contract.

B. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. The Contractor and each subcontractor must submit to the Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week.

C. The Contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

D. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 CFR § 5.12.

1.21 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT, 29 C.F.R. § 5.5(b)

A. Overtime requirements: No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

B. Violation; liability for unpaid wages; liquidated damages: In the event of any violation of the clause set forth in paragraph (b)(1) of this section (29 C.F.R. § 5.5(b)) the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section (29 C.F.R. § 5.5(b)), in the sum of $26 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section (29 C.F.R. § 5.5(b)).

C. Withholding for unpaid wages and liquidated damages: The City of Fayetteville shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section (29 C.F.R. § 5.5(b)).

D. Subcontracts: The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section (29 C.F.R. § 5.5(b)) and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section (29 C.F.R. § 5.5(b)).

1.22 PROCUREMENT OF RECOVERED MATERIALS

A. In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired competitively within a timeframe providing for compliance with the contract performance schedule, meeting contract performance requirements, or at a reasonable price.

B. Information about this requirement, along with the list of EPA designated items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensiveprocurement-guideline-cpg-program.

C. The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act."

1.23 DHS SEAL, LOGO, AND FLAGS

A. Contractor shall not use the Department of Homeland Security (DHS) seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval.

1.24 COMPLIANCE WITH FEDERAL LAW, REGULATIONS AND EXECUTIVE ORDERS

A. This is an acknowledgement that FEMA financial assistance will be used to fund the Agreement only. Contractor will comply will all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 31 13 PROJECT COORDINATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Administer contract requirements to construct the Project. Provide documentation per the requirements of this Section. Provide information as requested by the Owner.

1.02 DOCUMENTATION

A. Provide documents in accordance with Section 01 33 00 “Document Management.”

1.03 COMMUNICATION DURING THE PROJECT

A. Engineer is to be the first point of contact for all parties on matters concerning this Project.

B. Engineer will coordinate correspondence concerning:

1. Contract administration;
2. Clarification and interpretation of the Contract Documents;
3. Contract modifications;
4. Observation of Work and testing; and
5. Claims.

C. Engineer will normally communicate only with the Contractor. Any required communication with Subcontractors or Suppliers will only be with the direct involvement of the Contractor.

D. Direct written communications to the Engineer at the address indicated at the pre-construction conference. Include the following with communications as a minimum:

1. Name of the Owner
2. Project name
3. Contract title
4. Project number
5. Date
6. A reference statement

E. Submit communications on the forms referenced in this Section or in Section 01 33 00 “Document Management.”

1.04 PROJECT MEETINGS

A. Pre-Construction Conference:

1. Attend a pre-construction conference.
2. The location of the conference will be determined by the Engineer.

3. The time of the conference will be determined by the Engineer, but will be after the Notice of Award is issued and not later than 15 days after the Notice to Proceed is issued.
4. The Owner, Contractor's project manager and superintendent, representatives of utility companies, and representatives from major Subcontractors and Suppliers may attend the conference.
5. Provide and be prepared to discuss the following:
    a. Preliminary construction schedule per Section 01 33 05 "Construction Progress Schedule"
    b. Preliminary Schedule of Documents per Section 01 33 00 "Document Management"
    c. Schedule of Values and anticipated schedule of payments per Section 01 29 00 "Application for Payment Procedures"
    d. List of Subcontractors and Suppliers
    e. Contractor's organizational chart as it relates to this Project
    f. Letter indicating the agents of authority for the Contractor and the limit of that authority with respect to the execution of legal documents, contract modifications, and payment requests

B. Progress Meetings:
1. Attend meetings with the Engineer, and Owner.
    a. Meet monthly or as requested by the Engineer to discuss the Project.
    b. Meet at the Site or other location as designated by the Engineer.
    c. Contractor's superintendent and other key personnel are to attend the meeting. Other individuals may be requested to attend to discuss specific matters.
    d. Notify the Engineer of any specific items to be discussed a minimum of 1 week prior to the meeting.
2. Provide information as requested by the Engineer and Owner concerning this Project. Prepare to discuss the following:
    a. Status of overall project schedule
    b. Contractor's detailed schedule for the next month
    c. Anticipated delivery dates for equipment
    d. Coordination with the Owner
    e. Status of documents
    f. Information or clarification of the Contract Documents
    g. Claims and proposed modifications to the Contract
    h. Field observations, problems, or conflicts
    i. Maintenance of quality standards

3. Engineer will prepare a record of meeting proceedings. Review the record of the meeting and notify the Engineer of any discrepancies within 10 days of the date the record of the meeting is provided. The record will not be corrected after the 10 days have expired. Corrections will be reflected in the record of the following meeting.

C. Pre-Documentation and Pre-Installation Meetings:

1. Conduct pre-documentation and pre-installation meetings as required in the individual technical Specifications or as determined necessary by the Engineer (for example, instrumentation, roofing, concrete mix design, etc.).

2. Set the time and location of the meetings when ready to proceed with the associated Work. Submit a Notification by Contractor in accordance with Paragraph **[1.07]** for the meeting 2 weeks before the meeting. Owner must approve of the proposed time and location.

3. Attend the meeting and require the participation of appropriate Subcontractors and Suppliers in the meeting.

4. Engineer will prepare a record of meeting proceedings. Review the record of the meeting and notify the Engineer of any discrepancies within 10 days of the date the record of the meeting is provided. The record will not be corrected after the 10 days have expired. Corrections will be reflected in the record of the following meeting.

D. Weekly Coordination Meetings: Meet on a weekly basis with the Engineer or designated on-site representative of the Owner to discuss Work planned for the following week, review coordination issues, testing required, or other issues. Records of these meetings are not required.

1.05 REQUESTS FOR INFORMATION

A. Submit a Request for Information to the Engineer to obtain additional information or clarification of the Contract Documents.

1. Submit a separate Request for Information for each item on the form provided by the Engineer.

2. Attach adequate information to permit a response without further clarification. Engineer will return requests that do not have adequate information to the Contractor for additional information. Contractor is responsible for all delays resulting from multiple reviews due to inadequate information.

3. A response will be made when adequate information is provided. The response will be made on the Request for Information form provided by the Engineer.

4. A response will be made to an adequate Request for Information within 5 days from receipt.

B. Response to a Request for Information is given to provide additional information, interpretation, or clarification of the requirements of the Contract Documents, and does not modify the Contract Documents.

1. Submit a Change Proposal per Section 01 26 00 “Change Management” if a contract modification is suggested or required.

C. Use the Decision Register to document decisions made at meetings and actions to be taken in accordance with Paragraph **[1.06]**.

D. Use the Action Item Register to document assignments for actions to be taken in accordance with Paragraph **[1.06]**.

1.06 DECISION AND ACTION ITEM REGISTER

A. Engineer will maintain a Decision Register to document key decisions made during meetings, telephone conversations, or visits to the Site using the format provided by the Engineer:

1. Review the Decision Register prior to each regular meeting.

2. Report any discrepancies to the Engineer for correction or discussion at the next monthly meeting.

B. Engineer will maintain an Action Item Register in conjunction with the Decision Register to track assignments made during meetings, telephone conversations or visits to the Site using the format provided by the Engineer:

1. Review the Action Item Register prior to each regular meeting.

2. Report actions taken after the previous progress meeting on items in the register assigned to the Contractor or through the Contractor to a Subcontractor or Supplier to the Engineer. Report on status of progress 1 week prior to each progress meeting established in Paragraph **[1.04]** to allow Engineer to update the register prior to the Progress Meetings.

3. Be prepared to discuss the status at each meeting.

C. Decisions or action items in the register that require a change in the Contract Documents will have the preparation of a Modification as an action items if appropriate. The Contract Documents can only be changed by a Modification.

1.07 NOTIFICATION BY CONTRACTOR

A. Notify the Engineer of any of the following:

1. Need for testing (48 hours' notice)

2. Intent to work outside regular working hours (72 hours' notice)

3. Request to shut down facilities or utilities (2 weeks' notice)

4. Proposed utility connections (2 weeks' notice)

5. Required observation by Engineer, or inspection agencies prior to covering Work (72 hours' notice)

6. Training (1 weeks' notice)

B. Provide notification in advance as indicated above to allow Owner time to respond appropriately to the notification.

C. Use the Notification by Contractor form provided by the Engineer.

1.08 REQUESTS FOR MODIFICATIONS

A. Submit requests for Modifications per Section 01 26 00 “Change Management.”

1.09 RECORD DATA

A. Submit information required by the Contract Documents that is not related to a product as Record Data using the form provided by the Engineer.

1.10 RECORD DOCUMENTS

A. Maintain one complete set of printed Record Documents at the Site including the following:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Modifications
   5. Product Data and approved Shop Drawings
   6. Construction photographs
   7. Test Reports
   8. Clarifications and other information provided in Request for Information responses
   9. Reference standards

B. Store printed Record Documents and Samples in the Contractor’s field office.
   1. Record Documents are to remain separate from documents used for construction.
   2. Provide files and racks for the storage of Record Documents.
   3. Provide a secure storage space for the storage of Samples.
   4. Maintain Record Documents in clean, dry, legible conditions, and in good order.
   5. Make Record Documents and Samples available at all times for inspection by the Owner.

C. Maintain an electronic record of Specifications and Addenda to identify products provided in PDF format.
   1. Reference the Product Data number, Shop Drawing number, and O&M manual number for each product and item of equipment furnished or installed.
   2. Reference Modifications by type and number for all changes.

D. Maintain an electronic record of Drawings in PDF format.
   1. Reference the Product Data number, Shop Drawing number, and O&M manual number for each product and item of equipment furnished or installed.
   2. Reference Modifications by type and number for all changes.
   3. Record information as construction is being performed. Do not conceal any Work until the required information is recorded.

4. Mark drawings to record actual construction.
    a. Depths of various elements of the foundation in relation to finished first floor datum or the top of walls.
    b. Horizontal and vertical locations of underground utilities and appurtenances constructed, and existing utilities encountered during construction.
    c. Location of utilities and appurtenances concealed in the Work. Refer measurements to permanent structures on the surface. Include the following equipment:
        1) Piping
        2) Ductwork
        3) Equipment and control devices requiring periodic maintenance or repair
        4) Valves, unions, traps, and tanks
        5) Services entrance
        6) Feeders
        7) Outlets
    d. Changes of dimension and detail.
    e. Changes by Modifications.
    f. Information in Requests for Information or included in the Decision Register.
    g. Details not on the original Drawings. Include field verified dimensions and clarifications, interpretations, and additional information issued in response to Requests for Information.
5. Mark Drawings with the following colors:
    a. Highlight references to other documents, including Modifications in blue.
    b. Highlight mark ups for new or revised Work (lines added) in yellow.
    c. Highlight items deleted or not installed (lines to be removed) in red.
    d. Highlight items constructed per the Contract Documents in green.
6. Submit Record Documents to Engineer for review and acceptance 30 days prior to Final Completion of the Project.

E. Applications for Payment will not be recommended for payment if Record Documents are found to be incomplete or not in order. Final payment will not be recommended without complete Record Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 33 00 DOCUMENT MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Submit documentation as required by the Contract Documents and as requested by the Engineer.

B. Use the Project Management Information System (PMIS) provided by the **Engineer**.

1.02 QUALITY ASSURANCE

A. Submit legible, accurate, complete documents presented in a clear, easily understood manner. Documents not meeting these criteria will be returned without review as "Not Approved."

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Review documents prior to submission. Make certifications as required by the Contract Documents and as indicated on provided forms.

B. Provide a Schedule of Documents to list the documents that are to be submitted, the dates on which documents are to be sent to the Engineer for review. Use the form provided by the Engineer for this list.

C. Incorporate the dates for processing documents into the Progress Schedule required by Section 01 33 05 "Construction Progress Schedule."

1. Provide documents in accordance with the schedule so construction of the Project is not delayed.

2. Allow a reasonable time for the review of documents when preparing the Progress Schedule. Assume a fourteen (14) day review cycle for each document unless a longer period of time is indicated in the Contract Documents or agreed to by Engineer and Contractor.

3. Schedule delivery of review documents to provide all information for interrelated Work at one time.

4. Allow adequate time for processing documents so construction of the Project is not delayed.

1.04 FORMS AND WORKFLOWS

A. Use the forms or workflow process provided by the Engineer for project documentation.

1.05 DOCUMENT PREPARATION AND DELIVERY PROCEDURES

A. Deliver documents in electronic format as directed by the Engineer.

1. Do not leave any blanks incomplete. If information is not applicable, enter NA in the space provided.

2. Deliver all documents in Portable Document Format (PDF).

a. Create PDF documents from native format files unless files are only available from scanned documents.

b. Rotate pages so that the top of each document appears at the top of the monitor screen when opened in PDF viewing software.

c. Provide PDF document with adequate resolution to allow documents to be printed in a format equivalent to the document original. Documents are to be scalable to allow printing on standard 8-1/2 x 11 or 11 x 17 paper.

d. Submit color PDF documents where color is required to interpret the document.

e. Create or convert documents to allow text to be selected for comments or searched using text search features. Run scanned documents through Optical Character Recognition (OCR) software if necessary.

f. Flatten markups in documents to prevent markups made by Contractor from being moved or deleted. Flatten documents to allow markup recovery.

g. Add footers to each document with the name of the Project.

B. Software Requirements:

1. Owner and Contractor will each acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the following software formats:

Document	Document Format
Email	.htm, .rtf, or .txt without formatting that impairs legibility of content on screen or in printed copies
Submittals	Bluebeam or Adobe PDF
Applications for Payment	Bluebeam or Adobe PDF and Microsoft® Excel
Progress Schedules	PDF and Schedule in Native Format
Layouts and drawings to be submitted to Owner for future use and modification.	Autodesk® AutoCAD .dwg format
Document submitted to Owner for future word processing use and modification.	Microsoft® Word
Spreadsheets and data submitted to Owner for future data processing use and modification.	Microsoft® Excel

2. Software will be the version currently published at the time Contract is signed, unless a specific software version in listed in the Supplementary Conditions. Prior to using any updated version of the software required in this Section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or convert to comply with this Paragraph **[1.05.B]**.

1.06 DOCUMENT NUMBERING

A. Assign a document number to the Contractor originated document to allow tracking of the document during the review process.

1. Assign the number consisting of a prefix, a sequence number, and a letter suffix. Prefixes will be as follows:

Prefix	Description
AP	Application for Payment
CP	Change Proposal
CTR	Certified Test Report
EIR	Equipment Installation Report
GD	Graphic Documentation
NBC	Notification by Contractor
O&M	Operation and Maintenance Manuals
PD	Product Data
RD	Record Data
RFI	Request for Information
SD	Shop Drawing
SCH	Schedule of Progress

2. Issue sequence numbers in chronological order for each type of document as directed by the Engineer.

3. Issue numbers for resubmittals that have the same number as the original document followed by an alphabetical suffix indicating the number of times the same document has been sent to the Engineer for processing. For example: SD-025 A represents Shop Drawing number 25 and the letter “A” designates this is the second time this document has been sent for review.

4. Clearly note the document number on each page or sheet of the document.

5. Correct assignment of numbers is essential since different document types are processed in different ways.

B. Include reference to the Drawing number and/or Specification Section, detail designation, schedule, or location that corresponds with the data submitted on the Document Transmittal form. Other identification may also be required, such as layout drawings or schedules to allow the reviewer to determine where a particular product is to be used.

1.07 DOCUMENTATION

A. Furnish documents as indicated in Section 01 33 01 “Document Register” or in the individual Specification Sections. Submit documents per the procedures described in the Contract Documents.

B. Submit documents per the Specification Sections shown in the following table:

Document Type	Specification Section
Application for Payment	01 29 00

Document Type	Specification Section
Certified Test Report	01 33 02 for approval of product 01 40 00 to demonstrate compliance
Change Management	01 26 00
Equipment Installation Report	01 75 00
Graphic Documentation	01 33 06
Notification by Contractor	01 31 13
Operation & Maintenance Manuals	01 33 04
Product Data	01 33 03
Progress Schedules	01 33 05
Record Data	01 31 13
Request for Information	01 31 13
Schedule of Values	01 29 00
Shop Drawing	01 33 02
Substitutions	01 26 00
Suppliers and Subcontractors	01 31 13 01 33 03

1.08 Electronic Documents Protocol

A. The parties shall follow the provisions in this Section, referred to as the Electronic Documents Protocol ("EDP"), for exchange of electronic transmittals.

B. Basic Requirements:

1. Except as otherwise stated elsewhere in the Contract Documents, the Owner and Contractor will send and accept Electronic Documents sent by Electronic Means using the protocols provided in this Section.

2. The contents of the information in any Electronic Document will be the responsibility of the transmitting party. Electronic Documents may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, and are subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.

3. Provisions of this Contract regarding Electronic Documents must be incorporated into other agreements or subcontracts on the Project. Nothing in this paragraph reduces or eliminates requirements:

a. to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations;

b. to comply with any applicable Law or Regulation governing the signing and sealing of design documents and related Modifications or the signing and electronic transmission of any other documents; or

c. to comply with the notice requirements.

4. When sending Electronic Documents by Electronic Means the sending party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages,

operating systems, or computer hardware differing from those used in the drafting or sending Electronic Documents.

C. System Infrastructure for Electronic Document Exchange:

1. Contractor will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost. System Infrastructure must comply with these requirements.

2. The maximum size of an email attachment for exchange of Electronic Documents under this EDP is **[10]** MB. Attachments larger than that may be exchanged in parts or by using large file transfer functions or physical media.

3. Contractor assumes full and complete responsibility for its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software.

4. Contractor is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.

5. Contractor will operate and maintain industry-standard, industry-accepted, ISO standard, commercial-grade security software and systems that are intended to protect others from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. Contractor will not be liable to others for any breach of system security to the extent that Contractor maintains and operates required security software and systems.

6. In the case of disputes, conflicts, or modifications to the use of Electronic Documents required to address issues affecting System Infrastructure, Contractor and Owner will cooperatively resolve the issues; but, failing resolution, Owner is authorized to make and require reasonable and necessary changes meet its original intent. Contractor may submit a Change Proposal if the changes cause additional cost or time to Contractor that could not have reasonably been anticipated.

7. Contractor and Owner are both responsible for their own back-up and archive of documents sent and received during the term of the contract. Contractor and Owner remain solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract as each party deems necessary for its own purposes.

8. If a Contractor or Owner receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.

9. Owner will operate a project information management system (Project Website) for use of Owner and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this Contract, use of the Project Website will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information.

D. Software Requirements:

1. Owner and Contractor will each acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the following software formats:

Document	Document Format
Email	.htm, .rtf, or .txt without formatting that impair legibility of content on screen or in printed copies
Submittals	Bluebeam or Adobe PDF
Applications for Payment	Bluebeam or Adobe PDF and Microsoft® Excel
Progress Schedules	PDF and Schedule in Schedule in Native Format
Layouts and drawings to be submitted to Owner for future use and modification	Autodesk® AutoCAD .dwg format
Document submitted to Owner for future word processing use and modification	Microsoft® Word
Spreadsheets and data submitted to Owner for future data processing use and modification	Microsoft® Excel

2. Software will be the version currently published at the time Contract is signed, unless a specific software version in listed in the Supplementary Conditions. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or convert to comply with this Section.

3. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.

E. Requests by Contractor for Electronic Documents in Other Formats:

1. Release of any Electronic Documents developed during the design process (including Contract Documents, Technical Data, Drawings, and computer models) in formats other than those identified in this Section will be at the discretion of the Owner.

2. To the extent determined by Owner, release of Electronic Documents and other project information requested by Contractor (“Request”) in formats other than those

identified in this Section will be subject to the provisions of Owner's response to the Request, and to the following conditions:

a. The content included in the Electronic Documents covered by the Request was prepared by Engineer as an internal working document or electronic computer model solely for Engineer's purposes and not for any construction processes, and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor's application, or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the Request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and Contractor waives any claims against the Engineer or Owner arising from use of data in Electronic Documents covered by the Request.

c. **CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER AND ENGINEER AND THEIR SUBCONSULTANTS FROM ALL CLAIMS, DAMAGES, LOSSES, AND EXPENSES, INCLUDING ATTORNEYS' FEES AND DEFENSE COSTS ARISING OUT OF OR RESULTING FROM THE CONTRACTOR'S USE, ADAPTATION, OR DISTRIBUTION OF ANY ELECTRONIC DOCUMENTS PROVIDED UNDER THE REQUEST.**

d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to the Contractor's subcontractors. Contractor warrants that subsequent use by the Contractor's subcontractors complies with all terms of the Contract Documents and the Owner's response to Request.

3. In the event that Owner elects to provide or directs Engineer to provide to Contractor any Contractor-requested Electronic Document versions of project information that is not explicitly identified in the Contract Documents as being available to Contractor, Owner shall be reimbursed by Contractor on an hourly basis for any costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Engineer in accordance with the General Conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 33 02 SHOP DRAWINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Shop Drawings are required for those products that cannot adequately be described in the Contract Documents to allow fabrication, erection, or installation of the product without additional detailed information from the Supplier.

B. Submit Shop Drawings as required by the Contract Documents and as reasonably requested by the Engineer to:

1. Record the products incorporated into the Project;

2. Provide detailed information for the products proposed for the Project regarding their fabrication, installation, commissioning, and testing; and

3. Allow the Engineer to advise the Owner if products proposed for the Project by the Contractor conform, in general, to the design concepts of the Contract Documents.

C. Contractor's responsibility for full compliance with the Contract Documents is not relieved by the review of Shop Drawings, Samples, or mockups.

D. Submit a Change Proposal per Section 01 26 00 "Change Management" to request modifications to the Contract Documents, including those for approval of "or equal" products when specifically allowed by the Contract Documents or as a substitution for specified products or procedures. Deviations from the Contract Documents can only be approved Change Order or Field Order.

1.02 QUALITY ASSURANCE

A. Submit legible, accurate, and complete documents presented in a clear, easily understood manner. Shop Drawings not meeting these criteria will not be approved.

B. Demonstrate that the proposed products are in full compliance with the design criteria and requirements of the Contract Documents, or will be if deviations requested per Paragraph **[1.11]** are approved.

C. Furnish and install products that fully comply with the information included in the Shop Drawings.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Shop Drawings are required for the following items:

City of Fayetteville Specification Section	Shop Drawing Description
00490	Precast structures (manholes, catch basins, etc.)
00495	Pavement marking layout
00497	Traffic Control Phasing and Plan

Public Works Commission Specification Section	Shop Drawing Description
02660	Valves, hydrants, tapping sleeves, restrained joint pipe/fittings
02730	Manholes, ductile iron fittings, air release valves, transition fittings
02750	Bypass pumping system layout, temporary bypass plan
Project Special Provisions	**Shop Drawing Description**
31 41 40	Vibration Monitoring Plan (VMP), Foundation Protection Plan (FPP)
33 42 13	Culvert layout, reinforcement, openings, joint details, joint sealer wrap

B. Include Shop Drawings in the Document Register required by Section 01 33 00 "Document Management" to indicate the Shop Drawings to be submitted, the dates on which Shop Drawings are to be sent to the Engineer for review, and proposed dates that the product will be incorporated into the Project.

C. Incorporate the dates for processing Shop Drawings into the Progress Schedule required by Section 01 33 05 "Construction Progress Schedule."

1. Submit Shop Drawings in accordance with the schedule so construction of the Project is not delayed.
2. Submit Shop Drawings for interrelated Work at one time.
3. Allow adequate time for ordering, fabricating, delivering, and installing products so construction of the Project is not delayed.

D. Complete the following before submitting a Shop Drawing or Sample:

1. Prepare and review the Shop Drawing or Sample. Coordinate the Shop Drawing or Sample with other Shop Drawings and Samples, with the requirements of the Work, and the Contract Documents;
2. Determine and verify specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to Shop Drawings and Samples;
3. Determine and verify the suitability of materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
4. Determine and verify information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

E. Determine and verify:

1. Field measurements, quantities, and dimensions are shown on the Shop Drawing and are accurate;

2. Location of existing structures, utilities, and equipment related to the Shop Drawing have been shown and conflicts between the products, existing structures, utilities, and equipment have been identified;

3. Conflicts that impact the installation of the products have been brought to the attention of the Engineer;

4. Shop Drawing is complete for its intended purpose; and

5. Conflicts between the Shop Drawing related to the various Subcontractors and Suppliers have been resolved.

F. Review Shop Drawings prior to submitting to the Engineer. Certify that all Shop Drawings have been reviewed by the Contractor and are in strict conformance with the Contract Documents as modified by Addenda, Change Order, Field Order, or Contract Amendment when submitting Shop Drawings except for deviations specifically brought to the Engineer's attention on an attached Shop Drawing Deviation Request form in accordance with Paragraph **[1.11]**.

G. Fabrication or installation of any products prior to the approval of Shop Drawings is done at the Contractor's risk. Defective products may be rejected at the Owner's option.

H. Payment will not be made for products for which Shop Drawings or Samples are required until these are approved by the Engineer.

1.04 DOCUMENTATION

A. Provide adequate information in Shop Drawings and with Samples so the Engineer can:

1. Assist the Owner in selecting colors, textures, or other aesthetic features.

2. Compare the proposed features of the product with the specified features and advise Owner that the product does, in general, conform to the Contract Documents.

3. Compare the performance features of the proposed product with those specified and advise the Owner that the product does, in general, conform to the performance criteria specified in the Contract Documents.

4. Review required certifications, guarantees, warranties, and service agreements for compliance with the Contract Documents.

B. Include a complete description of the material or equipment to be furnished, including:

1. Type, dimensions, size, arrangement, model number, and operational parameters of the components;

2. Weights, gauges, materials of construction, external connections, anchors, and supports required;

3. Performance characteristics, capacities, engineering data, motor curves, and other information necessary to allow a complete evaluation of mechanical components;

4. All applicable standards;

5. Fabrication and installation drawings, setting diagrams, manufacturing instructions, templates, patterns, and coordination drawings;
6. Wiring and piping diagrams and related controls;
7. Mix designs for concrete, asphalt, or other materials proportioned for the Project; and
8. Complete and accurate field measurements for products which must fit existing conditions. Indicate on the document that the measurements represent actual dimensions obtained at the Site.

C. Submit Shop Drawings that require coordination with other Shop Drawings for fabrication at the same time. Shop Drawings requiring coordination with other Shop Drawings will not be approved until a complete package is submitted, unless approved by the Engineer.

D. Submit information for all of the components and related equipment required for a complete and operational system in one Submittal.
1. Include electrical, mechanical, and other information required to indicate how the various components of the system function together as a system.
2. Provide certifications, warranties, and written guarantees and service contracts with the document package for review when these are required.

1.05 SPECIAL CERTIFICATIONS AND REPORTS

A. Provide all required special certifications, reports, and other documentation with the Shop Drawings as specified in the individual Specification Sections which may include:
1. Certified Test Reports (CTR): A report prepared by an approved testing agency giving results of tests performed on products to indicate their compliance with the Specifications. This report is to demonstrate that the product, when installed, will meet the requirements of the Contract Documents and is part of the Shop Drawing. Field tests may be performed by the Owner to determine that in place materials or products meet the same quality as indicated in the CTR submitted as part of the Shop Drawing.
2. Certification of Local Field Service (CLS): A certified letter stating that field service is available from a factory or supplier approved service organization located within a 300-mile radius of the Site. Include the names, addresses, and telephone numbers of approved service organizations with the certificate.
3. Certification of Adequacy of Design (CAD): A certified letter from the manufacturer of the equipment stating that the equipment has been designed to be structurally stable and to withstand all imposed loads without deformation, failure, or adverse effects to the performance and operational requirements of the unit. The letter must state that mechanical and electrical components have been adequately sized to be fully operational for the conditions specified or normally encountered by the product's intended use.
4. Certification of Applicator/Subcontractor (CSQ): A certified letter stating that the applicator or subcontractor proposed to perform a specified function is duly designated as factory authorized and trained for the application of the specified product.

1.06 WARRANTIES AND GUARANTEES

A. Provide all required warranties, guarantees, and related documents with the Shop Drawing. The effective date of warranties and guarantees will be the date of Substantial Completion.

B. Identify all extended warranties which are defined as any guarantee of performance for the product or system beyond the one-year correction period described in the General Conditions. Issue the warranty certificate in the name of the Owner. Provide a warranty bond for extended warranties if required by the individual Specification Sections.

C. Include an additional copy of equipment warranties in operation and maintenance manuals.

D. Provide a copy of all warranties in a separate document in accordance with Section 01 70 00 “Execution and Closeout Requirements.”

1.07 EXTENDED SERVICE AGREEMENTS

A. Provide Extended Service Agreements and related documents with the Product Data. An Extended Service Agreement is a contract between the Owner and an approved Subcontractor or Supplier to provide service and or maintenance beyond that required to fulfill requirements for warranty repairs, or to perform routine maintenance for a definite period beyond the one-year correction period specified in the General Conditions.

B. An Extended Service Agreement does not relieve the Contractor from obligations under the one-year correction period or warranty provisions specified in the General Conditions.

C. An Extended Service Agreement does not relieve the Contractor from obligations under the maintenance bond, if a maintenance bond is required by the Contract.

D. Requirements for the Extended Service Agreement are described in the Specification Sections for each piece of equipment or system requiring an Extended Service Agreement.

E. Enter into a contract with the service provider and assign the service contract to the Owner on the date Substantial Completion. Once assigned to the Owner, Contract requirements for the Extended Service Agreement will be complete and will not extend the Contract between the Owner and Contractor.

F. Owner may require that a performance bond be provided for the Extended Service Agreement. Provide a separate bond meeting the same requirements as those for the Contractor’s performance bond if required. The bond will be in the amount of the Extended Service Agreement.

G. Include an additional copy of Extended Service Agreements in operation and maintenance manuals.

H. Provide a copy of Extended Service Agreements in a separate document in accordance with Section 01 70 00 “Execution and Closeout Requirements.”

1.08 SHOP DRAWING SUBMITTAL PROCEDURES

A. Submit Shop Drawings to the Engineer. Send all documents in digital format for processing.

1. Provide all information requested. Do not leave any blanks incomplete. If information is not applicable, enter NA in the space provided.

2. Submit all documents in Portable Document Format (PDF) as required by Section 01 33 00 “Document Management.” Provide color PDF documents where color is required to interpret the Shop Drawing. Provide Samples and color charts per Paragraph **[1.10]**.
3. Submit each specific product, class of material, or equipment system separately so these can be tracked and processed independently. Do not submit Shop Drawings for more than one independent system in the same Submittal.
4. Submit items specified in different Specification Sections separately unless they are part of an integrated system.
5. Define abbreviations and symbols used in Shop Drawings.
    a. Use terms and symbols in Shop Drawings consistent with the Contract Drawings.
    b. Provide a list of abbreviations and their meaning as used in the Shop Drawings.
    c. Provide a legend for symbols used on Shop Drawings.
6. Mark Shop Drawings to reference:
    a. Related Specification Sections;
    b. Drawing number and detail designation;
    c. Equipment designation or name;
    d. Schedule references;
    e. System into which the product is incorporated; and
    f. Location where the product is incorporated into the Project.

B. Use the following conventions to markup Shop Drawings for review:
1. Make comments and corrections in the color blue. Add explanatory comments to the markup.
2. Highlight items in black (redact) that are not being furnished when the Supplier’s standard drawings or information sheets are provided so that only the products to be provided are in their original color.
3. Make comments in yellow where selections or decisions by the Engineerare required, but such selections do not constitute a deviation from the Contract Documents. Add explanatory comments to the markup to indicate the action requested of the Engineer.
4. Make comments in orange that are deviation requests. Include the deviation request number on the Shop Drawing that corresponds to the deviation request on the Shop Drawing Deviation Request form. Include explanatory comments in the Shop Drawing Deviation Request form.
5. Mark dimensions with the prefix “FD” to indicate field verified dimensions on the Shop Drawings.

C. Designate a document as requiring priority treatment to place the review of the Shop Drawing ahead of other Shop Drawings previously delivered. Shop Drawings are typically reviewed in the order received, unless Contractor requests that a different priority be

assigned. Priority Shop Drawings will be reviewed before other Shop Drawings already received but not yet reviewed. Use of this priority designation for Shop Drawings may delay the review of Shop Drawings previously submitted. Contractor is responsible for delays resulting from the use of the priority designation status on Shop Drawings.

D. Complete the certification required by Paragraph **[1.03.G]**.

1.09 SAMPLE AND MOCKUP SUBMITTAL PROCEDURES

A. Submit color charts and Samples for every product requiring color, texture, or finish selection.

1. Submit color charts and Samples only after Shop Drawings for the products have been approved.
2. Deliver all color charts and Samples at one time.
3. Provide Samples of adequate size to clearly illustrate the functional characteristics of the product, with integrally related parts and attachment devices.
4. Indicate the full range of color, texture, and patterns.
5. Deliver color charts and Samples to the field office and store for the duration of the Project.
6. Notify the Engineer that color charts and Samples have been delivered for approval using the Notification by Contractor form.
7. Submit color charts and Samples not less than 30 days prior to when these products are to be ordered or released for fabrication to comply with the Project schedule.
8. Remove Samples that have not been approved. Submit new Samples following the same process as for the initial Sample until Samples are approved.
9. Dispose of Samples when related Work has been completed and approved and disposal is approved by the Engineer. At Owner's option, Samples will become the property of the Owner.

B. Construct mockups for comparison with the Work being performed.

1. Construct mockups from the actual products to be used in construction per the detailed specifications.
2. Construct mockups of the size and in the area indicated in the Contract Documents.
3. Construct mockups complete with texture and finish to represent the finished product.
4. Notify the Engineer that mockups have been constructed and are ready for approval using the Notification by Contractor form. Allow 2 weeks for Engineer to approve of the mockup before beginning the Work represented by the mockup.
5. Remove mockups that have not been approved. Construct new mockups following the same process as for the initial mockup until mockup is approved.
6. Protect mockups until Work has been completed and accepted by the Engineer.
7. Dispose of mockups when related Work has been completed and disposal is approved by the Engineer.

1.10 REQUESTS FOR DEVIATION

A. Submit a Change Proposal per Section 01 26 00 “Change Management” to request modifications to the Contract Documents, including those for approval of “or equal” products when specifically allowed by the Contract Documents or as a substitution for specified products or procedures.

B. Provide a Shop Drawing with the Change Proposal that clearly identifies deviations for any product or component of the product that does not fully comply with the Contract Documents using the Shop Drawing Deviation Request form provided by the Engineer. Mark deviations on the Shop Drawing per Paragraph **[1.09.B]**.

C. Include a description of why the deviation is required and the impact on Contract Price or Contract Times. Include the amount of any cost savings to the Owner for deviations that result in a reduction in cost.

D. Identify each deviation request as a separate item. Include all requested deviations that must be approved as a group together and identify them as a single item.

E. Engineer will issue a Field Order or Change Order to approve acceptable deviations. Approval of a requested Shop Drawing deviation by the Engineer on the Shop Drawings Deviation Request form indicates approval of the requested deviation only on its technical merits as generally conforming to the Contract Documents. Deviations from the Contract Documents can only be approved by a Modification issued by the Engineer.

1.11 ENGINEER RESPONSIBILITIES

A. Shop Drawings will be received by the Engineer. Engineer will log the documents and forward to the Engineer for review per this Section for general conformance with the Contract Documents.

1. Design Professional’s review and approval will be only to determine if the products described in the Shop Drawing or Sample will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Design Professional’s review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

3. Design Professional’s review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

B. Comments will be made on items called to the attention of the Engineer for review and comment. Any marks made by the Design Professional do not constitute a blanket review of the document or relieve the Contractor from responsibility for errors or deviations from the Contract requirements.

1. Engineer will respond to Contractor’s markups by either making markups directly in the Shop Drawing file using the color red or by attaching a Document Review Comments form with review comments keyed to the Drawings or Shop Drawing Deviation Request.

2. Shop Drawings that are reviewed will be returned with one or more of the following status designations:

    a. Approved: Shop Drawing is found to be acceptable as submitted.

    b. Approved as Noted: Shop Drawing is approved so long as corrections or notations made by Engineer are incorporated into the Shop Drawing.

    c. Not Approved: Shop Drawing or products described are not acceptable.

    d. Cancelled: This action indicates that for some reason, the Shop Drawing is to be removed from consideration and all efforts regarding the processing of that document are to cease.

3. Shop Drawings will also be designated for one of the following actions:

    a. Documents Filed: Shop Drawing is acceptable without further action and has been filed as a record document.

    b. Shop Drawing Not Required: A Shop Drawing was not required by the Contract Documents. Resubmit the document per Section 01 33 03 “Product Data.”

    c. Cancelled: This action indicates that for some reason, the Shop Drawing is to be removed from consideration and all efforts regarding the processing of that document are to cease.

    d. Revise and Resubmit: Shop Drawing has deviations from the Contract Documents, significant errors, or is inadequate and must be revised and resubmitted for subsequent review.

    Actions “a” through “c” will close out the Shop Drawing review process and no further action is required as a Shop Drawing. Action “d” requires follow up action to close out the review process.

4. Drawings with a significant or substantial number of markings by the Contractor may be marked “Approved as Noted.” These drawings are to be revised to provide a clean record of the document. Proceed with ordering products as the documents are revised.

5. Dimensions or other data that do not appear to conform to the Contract Documents will be marked as “At Variance With” (AVW) the Contract Documents or other information provided. The Contractor is to make revisions as appropriate to comply with the Contract Documents.

C. Bring deviations to the Shop Drawings to the attention of the Engineer for approval by using the Shop Drawing Deviation Request form. Use a single line for each requested deviation so the Status and Action for each deviation can be determined for that requested deviation. If approval or rejection of a requested deviation will impact other requested deviation, then all related deviations should be included in that requested deviation line so the status and action can be determined on the requested deviation as a whole.

D. Requested deviations will be reviewed as a possible Modification to the Contract Documents.

1. A requested deviation will be marked as “Not Approved” if the requested deviation is unacceptable. Contractor is to revise and resubmit the Shop Drawing with corrections for approval.
2. A Field Order will be issued by the Engineer for deviations approved by the Engineer if the requested deviation is acceptable and if the requested deviation will not result in a change in Contract Price or Contract Times. Requested deviations from the Contract Documents may only be approved by Field Order.
3. A requested deviation will not be approved if the requested deviation is acceptable but the requested deviation will or should result in a change in Contract Price or Contract Times. Submit any requested deviation that requires a change in Contract Price or Contract Times as a Change Proposal for approval prior to resubmitting the Shop Drawing.

E. Contractor is to resubmit a complete Shop Drawing incorporating revisions until it is acceptable and marked “Approved” or “Approved as Noted” and is assigned an action per Paragraph **[1.12.B.3]** that indicates that the Shop Drawing process is closed.

F. Information that is submitted as a Shop Drawing that should be submitted as Product Data or other type of document, or is not required may be returned without review, or may be deleted. No further action is required and the Shop Drawing process for this document will be closed.

1.12 RESUBMISSION REQUIREMENTS

A. Make all corrections or changes required by the Engineer in the document and resubmit to the Engineer until approved.

B. Resubmit a complete Shop Drawing for each resubmittal. The last approved Shop Drawing must not rely on previous submissions. The final Shop Drawing is to provide a complete record for the Owner’s records.

C. Revise initial drawings or data and resubmit as specified for the reviewed document.

1. Highlight or cloud in green those revisions which have been made in response to the previous reviews by the Engineer. This will include changes previously highlighted or clouded in yellow to direct attention to Engineer to items requiring selections, decisions by the Engineer or highlighted or clouded in orange for a requested deviation from the Contract Documents, or comments in red made by the Engineer.
2. Highlight and cloud new items in yellow where selections or decisions by the Engineer are required, but such selections do not constitute a deviation from the Contract Documents. Add explanatory comments to the markup to indicate the action to be taken by the Engineer.
3. Highlight and cloud new items in orange that are deviation requests. Include the deviation request number on the Shop Drawing that corresponds to the deviation request on the Shop Drawing Deviation Request form. Numbering for these new items is to start with the next number following the last Shop Drawing deviation requested. Include explanatory comments in the Shop Drawing Deviation Request form.

D. Pay for excessive review of Shop Drawings.

1. Excessive review of Shop Drawings is defined as any review required after the original review has been made and the first resubmittal has been checked to see that corrections have been made.
2. Review of Shop Drawings or Samples will be an additional service requiring payment by the Contractor if the Contractor submits a substitution for a product for which a Shop Drawing or Sample has previously been approved, unless the need for such change is beyond the control of Contractor.
3. Cost for additional review time will be billed to the Owner by the Engineer for the actual hours required for the review of Shop Drawings by Engineer and in accordance with the rates listed in Section 00 73 00 “Supplementary Conditions.”
4. A set-off will be included in each Application for Payment to pay the cost for the additional review. The set-off will be based on invoices submitted to the Owner for these services.
5. Need for more than one resubmission or any other delay in obtaining Engineer’s approval of Shop Drawings will not entitle the Contractor to an adjustment in Contract Price or an extension of Contract Times.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 33 03 PRODUCT DATA

PART 1 - GENERAL

1.01 SUMMARY

A. Submit Product Data as required by the Contract Documents and as reasonably requested by the Engineer. Provide Product Data for all products unless a Shop Drawing is required for the same item.

B. Submit Product Data to provide documents that allow the Owner to:

1. Record the products incorporated into the Project;

2. Record detailed information about products regarding their fabrication, installation, commissioning, and testing; and

3. Provide replacement or repair of products at some future date.

C. Contractor's responsibility for full compliance with the Contract Documents is not relieved by the receipt or cursory review of Product Data.

D. Submit a Change Proposal per Section 01 26 00 "Change Management" to request modifications to the Contract Documents, including those for approval of "or equal" products when specifically allowed by the Contract Documents or as a substitution for specified products or procedures. Deviations from the Contract Documents can only be made by an approved Change Order or Field Order.

1.02 QUALITY ASSURANCE

A. Submit legible, accurate, and complete documents presented in a clear, easily understood manner. Product Data not meeting these criteria will not be accepted and must be resubmitted.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Product Data is required for the following items:

City of Fayetteville Specification Section	**Product Data Description**
00430	Silt fence fabric, wire fencing, riprap stone, erosion matting
00480	Seed mix, fertilizer, mulch, erosion control matting
00485	Cement, fly ash, aggregates, admixtures, water for flowable fill
00490	Manhole covers, steps, pipe boots/seals, joint sealants, grates
00495	Thermoplastic marking material, drop-on beads, primer/sealer
00496	Pavement markers, adhesives
Public Works Commission Specification Section	**Shop Drawing Description**

02660	Pipe (ductile/PVC), fittings, valves, hydrants, tracer wire, joint restraint components
02730	Sanitary sewer pipe, manhole castings, transition fittings, sealants, air release valves
Project Special Provisions	**Shop Drawing Description**
31 41 40	Vibration monitors, crack monitors, seismographs
33 42 13	Precast box culvert sections, joint sealants, joint wrap, concrete mix, reinforcement

B. Complete the following before submitting Product Data:

1. Prepare Product Data and coordinate with Shop Drawings, Samples, Product Data for related products, and with the requirements of the Contract Documents;
2. Determine and verify specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information;
3. Determine and verify the suitability of materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
4. Determine and verify information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

C. Determine and verify:

1. Field measurements, quantities, and dimensions are shown on the Product Data and are accurate;
2. Location of existing structures, utilities, and equipment related to the Product Data have been shown and conflicts between the products, existing structures, utilities, and equipment have been brought to the attention of the Engineer;
3. Conflicts that impact the installation of the products have been brought to the attention of the Engineer;
4. Product Data is complete for its intended purpose; and
5. Conflicts between the Product Data related to the various Subcontractors and Suppliers have been resolved.

D. Review Product Data prior to submitting to the Engineer. Certify that all Product Data has been reviewed by the Contractor and is in strict conformance with the Contract Documents as modified by Addenda, Change Order, Field Order, or Contract Amendment when submitting Product Data.

1.04 DOCUMENTATION

A. Include a complete description of the material or equipment to be furnished, including:

1. Type, dimensions, size, arrangement, model number, and operational parameters of the components;
2. Weights, gauges, materials of construction, external connections, anchors, and supports required.

3. Performance characteristics, capacities, engineering data, motor curves, and other information necessary to allow a complete evaluation of mechanical components;
4. All applicable standards;
5. Fabrication and installation drawings, setting diagrams, manufacturing instructions, templates, patterns, and coordination drawings;
6. Wiring and piping diagrams and related controls;
7. Mix designs for concrete, asphalt, or other materials proportioned for the Project; and
8. Complete and accurate field measurements for products which must fit existing conditions. Indicate on the document that the measurements represent actual dimensions obtained at the Site.

B. Submit information for all components and related equipment required for a complete and operational system in one submittal.
1. Include electrical, mechanical, and other information required to indicate how the various components of the system function together as a system.
2. Provide certifications, warranties, and written guarantees and service contracts with the document package for review when these are required.

1.05 SPECIAL CERTIFICATIONS AND REPORTS

A. Provide all required certifications with the Product Data as specified in the individual Specification Sections:
1. Certified Test Reports (CTR): A report prepared by an approved testing agency giving results of tests performed on products to indicate their compliance with the Specifications. This report is to demonstrate that the product when installed will meet the requirements of the Contract Documents and is part of the Product Data. Field tests may be performed by the Owner to determine that in place materials or products meet the same quality as indicated in the CTR submitted as part of the Product Data.
2. Certification of Local Field Service (CLS): A certified letter stating that field service is available from a factory or supplier approved service organization located within a 300-mile radius of the Site. Include the names, addresses, and telephone numbers of approved service organizations with the certificate.
3. Certification of Adequacy of Design (CAD): A certified letter from the manufacturer of the equipment stating that the equipment has been designed to be structurally stable and to withstand all imposed loads without deformation, failure, or adverse effects to the performance and operational requirements of the unit. The letter must state that mechanical and electrical components have been adequately sized to be fully operational for the conditions specified or normally encountered by the product's intended use.
4. Certification of Applicator/Subcontractor (CSQ): A certified letter stating that the applicator or subcontractor proposed to perform a specified function is duly designated as factory authorized and trained for the application of the specified product.

1.06 WARRANTIES AND GUARANTEES

A. Provide all required warranties, guarantees, and related documents with the Product Data. The effective date of warranties and guarantees will be the date of Substantial Completion.

B. Identify all Extended Warranties which are defined as any guarantee of performance for the product or system beyond the one-year correction period described in the General Conditions. Issue the warranty certificate in the name of the Owner. Provide a warranty bond for extended warranties if required by Specification Sections.

C. Include an additional copy of equipment warranties in operation and maintenance manuals.

D. Provide a copy of all warranties in a separate document in accordance with Section 01 70 00 “Execution and Closeout Requirements.”

1.07 EXTENDED SERVICE AGREEMENTS

A. Provide Extended Service Agreements and related documents with the Product Data. An Extended Service Agreement is a contract between the Owner and an approved Subcontractor or Supplier to provide service and or maintenance beyond that required to fulfill requirements for warranty repairs, or to perform routine maintenance for a definite period beyond the one-year correction period specified in the General Conditions.

B. An Extended Service Agreement does not relieve the Contractor from obligations under the one-year correction period or Warranty provisions specified in the General Conditions.

C. An Extended Service Agreement does not relieve the Contractor from obligations under the maintenance bond, if a maintenance bond is required by the Contract.

D. Requirements for the Extended Service Agreement are described in the Specification Sections for each piece of equipment or system requiring an Extended Service Agreement.

E. Enter into a contract with the service provider and assign the service contract to the Owner on the date of Substantial Completion. Once assigned to the Owner, Contract requirements for the Extended Service Agreement will be complete and will not extend the Contract between the Owner and Contractor.

F. Owner may require that a performance bond be provided for the Extended Service Agreement. Provide a separate bond meeting the same requirements as those for the Contractor’s performance bond if required. The bond will be in the amount of the Extended Service Agreement.

G. Include an additional copy of Extended Service Agreements in operation and maintenance manuals.

H. Provide a copy of Extended Service Agreements in a separate document in accordance with Section 01 70 00 “Execution and Closeout Requirements.”

1.08 PRODUCT DATA SUBMITTAL PROCEDURES

A. Submit Product Data to the Engineer. Send all documents in digital format for processing.

1. Provide all information requested. Do not leave any blanks incomplete. If information is not applicable, enter NA in the space provided.

2. Submit all documents in Portable Document Format (PDF) as required by Section 01 33 00 “Document Management.” Provide color PDF documents where color is required to interpret the Product Data.
3. Submit each specific product, class of material, or equipment system separately so these can be tracked and processed independently. Do not submit Product Data for more than one system in the same Submittal.
4. Submit items specified in different Specification Sections separately unless they are part of an integrated system.
5. Define abbreviations and symbols used in Product Data.
    a. Use terms and symbols in Product Data consistent with the Contract Drawings.
    b. Provide a list of abbreviations and their meaning as used in the Product Data.
    c. Provide a legend for symbols used on Product Data.
6. Mark Product Data to reference:
    a. Related Specification Sections;
    b. Drawing number and detail designation;
    c. Equipment designation or name;
    d. Schedule references;
    e. System into which the product is incorporated; and
    f. Location where the product is incorporated into the Project.

B. Complete the certification required by Paragraph **[1.03.F]**.

1.09 ENGINEER RESPONSIBILITIES

A. Product Data will be received by the Engineer, logged, and provided to Owner as the Project record.
1. Product Data may be reviewed to see that the information provided is adequate for the purpose intended. Product Data not meeting the requirements of Paragraph **[1.02]** may not be approved.
2. Product Data is not reviewed for compliance with the Contract Documents. Comments may be returned if deviations from the Contract Documents are noted during the cursory review performed to see that the information is adequate.
3. Contractor’s responsibility for full compliance with the Contract Documents is not relieved by the review of Product Data. Contract modifications can only be approved by a Change Order or Field Order.

B. Engineer may take the following action in processing Product Data:
1. File Product Data as received if the cursory review indicates that the document meets the requirements of Paragraph **[1.02]**. Document will be marked “Filed as Received” and “Documents Filed.” No further action is required on that Product Data.

2. Not approve the Product Data for one of the following reasons:

    a. The documentation requirements of the Contract Documents indicate that the document submitted as Product Data should have been submitted as a Shop Drawing. The Product Data will be marked “Not Approved” and “Submit as Shop Drawing.” No further action is required on this document as Product Data and the Product Data process will be closed. Resubmit the document as a Shop Drawing per Section 01 33 02 “Shop Drawings.”

    b. The cursory review indicates that the document does not meet the requirements of Paragraph **[1.02]**. The Product Data will be marked “Not Approved” and “Revise and Resubmit.” Contractor is to resubmit the Product Data until it is acceptable and marked “Filed as Received.” When Product Data is filed, no further action is required and the Product Data process will be closed.

    c. The Product Data is not required by the Contract Documents nor is applicable to the Project. The Product Data will be marked “Not Approved” and “Cancelled.” No further action is required and the Product Data process will be closed.

C. Contractor is to resubmit the Product Data until it is acceptable and marked “Filed as Received.”

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 33 05 CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.01 SUMMARY

A. Prepare and submit a Progress Schedule for the Work and update the schedule on a monthly basis for the duration of the Project.

B. Provide Progress Schedule in adequate detail to allow Owner to monitor progress and to relate submittal processing to sequential activities of the Work.

C. Incorporate Contract Milestones into the schedule and show activities leading to achievement of these milestones.

D. Assume complete responsibility for maintaining the progress of the Work per the Progress Schedule submitted.

1.02 DOCUMENTATION

A. Submit the schedules to the Engineer. Send all documents in digital format for processing.

B. Do not leave any blanks incomplete. If information is not applicable, enter NA in the space provided.

C. Provide schedules, schedule updates and revisions to the Engineer in electronic format in its originating software and in Portable Document Format (PDF) as required by Section 01 33 00 “Document Management.”

D. Submit a preliminary Progress Schedule at the pre-construction conference.

E. Submit a detailed Progress Schedule at least 10 days prior to the first payment request.

F. Submit Progress Schedule updates monthly with the Applications for Payment to indicate the progress made on the Project to the closing date for the Application for Payment. Failure to submit Progress Schedules will cause delay in the review and approval of subsequent Applications for Payment.

1.03 PROGRESS SCHEDULE REQUIREMENTS

A. Progress Schedule is to be in adequate detail to:

1. Ensure adequate planning, scheduling, and reporting during the execution of the Work;

2. Ensure the coordination of the Work of the Contractor and the various Subcontractors and Suppliers;

3. Monitor the progress of the Work; and

4. Evaluate the impact of proposed changes to the Contract Times and Project Schedule.

B. Provide personnel with 5 years’ minimum experience in scheduling construction work comparable to this Project. Prepare the Progress Schedule using acceptable scheduling software.

C. Provide the Progress Schedule in the form of a computer-generated critical path schedule which includes Work to be performed on the Project. It is intended that the Progress Schedule accomplish the following:

1. Give early warning of delays in time for correction.
2. Provide detailed plans for the execution of the Work in the form of future activities and events in sequential relationships.
3. Establish relationships of significant planned Work activities and provide a logical sequence for planned Work activities.
4. Provide continuous current status information.
5. Allow analysis of the Contractor's program for the completion of the Project.
6. Permit schedules to be revised when the existing schedule is not achievable.
7. Log the progress of the Work as it actually occurs.

D. Provide a time-scaled horizontal bar chart which indicates graphically the Work scheduled at any time during the Project. The chart is to indicate:

1. Complete sequence of construction by activity;
2. Identification of the activity by structure, location, and type of Work;
3. Chronological order of the start of each item of Work;
4. The activity start and stop dates;
5. The activity duration; and production rates used to determine the duration;
6. Successor and predecessor relationships for each activity;
7. A clearly indicated single critical path; and
8. Projected percentage of completion, based on dollar value of the Work included in each activity as of the first day of each month.

E. Provide a Progress Schedule for Submittals:

1. Indicate the specific dates each document is to be delivered to the Engineer.
2. Allow a reasonable time to review each document, taking into consideration the size and complexity of the document, other documents being processed, and other factors that may affect review time.
3. Include time for making revisions to the Shop Drawings and resubmitting the Shop Drawing for at least a second review.
4. Assume a 14-day review cycle for each time a Shop Drawing is submitted for review unless a longer period is indicated in the Contract Documents or provided by the Engineer.
5. Contractor is responsible for delays associated with additional time required to review incomplete or erroneous documents and for time lost when documents are submitted for products that do not meet specification requirements.

1.04 PROGRESS SCHEDULE REVISIONS

A. Revise the Progress Schedule if it appears that the schedule no longer represents the actual progress of the Work.

1. Submit a Plan of Action for schedule recovery if the Progress Schedule or earned value analysis indicates that the Project is more than 30 days behind schedule. The report is to include:

a. Number of days behind schedule;

b. Narrative description of the steps to be taken to bring the Project back on schedule; and

c. Anticipated time required to bring the Project back on schedule.

2. Submit a revised Progress Schedule indicating the action that the Contractor proposes to take to bring the Project back on schedule.

B. Revise the Progress Schedule to indicate any adjustments in Contract Times approved by a Modification.

1. Include a revised Progress Schedule with Change Proposals if a change in Contract Times is requested.

2. Engineer will deem any Change Proposal that does not have a revised Progress Schedule and request for a change in Contract Times as having no impact on the ability of the Contractor to complete the Project within the Contract Times.

C. **Updating the Progress Schedule to reflect actual progress is not considered a revision to the schedule.**

D. Applications for Payment will not be recommended for payment without a revised Progress Schedule and if required, the report indicating the Contractor's plan for bringing the Project back on schedule.

1.05 FLOAT TIME

A. Define float time as the amount of time between the earliest start date and the latest start date of a chain of activities on the construction schedule.

B. Float time is not for the exclusive use or benefit of either the Contractor or Owner.

C. Where several subsystems each have a critical path, the subsystem with the longest time of completion is the critical path and float time is to be assigned to other subsystems.

D. Schedule completion date must be the same as the Contract completion date. Time between the end of construction and the Contract completion date is float time.

1.06 MODIFICATION OF CONTRACT TIMES

A. Contract Times cannot be changed by the submission of a Progress Schedule. Contract Times can only be modified by a Change Order or Contract Amendment.

B. Submit a Change Proposal for any proposed change in Contract Times, and include justification for the change in accordance with the provisions of the Contract Documents.

1.07 NEAR-TERM LOOK AHEAD SCHEDULES

A. Provide a near-term look ahead schedule (NTLA Schedule) every 14 days, typically at periodic coordination meetings, using the form provided by the Engineer which shows the days of planned activity for the following:

1. Submittals to be provided and day of anticipated return;
2. Equipment and material deliveries;
3. Arrival and departure of key construction equipment; and
4. Activities for the Contractor and each Subcontractor.

B. Coordinate NTLA Schedule with Project Schedule. Submit a report with each NTLA Schedule identifying deviations from the Project Schedule.

C. Submit a report of near-term work planned in the previous NTLA Schedule that was delayed or not executed by marking actual activity on the previous near term look ahead schedule. Provide explanation of why planned work was not executed and plan to execute in the future and regain time lost.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 33 06 GRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provide aerial photographs of the completed Project. Include one photograph for each **[mile]** of the Project with adequate overlap to provide a continuous photograph of the Project without gaps. Each photograph should be taken from approximately the same distance above ground and that the same angle to provide a consistent perspective.

B. Provide a video recording of the Site.

1. Record the condition of all existing facilities in or abutting the construction area (right-of-way) including streets, curbs and gutter, utilities, driveways, fencing, landscaping, etc., prior to the beginning of construction. Record after construction staking is complete but prior to any clearing. Provide one copy of the dated and labeled recording to the Engineer before the start of construction. Provide additional recording as directed by the Engineer if the recording provided is not considered suitable for the purpose of recording pre-existing conditions.

2. Provide a video recording of the completed Project. Make the recording from approximately the same distance above ground and that the same angle to provide a consistent perspective. Record the Project while flying the same direction for all segments.

3. Format must allow photographic still shots to be extracted from the video recording.

C. All photographs and video recordings are to become the property of the Owner. Photographs or recordings may not be used for public or private publication or display without the written consent of the Owner.

1.02 DOCUMENTATION

A. Submit photographic documentation and two DVDs/USBs of the video recording in accordance with Section 01 33 00 “Document Management.”

1.03 QUALITY ASSURANCE

A. Provide clear photographs and video recordings taken with proper exposure. View photographs and video recordings in the field and take new photographs or video recordings immediately if photos of an adequate print quality cannot be produced or video quality is not adequate. Provide photographs with adequate quality and resolution to permit enlargements.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHS

A. Provide photographs in digital format with a minimum resolution of 1280x960, accomplished without a digital zoom.

B. Take photographs at locations acceptable to the Engineer.

C. Provide two color prints of each photograph and a digital copy on a DVD/USB of each photograph taken.

D. Identify each print on back with:

1. Name of the Project.

2. Date, time, location, and orientation of the exposure.

3. Description of the subject of photograph.

E. Submit photograph in clear plastic sheets designed for photographs. Place only one photograph in each sheet to allow the description on the back to be read without removing the photograph.

F. Final photographs are to include two **[8-inch x 10-inch] [24-inch x 30-inch]** glossy color prints for each of the 10 photographs selected by the Engineer. These photographs are in addition to normal prints.

2.02 VIDEO RECORDING

A. Provide video recordings in digital format on a DVD/USB that can be played with Windows Media Player in common format in full screen mode without loss of resolution.

B. Identify Project on video by audio or visual means.

C. Provide video with file size that does not exceed 1 GB.

D. Provide video resolution of at least 1080p.

E. The quality of the video must be sufficient to determine the existing conditions of the construction area. Camera panning must be performed while at rest; do not pan the camera while walking or driving. Camera pans should be performed at intervals sufficient to clearly view the entire construction area.

F. Label the DVD/USB with construction stationing. Stationing is to be annotated in the video.

G. The entire construction area recording must be submitted at once. Sections submitted separately will not be accepted.

H. Linear projects should be recorded linearly from beginning to end.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 35 00 SPECIAL PROCEDURES

PART 1 - GENERAL

1.01 CITIZEN NOTIFICATION

A. The Contractor shall be responsible for notifying in writing all property owners and residents directly affected by this project at least seven (7) calendar days prior to beginning construction. A copy of the notification shall be submitted to and approved by the City of Fayetteville prior to its issuance to the residents a minimum of fourteen (14) calendar days prior to issuance. This also includes all businesses whether owned, leased, or rented by the property owner of record. Notices are to be mailed and/or hand delivered in addition to email notifications where email addresses have been provided to the Contractor in confidence.

B. Contractor shall also provide other notices including planned utility outages and limitations on access to private property. These notices are to be provided to the affected property owners at least three (3) calendar days prior to the specific activity. A copy of the notification shall be submitted to and approved by the City of Fayetteville prior to its issuance to the residents a minimum of fourteen (14) calendar days prior to issuance. Notices are to be hand delivered in addition to email notifications where email addresses have been provided to the Contractor in confidence.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 40 00 QUALITY MANAGEMENT

PART 1 - GENERAL

1.01 OVERVIEW

A. Quality management refers to the overall process of delivering a completed Project to the Owner that complies with the requirements of the Contract Documents. Quality management applies to documentation, products, services and the Work.

B. The Contractor is responsible for the quality of documentation, products, services and the Work provided.

1. Contractor is to integrate quality control procedures into the execution of the Work that are adequate to produce a Project that meets the requirements of the Contract Documents while minimizing loss of time and increased cost. Contractor is solely responsible for time and cost impacts of correcting Defective Work.

2. Contractor is to provide verification or acceptance testing as required by the Contract Documents to demonstrate that the completed Work complies with the requirements of the Contract Documents, except for those test that the Owner has determined are to be conducted independent of the Contractor and identified as Owner testing in the Owner's Quality Management Plan.

1.02 STANDARDS

A. Provide testing laboratories that comply with the American Council of Independent Laboratories (ACIL) "Recommended Requirements for Independent Laboratory Qualifications."

B. Perform testing per recognized test procedures as listed in the various Sections of the Specifications, standards of the State Department of Transportation, ASTM International (American Society for Testing and Materials), or other testing associations. Perform tests in accordance with published procedures for testing issued by these organizations.

1.03 DOCUMENTATION

A. Provide documentation which includes:

1. Contractor's Quality Management Plan that establishes the methods of ensuring compliance with the Contract Documents. Submit this plan as Product Data per Section 01 31 13 "Project Coordination."

2. A statement of qualifications for any proposed testing laboratory that includes a list of the engineers and technical staff that will provide testing services on the Project, descriptions of the qualifications of these individuals, list of tests that can be performed, equipment used with date of last certification, and a list of recent projects for which testing has been performed with references for those projects.

3. Certified Test Reports for products to be incorporated into the Project. Provide reports to indicate that the proposed products comply with the Contract Documents or indicate that the proposed products do not comply with the Contract Documents and

why those products do not comply. Submit Certified Test Reports as part of a Shop Drawing submitted per Section 01 33 02 “Shop Drawings.”

4. Certified Test Reports for inspections and testing required in this Section and in other Sections of the Specifications. Provide reports to indicate that the Work complies with the Contract Documents or indicate that the Work does not comply with the Contract Documents and why the Work does not comply. Submit these test reports on forms provided by the Engineer per Section 01 33 00 “Document Management.”

5. Certified Test Reports of Defective Work and Certified Test Reports documenting that successful corrective action has produced Work that complies with the Contract Documents. Engineer will maintain a Defective Work register. Progress on correction of Defective Work will be discussed at progress meetings as described in Paragraph 1.05.C. The final Defective Work register will be incorporated into closeout documentation required per Section 01 70 00 “Execution and Closeout Requirements” as a record that all Defective Work has been corrected.

1.04 OWNER’S QUALITY MANAGEMENT ACTIVITIES

A. Owner may perform its own verification testing independent of the Contractor. Owner’s Quality Management Plan describes the Owner’s anticipated verification testing program for this Project. The preliminary testing plan **is shown in Paragraph 3.04**. This plan outlines the anticipated testing in general terms and may not reflect the actual testing performed by the Owner. Actual testing will depend on the Contractor’s means, methods, and procedures of construction which will not be known until the Contractor submits the Contractor’s Quality Control Plan (CQCP) to the Owner. There is no guarantee that all testing in the preliminary OQMP included in the Bidding/Proposal Documents will be performed by the Owner. Contractor will arrange and pay for all production control testing deemed necessary by the Contractor to produce quality results.

B. Perform tests as indicated in Contract Documents. All verification testing is to be observed by the Engineer or its designated representative.

C. CMIT will distribute test reports to the Project Team.

D. Quality management activities of the Owner are for verifying the results of the Contractor’s Work complies with the requirements of the Contract Documents. Performance or non-performance of verification activities by the Owner:

1. Does not relieve the Contractor of its responsibility to provide Work and furnish products that comply with the requirements of the Contract Documents;

2. Does not relieve the Contractor of its responsibility to provide adequate quality control measures to produce quality documents, products, services or Work;

3. Does not relieve the Contractor of its responsibility for damage to or loss of Work or products before Owner’s acceptance; and

4. Does not affect the continuing rights of the Owner after Owner’s acceptance of the completed Work.

E. The Work is subject to Owner’s observations or testing at any time. Products which have been tested or inspected and accepted by the Owner at a supply source or staging area may be inspected or tested again by the Owner before, during, or after incorporation into

the Work and rejected if products do not comply with the Contract Documents. Verification testing performed by the Owner will be paid for by the Owner, except for testing related to Defective Work as discussed in Paragraph 3.03

1.05 CONTRACTOR'S RESPONSIBILITIES

A. Review the OQMP and provide a Contractor's Quality Control Plan (CQCP) outlining testing to be provided by the Contractor per Paragraph 1.07

B. Implement the CQCP to provide Work that complies with the requirements of the Contract Documents.

1. Provide quality documents meeting the requirements of the Contract Documents.

2. Provide services meeting the requirements of the Contract Documents.

3. Inspect and test products to be incorporated into the Project to identify defects before installing them. Do not install Defective products. Conspicuously mark Defective products and remove from the Site. If products are installed before the defect is recognized, remove the Defective products, mark them as Defective and remove them from the Site when the defect is recognized.

4. Integrate production quality control measures into construction activities to produce Work meeting the requirements of the Contract Documents. Inspect self-performed Work and the Work of Subcontractors and Suppliers to identify defects. Correct or replace Defective Work.

5. Provide facilities, equipment, and Samples required for inspections and tests.

a. Give the Engineer adequate notice before proceeding with Work that would interfere with inspections or testing.

b. Notify the Engineer and CMIT provider prior to the time that testing is required, providing adequate lead time to allow arrangements for inspections or testing to be performed.

c. Do not proceed with Work that would impact the ability to correct defects, or with Work that would require that it be removed to correct defects, until testing is complete, and test results indicate that the corrected Work is acceptable.

d. Provide safe access for all CMIT activities, including those to be conducted as part of the Owner's Quality Management Program.

e. Cooperate fully with the performance of sampling, inspection, and testing. Provide personnel to assist with sampling or to assist in making inspections and field tests.

f. Provide Samples and products in adequate quantities for testing at the Site or at the production source of the product for testing.

g. Provide facilities required to store and cure test Samples.

h. Provide calibrated scales and measuring devices for Owner's use in performing inspections and testing.

i. Provide adequate lighting to allow Owner observations.

j. Make Contract Documents available to testing agencies when requested.

C. Provide an update on quality control activities performed the previous month and planned for the coming month at monthly progress meetings required by Section 01 31 13 “Project Coordination.”

D. Determine testing or inspections required to implement the CQCP. Include costs for additional testing and inspections required to meet Contractor’s quality control obligations in the Contract Price.

1.06 CONTRACTOR’S QUALITY CONTROL MANAGER

A. Provide a Quality Control Manager for the Project. The Quality Control Manager must have authority to reject Defective Work, redirect the efforts of the Contractor, Subcontractor and Suppliers to correct Defective Work and implement steps to prevent future Defective Work.

B. The resident superintendent or an approved assistant can serve as Quality Control Manager, provided other duties will allow adequate time to serve in this capacity.

1.07 CONTRACTOR’S QUALITY CONTROL PLAN

A. Provide a CQCP that describes testing and inspections for Work performed at the Site and at remote locations. Include Work by Subcontractors and Suppliers. The CQCP is to include:

1. A description of the quality control organization, including an organization chart showing lines of authority to control the quality of Work;

2. Documentation describing name, qualifications (in resume format), duties, responsibilities, and level of authority of the Quality Control Manager.;

3. The name, qualifications (in resume format), duties, responsibilities, and authorities of other persons assigned a quality control function;

4. Procedures for scheduling, reviewing, certifying, and managing documentation including documentation provided by Subcontractors and Suppliers;

5. Control, verification, and acceptance testing procedures for each specific test. Include:

a. Name of tests to be performed,

b. Specification paragraph requiring test,

c. Parameters of Work to be tested,

d. Test frequency,

e. Persons responsible for each test, and

f. Applicable industry testing standards and laboratory facilities to be used for the test;

6. Incorporate the testing specified in the OQMP into the CQCP, specifically identifying the tests or inspections that will be provided by the OQMP;

7. Procedures for tracking and documenting quality management efforts per Paragraph 1.03.

8. Reporting procedures which incorporate the use of forms provided by the Engineer.

9. The name of the proposed testing laboratories along with documentation of qualifications per Paragraph 1.03.

B. Use the Contractor's Quality Control Plan Checklist provided by the Engineer to review the CQCP before submitting and include a copy of the completed checklist with the CQCP. Do not begin Work until the CQCP is accepted. Submit an interim plan covering only the portion of Work to be performed if the Contractor plans to begin Work prior to submitting the complete CQCP for the Project. Do not begin Work on other parts of the Project until the complete CQCP is accepted.

C. Meet with the Owner 7 days after CQCP is submitted and before start of construction to discuss the CQCP.

D. Notify the Engineer of any changes to the CQCP or quality control personnel.

1.08 CONTRACTOR'S USE OF OWNER'S TEST REPORTS

A. Contractor will receive copies of all test reports documenting Owner's verification tests. Contractor is entitled to rely on the accuracy of these tests results and use these as part of its quality control efforts.

B. Contractor may submit a Change Proposal if the Owner's testing program deviates significantly from the OQMP. Contractor must demonstrate that actual testing and inspection costs were incurred implementing the CQCP as a result of Owner's decision to not provide testing described in the OQMP.

1.09 LIMITATION OF AUTHORITY OF THE TESTING LABORATORY

A. The testing laboratory representatives are limited to providing testing services and interpreting the results of the test performed.

B. The testing laboratory is not authorized to:

1. Alter the requirements of the Contract Documents;

2. Accept or reject any portion of the Work;

3. Perform any of the duties of the Contractor; or

4. Direct or stop the Work.

1.10 TEST REPORTS

A. Certified Test Reports are to be prepared for all tests.

1. Tests performed by testing laboratories may be submitted on their standard test report forms if acceptable to the Owner using the process directed by the Engineer. These reports must include the following:

a. Name of the Owner, Project title and number, and name of the Contractor;

b. Name, address, and telephone number of the laboratory;

c. Name and signature of the laboratory personnel performing the test;

d. Description of the product being sampled or tested;

e. Date and time of sampling, inspection, and testing;

f. Date the report was issued;

g. Description of the test performed;

h. Weather conditions and temperature at time of test or sampling;

i. Location at the Site or structure where the test was taken;

j. Standard or test procedure used in making the test;

k. A description of the results of the test;

l. Statement of compliance or non-compliance with the Contract Documents; and

m. Interpretations of test results, if appropriate.

2. Submit reports on tests performed by Contractor, Subcontractors, or Suppliers on the as directed by the Engineer.

3. Owner will prepare test reports on tests performed by the Owner.

B. Submit test reports as directed by the Engineer within 24 hours of completing the test. Flag tests reports with results that do not comply with Contract Documents for immediate attention. Notify the Engineer using acceptable means other than the test report, immediately of any test that fails to comply with the Contract Documents.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Handle and protect test specimens of products and construction materials at the Site in accordance with recognized test procedures. Provide facilities for storing, curing, and processing test specimens as required by test standards to maintain the integrity of Samples. Transport test specimens in a manner to prevent damage to specimens while in transit.

PART 2 - PRODUCTS

2.01 TESTING APPARATUS

A. Furnish testing apparatus and related accessories necessary to perform the tests.

2.02 SAMPLE PRODUCTS

A. Provide Samples of products in adequate quantity for testing.

PART 3 - EXECUTION

3.01 IMPLEMENTING CONTRACTOR'S QUALITY CONTROL PLAN

A. Perform quality control observations and testing as required in each Section of the Specifications and where indicated on the Drawings.

B. Include the following phases for each definable work task. A definable work task is one which is separate and distinct from other tasks, has separate control requirements, may be

provided by different trades or disciplines, or may be work by the same trade in a different environment.

1. Planning Phase: Perform the following before beginning each definable work task:
    a. Review the Contract Documents.
    b. Review documents the Contractor will submit and determine that they are complete in accordance with the Contract Documents.
    c. Check to ensure that all materials and/or equipment have been tested, submitted, and approved.
    d. Examine the work area to ensure that all required preliminary Work has been completed and complies with the Contract Documents.
    e. Examine required materials, equipment, and sample Work to ensure that they are on hand, conform to Contract Documents, Shop Drawings and Product Data, and are properly stored.
    f. Review requirements for quality control inspection and testing.
    g. Discuss procedures for controlling quality of the Work. Document construction tolerances and workmanship standards for the work task.
    h. Check that the portion of the plan for the Work to be performed incorporates document review comments.
    i. Discuss results of planning phase with the Engineer. Conduct a meeting attended by the Engineer, Quality Control Manager, superintendent, other quality control personnel as applicable, and the foreman responsible for the work task. Instruct applicable workers as to the acceptable level of workmanship required to meet the requirements of the Contract Documents. Document the results of the planning phase actions by separate meeting minutes prepared by the Quality Control Manager and attached to the quality control report.
    j. Do not move to the next phase unless results of investigations required for the planning phase indicate that requirements have been met.
2. Work Phase: Complete this phase after the planning phase:
    a. Notify the Engineer at least 1 week in advance of beginning the Work and discuss the review of the planning phase effort to indicate that requirements have been met.
    b. Check the Work to ensure that it is in full compliance with the Contract Documents.
    c. Verify adequacy of controls to ensure full compliance with Contract Documents. Verify required control inspection and testing is performed.
    d. Verify that established levels of workmanship meet acceptable workmanship standards. Compare with required Sample panels as appropriate.
    e. Repeat the work phase for each new crew to work on-site, or any time acceptable specified quality standards are not being met.

3. Follow-Up Phase: Perform daily checks to ensure control activities, including control testing, are providing continued compliance with contract requirements:

    a. Make checks daily and record observations in the quality control documentation.

    b. Conduct follow-up checks and correct all defects prior to the start of additional work tasks that may be affected by the Defective Work. Do not build upon nor conceal Defective Work.

    c. Conduct a review of the Work at least 1 month prior to the expiration of the correction period prescribed in the General Conditions with the Owner. Correct defects as noted during the review.

C. Conduct additional planning and work phases if:

1. The quality of on-going Work is unacceptable;

2. Changes are made in applicable quality control staff, on-site production supervision, or crews;

3. Work on a task is resumed after a substantial period of inactivity; or

4. Other quality problems develop.

3.02 DEFECTIVE WORK

A. Immediately correct any Defective Work or notify the Engineer why the Work is not to be corrected immediately and when corrective action will be completed.

B. Work performed that is connected or adjacent to Defective Work or Work that would have to be removed to correct Defective Work is also considered to be Defective. Contractor is responsible for all costs associated with replacing any acceptable Work that must be removed, or might be damaged by corrective actions.

C. Document Defective Work, corrective actions taken to correct defects and that corrected Work complies with the Contract Documents.

D. Implement countermeasures to prevent future Defective Work.

E. No payment will be made for Defective Work. Remove Work from the Application for Payment if Work paid for on a previous Application for Payment is found to be Defective.

F. Owner will withhold payment for Defective Work or Work that has not been tested or inspected in accordance with the CQCP, OQCP, or the Contract Documents.

3.03 VERIFICATION TESTING FOR CORRECTED DEFECTS

A. Provide verification testing on corrected Work when corrective action is complete to demonstrate that the corrected Work complies with the Contract Documents. Conduct the same tests or inspections used to determine that the original Work was Defective. Different tests or methods may be used if approved by the Owner. Document that Defective Work has been corrected with the Engineer.

B. Pay for verification testing until Work meets quality requirement set forth in the Contract Documents. Owner may perform verification testing as part of its Quality Management Program and impose a Set-off to recover the cost for this testing.

3.04 OWNER'S PRELIMINARY QUALITY CONTROL PLAN

The following list is not all inclusive; the Contractor is responsible for all testing and submittals as outlined in the Construction Documents.

Spec. Section	COF Test / Frequency	PWC Test / Frequency	Owner or Contractor
2222	Soil compaction density in road subgrade / Per lift (ASTM D698)	Soil compaction density in utility trenches / Per lift or trench segment (ASTM D698)	Contractor
2573	Asphalt thickness and in-place density / Per permanent patch area	—	Contractor
2660	Water service line pressure integrity / Visual & leak check at service connections	Pressure integrity of water main (Hydrostatic test @ 200 psi, 1 hr) / Per main section	Contractor
2660	—	Water main disinfection effectiveness / Chlorine residual (50–100 ppm, 24 hr) + Bacteria sampling	Contractor
2660	—	Continuity of tracer wire system / Ohm meter test per segment	Contractor
2730	—	PVC sewer pipe air tightness / Low-pressure air test (ASTM F1417) between manholes	Contractor
2730	—	PVC pipe deformation (deflection ≤5%) / Mandrel test after 30 days post-backfill	Contractor
2730	—	Manhole watertightness / Vacuum test per ASTM C1244	Contractor
2730	—	Manhole invert configuration, slope, and leakage / Field visual inspection	Owner
2730	—	Manhole invert shelf slope and flow channel finish / Field inspection	Owner

2762	—	Thickness of polymeric manhole lining / Dry film thickness measurement (ASTM D4414)	Contractor
2762	—	Continuity of polymeric lining / Spark test for coating integrity (NACE SP0188)	Contractor
9802	—	Thickness of epoxy protective coatings / Dry film measurement (SSPC-PA-2)	Contractor
9802	—	Epoxy coating continuity / High-voltage spark test (2,500V)	Contractor
3301	Concrete strength for structural components / 4 cylinder breaks (7 & 28 day) per pour	Concrete strength for utility structures / 4 cylinder breaks (7 & 28 day) per pour	Owner
3301	Slump and air content of concrete / Per pour (as needed)	—	Owner
455	Slope and finish of concrete sidewalks and driveways / Field check per layout	—	Owner
490	Fit, dimension, and seal of precast structures / Field inspection at install	—	Owner
490	Secure embedment of manhole or catch basin steps / Field check at install	—	Contractor

END OF SECTION

01 50 00 TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide temporary facilities, Contractor's field offices, storage sheds or containers, workshops, and other facilities needed to complete the Work.

B. Provide temporary utilities needed to support the operation of the facilities and construction activities.

C. Maintain any temporary project identification signs.

D. Provide temporary informational signs to identify key elements of construction and direct the flow of traffic.

E. Provide a weatherproof kiosk for display of permits and other notices required by Laws and Regulations.

F. Provide a rain gauge and a weatherproof box for documents pertaining to the North Carolina Department of Environmental Quality ("NCDEQ") Permit, including all NPDES Self-Inspections.

1.02 DOCUMENTATION

A. Provide the City of Fayetteville Traffic Engineer with a Traffic Control Plan within fourteen (14) days of being declared the lowest responsible bidder. See "Traffic Control" Section 00497 for further.

B. Provide the Owner and Engineer with a Site Storage Plan prior to beginning work.

1.03 QUALITY ASSURANCE

A. Inspect and test each utility before using facilities. Arrange for all required inspections and tests by regulatory agencies, and obtain required certifications and permits for use of facilities.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Transport, unload, and set up all temporary buildings and utilities.

1.05 JOB CONDITIONS

A. Locate buildings and sheds at the Site as indicated on the Drawings.

B. Prepare the Site by removing trees, brush, or debris and performing demolition or grubbing needed to clear a space adequate for the structures.

C. Provide Contractor's temporary facilities and utilities in time to avoid delays in the performance of the Work.

D. Provide and maintain temporary facilities and utilities.

E. Operate temporary facilities in a safe and efficient manner.

1. Restrict loads on utilities to operate within their designed or designated capacities.
2. Provide sanitary conditions. Prevent public nuisance or hazardous conditions from developing or existing at the Site.
3. Prevent freezing of pipes, flooding, or the contamination of water.
4. Maintain site security and protection of the facilities.

F. Remove temporary facilities and utilities when construction is complete and removal is approved by the Engineer.

PART 2 - PRODUCTS

2.01 CONTRACTOR'S FIELD OFFICE

A. Furnish a field office of adequate size for Contractor's use, if applicable.

B. Subcontractors may provide their own field offices only when space is available on the Site and the ENGINEER agrees to its size, condition, and location.

2.02 TEMPORARY STORAGE BUILDINGS

A. Furnish storage buildings of adequate size to store any materials or equipment delivered to the Site that might be affected by weather.

2.03 TEMPORARY SANITARY FACILITIES

A. Provide sanitary facilities at the Site for the entire duration of the Project. Maintain these facilities in a clean and sanitary condition at all times, and comply with the requirements of the local health authority. On large sites, provide portable toilets at such locations so that no point at the Site will be more than 600 feet from a toilet.

B. Use these sanitary facilities. Do not use restrooms within existing or Owner-occupied buildings.

2.04 TEMPORARY HEAT

A. Provide heating devices needed to protect buildings during construction. Provide fuel needed to operate the heating devices and attend the heating devices at all times they are in operation, including overnight operations.

2.05 TEMPORARY UTILITIES

A. Provide the temporary utilities for administration, construction, testing, disinfection, and startup of the Work, including electrical power, water, and telephone. Pay all costs associated with furnishing temporary utilities.

1. Provide a source of temporary electrical power of adequate size for construction procedures.

a. Use existing power systems where spare capacity is available. Provide temporary power connections that do not adversely affect the existing power supply. Submit connections to the Engineer for approval prior to installation.

b. Provide electrical pole and service connections that comply with Laws and Regulations and the requirements of the power company.

B. Provide power for construction and storage. Provide power to energize space heaters for stored electrical equipment.

2.06 WATER FOR CONSTRUCTION

A. Provide temporary water. Potable water may be purchased from the City of Fayetteville via a hydrant meter. Non-potable water may be used for hydraulic testing of non-potable basins or pipelines. Include the cost of water as well as its transportation and storage in the Contract Price.

PART 3 - EXECUTION

3.01 LOCATION OF TEMPORARY FACILITIES

A. Locate temporary facilities in areas approved by the Engineer. Construct and install signs at locations approved by the Engineer. Install informational signs so they are clearly visible.

3.02 TEMPORARY LIGHTING

A. Provide temporary lighting inside buildings once buildings are weatherproof.

B. Provide exterior security lighting.

C. Provide lighting that is adequate to perform Work within any space. Temporary lights may be removed once the permanent lighting is in service.

D. Provide portable flood lights at any time that Work will be performed outside the structure at night. Provide adequate lighting at any location Work is being performed.

3.03 CONSTRUCTION FENCE

A. Install and maintain a chain-link construction fence around the Site and off-site storage yards. Fence must be a minimum 6 feet high. Provide gates with padlocks.

3.04 REMOVAL OF TEMPORARY FACILITIES

A. Remove temporary buildings, sheds, and utilities at the conclusion of the Project and restore the Site to original condition or finished condition in accordance with the Drawings.

B. Remove informational signs upon completion of construction.

C. Remove project identification signs, framing, supports, and foundations upon completion of the Project.

3.05 MAINTENANCE AND JANITORIAL SERVICE

A. Empty trash and service portable toilets weekly.

B. Maintain signs and supports in a neat, clean condition. Repair damage to structures, framings, or signs.

C. Repair any damage to Work caused by placement or removal of temporary signage.

END OF SECTION

01 57 00 TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide labor, materials, equipment, and incidentals necessary to construct temporary facilities to provide and maintain control over environmental conditions at the Site. Remove temporary facilities when no longer needed. Comply with Section 01 57 23 “NC Erosion and Sedimentation Control.”

B. Construct temporary impounding works, channels, diversions, furnishing, and operation of pumps, installing piping and fittings, and other construction for control of conditions at the Site. Remove temporary controls at the end of the Project. Comply with Section 01 57 23 “NC Erosion and Sedimentation Control.”

1.02 DOCUMENTATION

A. Provide Shop Drawings in accordance with Section 01 33 02 “Shop Drawings.”

B. Provide copies of notices, records, and reports required by the Contract Documents or Laws and Regulations as Product Data in accordance with Section 01 31 13 “Project Coordination.” Comply with Section 01 57 23 “NC Erosion and Sedimentation Control.”

1.03 QUALITY ASSURANCE

A. Construct and maintain temporary controls with adequate workmanship using durable materials to provide effective environmental management systems meeting the requirements of the Contract Documents and Laws and Regulations. Use materials that require minimal maintenance to prevent disruption of construction activities while providing adequate protection of the environment.

B. Periodically inspect systems to determine that they are meeting the requirements of the Contract Documents.

C. Comply with Section 01 57 23 “NC Erosion and Sedimentation Control.”

1.04 POLLUTION CONTROL

A. Prevent the contamination of soil, water, or atmosphere by the discharge of noxious substances from construction operations. Provide adequate measures to prevent the creation of noxious air-borne pollutants. Prevent dispersal of pollutants into the atmosphere. Do not dump or otherwise discharge noxious or harmful fluids into drains or sewers, nor allow noxious liquids to contaminate public waterways in any manner.

B. Provide equipment and personnel and perform emergency measures necessary to contain any spillage.

1. Contain chemicals in protective areas and do not dump on soil. Dispose of such materials at off-site locations in an acceptable manner.

2. Excavate contaminated soil and dispose at an off-site location if contamination of the soil does occur. Fill resulting excavations with suitable backfill and compact to the density of the surrounding undisturbed soil.

3. Provide documentation to the Owner which states the nature and strength of the contaminant, method of disposal, and the location of the disposal site.

4. Comply with Laws and Regulations regarding the disposal of pollutants.

C. Groundwater or run-off water which has come into contact with noxious chemicals, sludge, or contaminated soil is considered contaminated. Do not allow contaminated water to enter streams or water courses, leave the Site in a non-contained form, or enter non-contaminated areas of the Site.

1. Construct temporary holding ponds or take other precautions and measures as required to contain the contaminated water and pump to a designated storage area.

2. Wash any equipment used for handling contaminated water or soil within contaminated areas three times with uncontaminated water prior to using such equipment in an uncontaminated area. Dispose of wash water used to wash such equipment as contaminated water.

1.05 EARTH CONTROL

A. Remove excess soil, spoil materials, and other earth not required for backfill. Control stockpiled materials to eliminate interference with Contractor and Owner's operations.

B. Dispose of excess earth off the Site. Provide written approval from the property owner for soils deposited on private property as Product Data per Section 01 31 13 "Project Coordination." Obtain approval of the Owner if this disposal impacts the use of Site or other easements.

1.06 AIR POLLUTION CONTROL

A. Air Pollution Watch Days:

1. Air Pollution Watch Days (APWD) may occur in the following times:

a. Typical Ozone Season: May 1 through October 31.

b. Critical Emission Time: 6:00 a.m. to 10:00 a.m.

2. Watch Days:

a. State or local environmental regulatory agencies, in coordination with the National Weather Service, may designate the following day as an APWD by 3:00 p.m. on the prior afternoon.

b. Begin work after 10:00 a.m. on designated APWD if work requires the use of heavy construction equipment for run times in excess of 1 hour prior to 10:00 a.m. Heavy construction equipment may be used prior to 10:00 a.m. if equipment is certified by EPA as "Low Emitting" or equipment burns Ultra Low Sulfur Diesel (ULSD), diesel emulsions, or alternative fuels such as CNG.

B. Obtain air permit for construction activities per requirements of Laws and Regulations.

1.07 TEMPORARY STORMWATER POLLUTION CONTROL

A. Provide temporary stormwater pollution control per Section 01 57 23 "NC Erosion and Sedimentation Control."

1.08 MANAGEMENT OF WATER

A. Manage water resulting from rains or ground water at the Site. Maintain trenches and excavations free of water at all times.

B. Lower the water table in the construction area by acceptable means if necessary to maintain a dry and workable condition at all times. Provide drains, sumps, casings, well points, and other water control devices as necessary to remove excess water.

C. Provide continuous operation of water management actions. Maintain standby equipment to provide proper and continuous operation for water management.

D. Ensure that water drainage does not damage adjacent property. Divert water into the same natural watercourse in which its headwaters are located, or other natural stream or waterway as approved by the Owner. Assume responsibility for the discharge of water from the Site.

E. Remove the temporary construction and restore the Site in a manner acceptable to the Engineer and to match surrounding material at the conclusion of the Work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide materials that comply with Laws and Regulations.

PART 3 - EXECUTION

3.01 CONSTRUCTING, MAINTAINING, AND REMOVING TEMPORARY CONTROLS

A. Construct temporary controls in accordance with Laws and Regulations.

B. Maintain controls in accordance with regulatory requirements where applicable or in accordance with the requirements of the Contract Documents.

C. Remove temporary control when no longer required, but before the Project is complete. Correct any damage or pollution that occurs as the result of removing controls while they are still required.

END OF SECTION

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01 57 23 NORTH CAROLINA EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. The work shown in the Drawings and specified herein shall constitute the erosion control plan for this project in conformance with the Sedimentation Pollution Control Act of 1973 and subsequent regulations including those set forth in the most recent publication "Erosion and Sediment Control Planning and Design Manual" by the North Carolina Department of Environmental Quality (NCDEQ). The erosion control plan shown is based on the anticipated construction methods and sequencing, including the permanent and temporary measures as required. The Contractor shall provide at no additional cost to the Owner any other measures as may be required to prevent erosion because of construction activity at the site.

B. Temporary erosion control measures shall include, but not be limited to the following: water diversion/pump around, stilling basin, sediment fence, check dam, temporary sediment trap, rock doughnut inlet protection, coir fiber matting, temporary seeding, or any other methods or devices that are necessary to control or restrict erosion. Temporary erosion control measures may include work outside the right-of-way or construction limits with written approval of the Engineer. The Contractor shall be liable for all damages to public or private property caused by silting or slides originating in areas used by the Contractor.

1.02 CONTRACTOR RESPONSIBILITY

A. Furnish labor, materials, equipment, and incidentals necessary to provide the system of erosion and sedimentation control measures in accordance with the approved project Erosion and Sediment Control (E&SC) plans. Approved E&SC plans serve as the minimum requirements and additional measures and/or modifications may be required by the Engineer and shall be provided at no additional cost to the Owner. Any additional E&SC measures or modifications that the Contractor chooses to provide are acceptable as long as the minimum requirements are met and shall be provided at no additional cost to the Owner. Install and maintain erosion and sedimentation control devices for the entire Site as required to function properly and to satisfy the representatives of the NCDEQ, including Division of Energy, Mineral and Land Resources (DEMLR), the Engineer, and the Owner.

B. For guidance on furnishing, installing, maintaining, and removing erosion and sediment control measures, use the approved and sealed project plans, the latest editions of the North Carolina Erosion and Sediment Control Planning and Design Manual, Division 16 of the North Carolina Department of Transportation's Standard Specifications for Roads and Structures, and the following provisions for the duration of the construction period. Only remove the measures when approved to do so by the Engineer and local NCDEQ. Promptly follow all directions by the Engineer and local NCDEQ.

C. Contractor shall comply with the requirements of the Sedimentation Pollution Control Act of 1973 and amendments, including but not limited to the rules and regulations promulgated pursuant to the provisions of said act.

D. In addition to complying with the project E&SC Plan, Contractor shall adhere to the requirements of the North Carolina General NPDES Permit No. NCG010000 (Stormwater Discharge Permit for Construction Activities).

1. Contractor shall be responsible for inspecting each erosion and sedimentation control measure at least once every seven (7) days and within twenty-four (24) hours of a storm event greater than 0.5 inches of rain over a period of twenty-four (24) hours. Contractor shall also observe runoff at the project stormwater outfalls for characteristics listed in the permit (clarity, solids, oil sheen, etc.).

2. Contractor shall keep a record of these inspections on the appropriate Division of Water Quality forms provided with permit NCG010000 (or similar form) and shall make these records available for review at the site. The monitoring condition set forth are available in the Division of Water Quality permit NCG01000.

3. Section 402 of the Clean Water Act states that for all construction contracts where disturbed area is one (1) acre or greater, all erosion control devices and best management practices ("BMPs") be monitored for compliance. Documentation must be provided in accordance with Section 01 33 00 "Document Management." Submit copies of required notices and reports to the Engineer as Product Data in accordance with Section 01 33 03 "Product Data."

4. Contractor shall supply, erect, secure and maintain an appropriate rain gauge for the necessary monitoring of rainfall amounts on the construction sites in this contract. The rain gauge shall be properly erected and secured. This gauge will be the full responsibility of the contractor and if lost or stolen is to be promptly replaced.

E. Failure by the Contractor to comply with the standards or failure to perform any required erosion control measure may result in notification by the Engineer, Owner, or NCDEQ to the Contractor directing remedial action to bring controls into compliance. Remedial action must begin by Contractor within twenty-four (24) hours of receipt of such notice to prevent the Engineer from ordering all work on the job stop and proceeding with having the work performed by others. Any work performed by others will result in no payment or pay item adjustments to the Contractor.

F. Verify required permits prior to beginning any construction or land-disturbing activities.

G. Surfaces on the construction site must be stabilized within the time-limits herein, and sediment must be retained on the site.

H. Any modification to the approved Erosion and Sediment Control Plan must be approved by the Engineer and local NCDEQ before it is implemented.

I. Erosion control measures must be allowed to dewater naturally before removal of the device. It is prohibited to de-water erosion control devices containing sediment-laden water by directly draining to streams.

J. Remove temporary E&SC measures only as they are no longer needed and only with approval of the Engineer and local NCDEQ. Permanent E&SC measures shall be in place prior to the removal of the temporary control measures.

K. To the fullest extent permitted by law, the Contractor(s) shall indemnify and hold harmless the City of Fayetteville and agents, consultants and employees of the City of Fayetteville, from and against all claims, damages, civil penalties, losses and expenses, including but not

limited to attorneys' fees, arising out of or resulting from the performance of work or failure of performance of work, provided that any such claim, damage, civil penalty, loss or expense is attributable to a violation of the Sedimentation Pollution Control Act of 1973. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or persons described in this Contract.

1.03 QUALITY ASSURANCE

A. Any land-disturbing activity performed by the Contractor(s) in connection with the project shall comply with all erosion control measures set forth in the contract documents and any additional measures which may be required in order to ensure that the project is in full compliance with the Sedimentation Pollution Control Act of 1973.

B. Install all features in accordance with the project E&SC plans and with guidance from the NC Erosion and Sedimentation Control Planning and Design Manual standards and other features as required by the Engineer or the Owner.

C. Protect waterways and wetlands from materials used during preparation and installation of sediment and erosion control features, including sediment, fill, admixtures, oil and grease, loose debris, and chemicals.

D. Periodically clean out and dispose of all sediment and other pollutants as necessary to maintain adequate treatment capacity of each pollution control feature. Do not damage structure or device during cleaning operations.

E. If the sediment control device is damaged, it shall be repaired or replaced immediately.

F. Clean out and properly dispose of all sediment and other stormwater pollutants at the time of completion of the Work.

G. Borrow, Stockpile, and Disposal Areas

1. Obtain and pay for erosion control permit for borrow, stockpile, and disposal areas as required by Engineer and local NCDEQ.

2. Install and maintain erosion control devices in accordance with Contractor’s approved plan.

1.04 SUBMITTALS

A. Materials and facilities for temporary erosion control measures shall have been approved by the Engineer before being used. Any facilities or materials different from those shown on the drawings or specified herein shall be submitted to the Engineer for approval.

B. Product Data: Submit manufacturer's technical data and material samples for each type of product listed including but not limited to sediment fence fabrics, ditch liner, filter cloth, matting for sediment fence fabrics, and other manufactured materials as requested.

C. Material Certificates: Submit material certificates signed by manufacturer and Contractor certifying specification compliance for posts, woven wire, filter stone, riprap, and other products as requested.

D. Drawings: Submit scaled drawings of changes in facilities shown on drawings and additional facilities proposed by Contractor or Engineer.

1.02 CONSTRUCTION SEQUENCE

A. Comply with construction sequence as shown on the Drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Temporary Silt Fences: Use posts and metal fence fabric as detailed in the plans and cover with filter cloth as indicated to furnish an effective filtering medium to separate soil sediment from the storm water runoff. The filter cloth shall be permanently attached to the fence to prevent displacement and the bottom of the filter cloth shall be buried to prevent under-washing in heavy rainstorms.

B. Special Sediment Control Fence: Use posts, hardware cloth, and sediment control stone as detailed in the plans. Place stone at the base of the hardware cloth to reduce water flow and retain sediment as detailed in the plans.

C. Temporary Swales and Ditches: Temporary swales and ditches shall be graded to the profiles and sections indicated in the locations as directed. Slope all swales and ditches to drain to the basins and/or filters as indicated. Sides/berm should be stabilized with seed and mulch or fabric as detailed in the plans.

D. Temporary Slope Drain: Berms to channel runoff into the slope drain should be graded to the profiles and sections indicated in the locations as directed. Use a flexible pipe from inlet to outlet secured by stakes. Outlet dissipater pad should be rip rap or silt basin as detailed in the plans.

E. Riser Basin: A basin to capture runoff from a large project area with a riser pipe to drain the basin and an overflow spillway to control excess runoff.

F. Silt Basin: A pit or basin to collect sediment flowing through a drainageway in conjunction with rock silt checks or drainage inlet as detailed in the plans.

G. Filters: Gravel filters as detailed on the drawings, consisting of piles of sediment control stone placed around permanent and temporary drainage structures as detailed in the plans.

H. Temporary Rock Silt Checks: A small dam with a weir outlet to trap sediment in the naturally formed storage area. Use Class B stone lined or unlined with sediment control stone as detailed in the plans.

I. Temporary Rock Sediment Dams: A larger dam structure with a weir outlet prior to the point where runoff leaves the project site. Use rip rap and sediment control stone as detailed in the plans.

J. Rock Pipe Inlet Sediment Traps: A horseshoe shaped device to prevent sediment from entering a pipe structure. Use rip rap and sediment control stone as detailed in the plans.

K. Skimmer Basin: A temporary basin with a trapezoidal spillway lined with filter fabric and utilizing a floating skimmer. Use a Faircloth Skimmer at the outlet, an emergency spillway with filter fabric, and coir fiber baffles as detained in the plans.

L. Stilling Basin: An earthen basin used to settle sediment from water that is being pumped. Use coir fiber baffles to slow down water and allow sediment to settle as detailed in the plans.

M. Rock Inlet Sediment Trap, Types A and B: A circular stone dam to protect an inlet from a moderate to large drainage area. Use Class A or B stone lined with sediment control stone as detailed in the plans.

N. Rock Inlet Sediment Trap, Type C: Use posts, hardware cloth, and stone of type and class as detailed on the drawings to protect a drop inlet from channel or limited flow. Stone, per class specified, shall be placed around the outside perimeter of the inlet structure with approximately 2:1 side slopes and plate the upstream side with #57 stone or others as specified in the plans.

O. Coir Fiber Baffle: A barrier to reduce the velocity of water in basins so that the sediment in the water settles before flowing off-site as detailed in the plans.

P. Gravel Construction Entrance: A stone pad where vehicles enter and exit a construction site or work area to clean vehicle tires and prevent sediment from leaving the site. Use Class A stone or other class in the dimensions detailed in the plans.

Q. Special Stilling Basin: A permeable fabric bag to trap sediment-laden water and serve as a portable stilling basin as detailed in the plans.

R. Wattle: A tubular device consisting of excelsior, coir fibers, or straw encased in natural or synthetic netting as detailed in the plans. Use in temporary and permanent ditches to reduce runoff velocity.

S. Matting: Provide excelsior matting or straw matting as directed. Furnish a material certification certifying that the matting meets this article. Other acceptable material manufactured especially for erosion control may be used when approved by the Engineer in writing before being used. Matting for erosion control shall not be dyed, bleached or otherwise treated in a manner that will result in toxicity to vegetation.

1. Excelsior matting shall consist of a machine produced mat of curled wood excelsior at least 47" in width and weigh 0.975 lb/sy with a tolerance of ± 10%. At least 80% of the individual excelsior fibers shall be 6" or more in length. Evenly distribute the excelsior fibers over the entire area of the blanket. Cover one side of the excelsior matting with an extruded plastic mesh. The mesh size for the plastic mesh shall be no more than 1" x 1".

2. Straw matting shall consist of a machine produced mat of 100% grain straw. The straw matting shall have a width of at least 48" and no more than 90" and weighing at least 0.50 lb/sy and no more than 0.75 lb/sy. Evenly distribute the straw over the entire area of the blanket. Cover one side of the blanket with photodegradable netting with a maximum mesh (netting) size of 0.75" x 0.75" sewn together with a degradable thread. The grain straw shall contain no weed seeds. Package each roll separately.

3. Wire Staples shall be machine made of No. 11 gauge new steel wire formed into a U-shape. The size when formed shall be not less than 6" in length with a throat of not less than 1" in width.

2.02 WATER DIVERSION/PUMP AROUND

A. The diversion pump(s)/diversion shall be adequate to redirect runoff around construction activities. Sediment pumps shall be used to pump water that has infiltrated into the construction area while construction activities are on-going. Special stilling basins shall be used to filter sediment-laden water prior to returning to the project below construction activities. Sediment pumps shall be sized adequately to remove water from the construction area. Pumping/Diverting shall be maintained around the area of the project being constructed such that water does not overtop the excavated basins at any time.

B. It shall be the responsibility of the contractor to provide all pumps, hose, materials, apparatus, fuel, pipe, and maintenance required to maintain pumping/diversion activities required during construction for the duration of the project.

PART 3 - EXECUTION

3.01 PREPARATION

A. Have all materials necessary to complete the intended erosion control measure installation and maintenance before disturbing the land.

3.02 INSTALLATION

A. Install erosion control devices, which shall be in place and operational prior to other land disturbing activity.

B. After installing erosion control devices as indicated on the Drawings, verify that reasonable measures have been taken to prevent the sedimentation of nearby watercourses, existing and new facilities, and adjacent property.

C. Should Contractor or Engineer believe that additional measures are necessary to adequately prevent erosion, immediately notify Engineer, Contractor, and Owner. If rain is predicted before the said parties can be notified, take measures as necessary to prevent siltation of nearby water courses.

D. After installing erosion control devices, request an inspection by the local agency having jurisdiction and the Engineer.

E. Incorporate permanent erosion control work into the project at the earliest practicable time. Coordinate temporary erosion control measures with permanent erosion control measures and other work on the project to assure effective and continuous erosion control throughout the construction and post construction period.

F. Maintain erosion control devices during construction until the disturbed areas are stabilized and the agency having jurisdiction and the Engineer have approved the removal of the erosion control devices.

G. Refer to NCDEQ guidelines for installation of additional features not included below.

H. Temporary Silt Fences: The filter cloth shall be permanently attached to the fence to prevent displacement and the bottom of the filter cloth shall be buried to prevent under-washing in heavy rainstorms. Eighteen inches of overlap is required when splicing. Do not install across a stream, ditch, waterway, or an area of concentrated flow.

I. Special Sediment Control Fence: The hardware cloth should be permanently attached to the fence and folded along the ground surface with sediment control stone placed on top at a minimum depth of one (1) foot.

J. Temporary Swales and Ditches: The ditch should be a minimum depth of one (1) foot to six (6) feet with 2:1 side slopes. Sides/berm should be stabilized with seed and mulch or fabric as directed. Maintain structure in place until the installation of final drainageways.

K. Temporary Slope Drain: The flexible pipe should be a minimum of twelve (12) inches in diameter and staked into position every ten (10) feet or less.

L. Riser Basin: Construct and install as directed by the drawings. Do not use in a perennial stream. Ensure overflow spillway is armored with rip rap as directed, does not exceed the specified elevation, and is the lowest point.

M. Silt Basin: Construct basin such that its length is equal to twice its width, with a depth of a minimum of two (2) feet. Clean basin regularly. Maintain until vegetation becomes established.

N. Temporary Rock Silt Checks: Construct such that each side of the check is of the same elevation. Install a weir at the center and extend approximately 2/3 of the channel width. Space so that the top of a lower dam is the same elevation as the toe elevation of the upper dam.

O. Temporary Rock Sediment Dams: Apron length should be approximately equal to the height of the dam with a minimum armored slope of 2:1. Do not place in live streams.

P. Rock Pipe Inlet Sediment Traps: Dam must be a minimum of eighteen (18) inches high.

Q. Skimmer Basin: Limit dam height to five (5) feet and ensure that emergency spillway is both armored and located at the lowest elevation of the dam. Install three rows of coir fiber baffles, or as detailed by the plans.

R. Stilling Basin: Do not pump sediment-laden water directly into a stream. Basin length should be a minimum of two times the width of the basin, with three coir fiber baffles diving the basin length into quarters, or as detailed by the plans.

S. Rock Inlet Sediment Trap, Types A and B: For Type A, use Class B stone with a minimum dam height of two (2) feet. For Type B, use a Class A stone with a minimum dam height of eighteen (18) inches.

T. Rock Inlet Sediment Trap, Type C: The hardware cloth should be permanently attached to the fence and folded along the ground surface with sediment control stone placed on top at a minimum depth of one (1) foot.

U. Coir Fiber Baffle: Use coir fiber mat attached permanently to steel T-posts. Install at spacing and length as detailed in the plans.

V. Gravel Construction Entrance: Minimum depth is eight (8) inches and minimum dimensions are fifty (50) feet long by twelve (12) feet wide. ABC may be used for part of the pad with Engineer approval.

W. Special Stilling Basin: Minimum dimensions of the bag are ten (10) feet by fifteen (15) feet with a maximum inlet spout of eight (8) inches. Place on a rock pad lined with filter fabric and eight (8) inches of sediment control stone, or as detailed in the plans.

X. Wattle: Minimum diameter wattle should be twelve (12) inches. Install using stakes on either side, but not through the middle, of the wattle. Place on top of erosion control matting or as detailed in the plans.

Y. Matting: Install matting with anchors at corners.

3.03 WATER DIVERSION/PUMP AROUND

A. Furnish, install, maintain, operate, and remove all pump systems and diversions used on this project. Pump-arounds/diversions shall be installed according to the Drawings and Project Manual. Multiple methods may be allowed. The pump-around system/diversion shall provide a passageway for any accumulated runoff from the work site. If the Engineer deems that the pumping/diverting method selected by the Contractor is inadequate for any reason, the Engineer may direct the use of another pumping/diverting method at no cost to the Owner. The Contractor shall install pump-around systems and diversions in locations indicated on the Drawings and in the Project Manual. Sediment pumps shall be used as required and as directed by the Engineer to remove water from work areas while retaining sediment prior to discharging back into the project.

B. The number of setups for diversion pumping/diversions may be increased, decreased, or eliminated entirely at the direction of the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

C. Install a special stilling basin as specified in the Drawings. Pump/divert water around the work site. If the water is turbid or exposed to bare soil, pump through a special stilling basin. Follow the detail for the pump-around/pipe diversion. Once the work is complete in the construction area, impervious dikes, pumping systems, and/or diversions shall be removed or relocated.

3.04 TEMPORARY SEEDING

A. The Contractor is responsible for establishing and maintaining vegetation on all disturbed areas. Furnishing, place, and incorporate soil amendments, fertilizer, and seed; compacting the seedbed; furnishing, placing, and securing mulch; and performing other operations necessary for the temporary establishment of vegetation. For all requirements, see Technical Specification Sections and Drawings Details.

B. All applications of seed, whether temporary, permanent, or a combination, will include the application of fertilizer, amendments, and mulch according to the recommended rates.

C. Fertilizer applied by means of a hydro-seeder shall be a liquid.

3.05 MAINTENANCE

Maintain E&SC measures in full working order at all times during construction. This must include any necessary repair or replacement of items which have become damaged or

ineffective. Remove sediment and other pollutants which accumulate in the measure as necessary to maintain the intended design efficiency.

A. Roadways, and parking areas shall be stoned immediately upon completion of grading.

B. Clean sediment transported onto roadways within the plant site and public roads at the end of each day. Sediment shall be removed by shoveling or sweeping and be transported to a controlled disposal area. Street washing shall be allowed after sediment is removed in this manner.

C. Dispose properly of trash, debris, and other pollutants.

D. Place sediment material in approved earth spoil areas or return the sediment material to the area from which it eroded.

E. Maintain E&SC measures until

   1. construction is complete for the area protected,

   2. the Site achieves final stabilization, and

   3. approval to remove has been given by the Engineer and local NCDEQ.

F. Matting must be inspected for bare spots caused by weather related events. Missing or loosened matting must be replaced or re-anchored. Also check for excess sediment deposited from runoff. Remove sediment and/or replace blanket as necessary. In addition, determine the source of excess sediment and implement appropriate Best Management Practices to control the erosion.

G. Silt fences must be inspected for buildup of excess sediment, undercutting, sags, and other failures. Sediment should be removed when it reaches approximately one-half the height of the fence. If the fabric becomes damaged or clogged, it must be repaired or replaced as necessary.

H. Inlet protection must be inspected regularly (at least as often as required by the General Permit). Floatable debris and other trash caught by the inlet protection should be removed after each storm event. Sediment should also be removed from curb inlet protection after each storm event because of the limited storage area associated with curb inlets. Sediment collected at inlet protection should be removed before it reaches half the height of the protection device. Sediment should be removed from inlets with excavated impoundment protection before the volume of the excavation is reduced by 50 percent. In addition, the weep holes should be checked and kept clear of blockage. Concrete blocks, 2-inch by 4-inch boards, stakes, and other materials used to construct inlet protection should be checked for damaged and repaired or replaced if damaged. When filter fabric or organic filter tubes are used, they should be cleaned or replaced when the material becomes clogged. For systems using filter stone, when the filter stone becomes clogged with sediment, the stones must be pulled away from the inlet and cleaned or replaced. Because of the potential for inlet protection to divert runoff or cause localized flooding, remove inlet protection as soon as the drainage area contributing runoff to the inlet is stabilized. Ensure that all inlet protection devices are removed at the end of the construction.

I. The stone outlet sediment trap should be inspected regularly (at least as often as required by the General Permit) to check for clogging of the void spaces between stones. If the filter stone appears to be clogged, such that the basin will not completely drain, then the filter

stone will require maintenance. If the filter stone is not completely clogged it may be raked with a garden rake to allow the water to release from the basin. If filter stone is completely clogged with mud and sediment, then the filter stone will have to be removed and replaced. Failure to keep the filter stone material properly maintained will lead to clogging of the stone riprap embankment. When this occurs, the entire stone rip-rap structure will need to be replaced. If the aggregate appears to be silted in such that efficiency is diminished, the stone should be replaced. Trash and debris should be removed from the trap after each storm event to prevent it from plugging the rock. Deposited sediment must be removed before the storage capacity is decreased by one-third, or sediment has reached a depth of 1 foot, whichever is less. The removed sediment must be stockpiled or redistributed in areas that are protected with erosion and sediment controls.

J. Sediment basins: Sediment must be removed and the basin must be re-graded to its original dimensions when the sediment storage capacity of the impoundment has been reduced by 20 percent. The removed sediment may be stockpiled or redistributed on-site in areas that are protected by erosion and sediment controls. Inspect temporary stabilization of the embankment and graded basin and the velocity dissipaters at the outlet and spillway for signs of erosion. Repair any eroded areas that are found. Install additional erosion controls if erosion is frequently evident.

K. Check dams: Silt must be removed when it reaches approximately one-third the height of the dam or 12 inches, whichever is less. Inspectors should monitor the edges of the dam where it meets the sides of the drainage ditch, swale, or channel for evidence of erosion due to bypass or high flows. Eroded areas must be repaired. If erosion continues to be a problem, modifications to the check dam or additional controls are needed. Care must be used when taking out rock check dams in order to remove as much rock as possible. Loose rock can create an extreme hazard during mowing operations once the area has been stabilized.

L. Stabilized construction entrances/exits: The stabilized construction exit must be maintained in a condition that prevents tracking or flow of sediment onto paved surfaces. Periodic re-grading and top dressing with additional stone must be done to keep the efficiency of the exit from diminishing. The rock must be re-graded when ruts appear. Additional rock must be added when soil is showing through the rock surface. Additional controls are needed if inspections reveal a properly installed and maintained exit but tracking of soil outside the construction area is still evident. Additional controls may be daily sweeping of all soil spilled, dropped, or tracked onto public rights-of-way or the installation of a wheel cleaning system.

END OF SECTION

01 60 00 PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide products for this Project that comply with the requirements of this Section. Specific requirements of the detailed equipment specifications govern in the case of a conflict with the requirements of this Section.

B. Comply with applicable specifications and standards.

1.02 DOCUMENTATION

A. Provide documents in accordance with the Contract Documents.

1.03 QUALITY ASSURANCE

A. Design Criteria:

1. Provide products designed for structural stability and operational capability.

2. Provide members designed to withstand all loads imposed by installation, erection, and operation of the product without deformation, failure, or adversely affecting the operational requirements of the product. Size and strength of materials for structural members are specified as minimums only.

3. Design mechanical and electrical components for all loads, currents, stresses, and wear imposed by startup and normal operations of the equipment without deformation, failure, or adversely affecting the operation of the unit. Mechanical and electrical components specified for equipment are specified as the minimum acceptable for the equipment.

B. Coordination:

1. Provide coordination of the entire Project, including verification that structures, piping, and equipment components to be furnished and installed for this Project are compatible.

2. Determine that the equipment furnished for this Project is compatible with the requirements of the Contract Documents and with the equipment and materials furnished by others.

3. Provide electrical components for equipment that comply with all provisions of the Contract Documents.

4. Apply protective coatings and paints to equipment in the shop that are fully compatible with the final coatings to be field applied in accordance with the Contract Documents.

C. Adapting Substitute Products:

1. The Drawings and Specifications are prepared for the specified products. Make modifications to incorporate the products into the Project if a substitution is requested

for a product is and approved in accordance with Section 01 26 00 “Change Management.”

2. Do not provide a product with a physical size that exceeds the available space. Consideration may be given to the acceptance of these products or equipment if the Contractor assumes all costs necessary to incorporate the item and the Engineer approves such revisions.

3. Coordinate electrical requirements for the products to be installed in the Project, including revisions in electrical equipment components wiring and other elements necessary to incorporate the component.

1.04 STANDARDS

A. The applicable industry standards referenced in the Specifications apply as if written here in their entirety.

B. Provide equipment manufactured using structural and miscellaneous fabricated steel conforming to the standards of the American Institute of Steel Construction, except where indicated otherwise.

1.05 WARRANTIES AND GUARANTEES

A. Normal warranty provisions are as stated in the General Conditions.

B. Correct Defective Work under the provisions of the General Conditions.

C. Provide warranties and guarantees for periods as defined in the Contract Documents. Individual Sections of the Specifications may have more stringent warranty requirements than stated in the General Conditions. The most stringent warranty will apply in the event of conflicts within the Contract Documents.

D. The Contract Documents may require special warranties that guarantee performance at a specified capacity, power consumption, efficiency, or other operating parameter. Correct defects that prevent products from meeting the specified performance parameters. The requirements of the special warranty that guarantee performance will be satisfied when the specified performance parameters have been met for a period of 1 calendar year of operation, unless Owner elects to accept Defective Work under the provisions of the General Conditions.

E. The Contract Documents may require special warranties for periods extending beyond the one-year correction period specified in the General Conditions. The full warranty provisions and requirements for correction of Defective Work stated in the General Conditions apply throughout the extended warranty period.

F. Provide a warranty bond to provide the same protection as the Contractor's performance bond for extended special warranties. The warranty bond will become effective on the day the performance bond expires which is 1 year after the date of final payment per the General Conditions. The warranty bond will remain in effect until the extended warranty period has expired.

G. In the event that products are repaired, modified, or replaced under the warranty bond, then the warranty period will continue on the date of completion of these repairs for a period of 6 months or until the end of the original warranty period, whichever is later. In no

event will the warranty period extend more than 6 months beyond the end of the original warranty period.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide products according to normally accepted engineering and shop practices, except where a higher standard of quality is required by the Contract Documents.

B. Manufacture like parts of duplicate units to standard sizes and gages that are interchangeable.

C. Two or more items of the same kind are to be identical and made by the same Supplier.

D. Provide products suitable for the intended service.

E. Adhere to the equipment capacities, sizes, and dimensions indicated in the Contract Documents.

F. Do not use products for any purpose other than that for which they were designed.

G. Provide new products. Do not provide equipment that has been in service at any time prior to delivery except for testing in accordance with the Contract Documents.

H. Provide materials suitable for service conditions.

I. Provide iron castings that are tough, close grained gray iron free from blowholes, flaws, or excessive shrinkage and that conform to ASTM A48.

J. Design structural members for shock or vibratory loads.

K. Provide steel that is at least 1/4 inch thick for all elements that will be submerged or subject to splashing all or part of the time during normal operation of the equipment. Chamfer or grind all edges to eliminate sharp exposed edges.

2.02 EQUIPMENT APPURTENANCES

A. Provide a safety guard covering all sides on belt or chain drives, fan blades, couplings, and other moving or rotating parts:

1. Fabricate safety guards from 16 US gauge or heavier galvanized or aluminum clad sheet steel or 1/2-inch mesh galvanized expanded metal;

2. Design guards for easy installation and removal;

3. Provide galvanized supports and accessories for each guard;

4. Provide stainless steel bolts and hardware; and

5. Provide safety guards designed to prevent the entrance of rain and dripping water in outdoor locations.

2.03 ANCHOR BOLTS

A. Provide suitable anchor bolts for each product.

B. Provide anchor bolts with templates or setting drawings in time to permit casting the anchor bolts in the concrete when concrete is placed.

C. Provide two nuts for each bolt.

D. Provide anchor bolts for products mounted on baseplates that are long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete. Bolts must be long enough to provide full nut engagement and leave three threads exposed. Housekeeping pads are not structural concrete.

E. Provide stainless steel anchor bolts, nuts, and washers.

2.04 SPECIAL TOOLS AND ACCESSORIES

A. Furnish tools, instruments, lifting and handling devices, and accessories necessary for proper maintenance and adjustment that are available only from the manufacturer or are not commonly available.

2.05 EQUIPMENT IDENTIFICATION PLAQUES

A. Provide a plaque for each piece of equipment in accordance with Section 40 05 53 “Identification for Process Piping and Equipment.”

2.06 LUBRICATION SYSTEMS FOR EQUIPMENT

A. Provide equipment lubricated by systems which:

1. Require attention no more frequently than weekly during continuous operation.

2. Do not require attention during startup or shut down.

3. Do not waste lubricants.

B. Provide lubricants to fill lubricant reservoirs and to replace lubricant consumed during testing, startup, and operation prior to acceptance of equipment by the Owner.

2.07 INSULATION OF PIPING

A. Insulate all piping on or related to equipment as required to prevent freezing under any condition. Insulate piping per the manufacturer’s written instruction or per Section 23 07 19 “HVAC Piping Insulation” whichever is more stringent.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install equipment including equipment pre-selected or furnished by the Owner. Assume responsibility for proper installation, startup, and making the necessary adjustments so that the equipment is placed in proper operating condition per Section 01 75 00 “Starting and Adjusting.”

3.02 LUBRICATION

A. Lubricate all products provided or installed for this Project, including products furnished by the Owner, per the manufacturer's written recommendations until the product is accepted by the Owner.

END OF SECTION

01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Comply with requirements of the General Conditions and specified administrative procedures in closing out the Contract.

1.02 DOCUMENTATION

A. Submit affidavits and releases on forms provided by the Engineer.

1.03 SUBSTANTIAL COMPLETION

A. The following requirements must be met for the Project or a designated portion of the Work to be Substantially Complete per the General Conditions:

1. Work must be fully functional and able to operate in accordance with the Contract Documents without special or extraordinary efforts on the part of the Owner.

B. Conduct inspections with superintendent, Subcontractors, and Suppliers for the Work or a designated portion of the Work prior to calling for a Substantial Completion inspection by the Owner. Create a list of deficiencies in the Work that must be completed for the Project to qualify for Substantial Completion. Review the list with the Engineer or the designated member of the Owner. The Engineer or the designated member of the Owner may assist the Contractor with this effort; however, it is the Contractor's responsibility to create and manage this list of deficiencies until corrections are made.

C. Correct the identified deficiencies prior to calling for a Substantial Completion inspection.

D. Notify the Engineer that the Work or a designated portion of the Work is Substantially Complete per the General Conditions. Include a list of the items remaining to be completed or corrected before the Project will be considered for Final Completion.

E. Owner will visit the Site to observe the Work within a reasonable time after notification is received to determine the status of the Project.

F. Engineer will notify the Contractor that the Work is either Substantially Complete or that additional Work must be performed before the Project will be considered Substantially Complete.

1. Engineer will notify the Contractor of items that must be completed before the Project will be considered Substantially Complete.

2. Correct the noted deficiencies in the Work.

3. Notify the Engineer when the items of Work in the Engineer's notice have been completed.

4. Owner will revisit the Site and repeat the process.

5. Engineer will issue a Certificate of Substantial Completion to the Contractor when the Owner considers the Project to be Substantially Complete. The certificate will include a tentative list of items to be corrected before Final Payment will be recommended.

6. Review the list and notify the Engineer of any objections to items on the list within 10 days after receiving the Certificate of Substantial Completion.

1.04 TRANSFER OF UTILITIES

A. Transfer utilities to the Owner when the Certificate of Substantial Completion has been issued.

B. Submit final meter readings for utilities and similar data as of the date the Owner occupied the Work.

1.05 CLOSEOUT REQUIREMENTS

A. Provide the following before Final Completion:

1. Record Documents per Section 01 31 13 “Project Coordination”;
2. Keys and keying schedule;
3. Warranties, bonds, and service agreements;
4. Equipment Installation Reports;
5. Shop Drawings, Product Data, operation and maintenance manuals, and other documentation required by the Contract Documents;
6. Specified spare parts and special tools;
7. Certificates of occupancy, operating certificates, or other similar releases required to allow the Owner unrestricted use of the Work and access to services and utilities;
8. Evidence of continuing insurance and bond coverage as required by the Contract Documents; and
9. Final videos and photographs per Section 01 33 06 “Graphic Documentation.”

1.06 WARRANTIES, BONDS, AND SERVICES AGREEMENTS

A. Provide warranties, bonds, and service agreements required by Section 01 33 00 “Document Management” or by the individual Sections of the Specifications.

B. The date for the start of warranties, bonds, and service agreements is established per the General Conditions.

C. Compile warranties, bonds, and service agreements and review these documents for compliance with the Contract Documents.

1. Each document is to be signed by the respective Supplier or Subcontractor.
2. Each document is to include:
    a. The product or Work item description;
    b. The firm name, with the name of the principal, address, and telephone number;
    c. Scope of warranty, bond, or services agreement;
    d. Date, duration, and expiration date for each warranty bond and service agreement;

e. Procedures to be followed in the event of a failure; and

f. Specific instances that might invalidate the warranty or bond.

D. Submit digital copies of the documents to the Engineer for review.

E. Submit warranties, bonds, and services agreements within 10 days after equipment or components placed in service.

1.07 FINAL COMPLETION

A. Conduct inspections with Superintendent, Subcontractors, and Suppliers prior to calling for a Final Completion inspection by the Owner. Create a list of deficiencies in the Work that must be completed for the Project to qualify for the Final Completion inspection. Review the list with the Engineer or the designated member of the Owner. The Engineer or the designated member of the Owner may assist the Contractor with this effort; however, it is the Contractor's responsibility to create and manage this list of deficiencies until corrections are made.

B. Identify, list, and correct deficiencies prior to calling for a Final Completion inspection. The Project at the call for Final Completion represents the Contractor's interpretation of a project completed in conformance with the Contract Documents and reflects the Contractor's representation of a quality project meeting the Owner's expectations.

C. Notify the Engineer when:

1. Work has been completed and complies with the Contract Documents;

2. Equipment and systems have been tested per the Contract Documents and are fully operational;

3. Final operation and maintenance manuals have been provided to the Owner and all operator training has been completed;

4. Specified spare parts and special tools have been provided;

5. Work is complete and ready for final inspection;

6. Final documentation for all outstanding Modifications and Claims (other than those listed on the Certificate of Final Completion) have been processed and are ready for incorporation into the final Application for Payment; and

7. Closeout requirements in Paragraph **[1.05]** have been completed.

D. Owner will visit the Site to determine if the Project is complete and ready for final payment within a reasonable time after the notice is received.

E. Engineer will notify the Contractor that the Project is complete or will notify the Contractor that Work is Defective.

F. Take immediate steps to correct Defective Work. Notify the Engineer when Defective Work has corrected. Owner will visit the Site to determine if the Project is complete and the Work is acceptable. Engineer will issue a Certificate of Final Completion to the Contractor when the Project is complete or will notify the Contractor that Work is Defective.

G. Submit the request for final payment with closeout documentation described in Paragraph **[1.06]** if notified that the Project is complete and the Work is acceptable.

1.08 REINSPECTION FEES

A. Owner may impose a set-off against the Application for Payment in accordance with the General Conditions to compensate the Owner for additional visits to the Project if additional Work is required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 74 23 FINAL CLEANING

PART 1 - GENERAL

1.01 SUMMARY

A. Perform a thorough cleaning of the Site, buildings, or other structures prior to Owner occupancy of the buildings, and prior to Final Completion. Leave the Project clean and ready for occupancy.

1.02 DOCUMENTATION

A. Provide data for maintenance per Section 01 33 04 “Operation and Maintenance Data.”

1.03 QUALITY CONTROL

A. Use experienced workmen or professional cleaners for final cleaning.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Furnish the labor and products needed for cleaning and finishing as recommended by the manufacturer of the surface material being cleaned.

B. Use cleaning products only on the surfaces recommended by the Supplier.

C. Use only those cleaning products which will not create hazards to health or property and which will not damage surfaces.

PART 3 - EXECUTION

3.01 FINAL CLEANING

A. Thoroughly clean the entire Site and make ready for occupancy.

1. Remove construction debris, boxes, and trash from the Site.
2. Remove construction storage sheds and field offices.
3. Restore grade to match surrounding condition and remove excess dirt.
4. Sweep all drives and parking lots clean of dirt and debris. Use water trucks or hose down paved site to like new appearance.

B. Clean floors and inspect for damage.

1. Remove oil, grease, paint drippings, and other contaminants from floors, then mop repeatedly until thoroughly clean. Replace damaged flooring.
2. Clean resilient flooring with an approved cleaner and provide one coat of liquid floor polish as recommended by the flooring manufacturer. Polish to a buffed appearance with powered floor buffer.
3. Vacuum all carpets with powered floor sweeper to remove dirt and dust. Remove glue or other substances from nap of carpet.

C. Clean and polish inside and outside glass surfaces. Wash with window cleaner and water, apply a coat of high quality glass polish, and wipe clean. Do not scratch or otherwise mar glass surfaces.

D. Clean wall surfaces to remove dirt or scuff marks. Remove excess adhesive along top edges of wall base. Remove adhesive from surfaces of vinyl wall coverings.

E. Align ceiling tile to fit properly in grid and replace cracked or damaged tile. Remove smear marks and other dirt from tile and clean surface of grid system.

F. Spot paint nicks and other damage. Repaint the wall from inside corner to inside corner if spot-painting does not blend into the existing color and texture of the surrounding surfaces. Touch up damaged surfaces on factory finished equipment using special paint furnished by the manufacturer.

G. Clean plumbing fixtures, valves, and trim. Clean toilet seats and covers. Remove labels and adhesive from fixtures. Remove floor drains and clean baskets or buckets. Polish strainers and exposed chrome or brass.

H. Remove dirt, oil, grease, dust, and other contaminants from floors, equipment, and apparatus in mechanical and electrical rooms.

I. Clean and polish ceramic tile floors and wall surfaces to remove mildew or other stains. Tuck point defective joints.

J. Inspect exterior painted surfaces. Spot paint any damaged surfaces.

K. Clean permanent filters and replace disposable filters on heating, ventilating, and air conditioning systems. Clean ducts, blowers, and coils if units were operated without filters during construction.

L. Clean roof areas of debris; flush roof drainage systems with water until clear.

M. Broom clean exterior paved surfaces and rake clean other surfaces of the grounds.

N. Clean and polish all electrical equipment and exposed conduits. Remove paint overspray. Provide a blemish free appearance on all exposed equipment and conduits.

END OF SECTION

Tryon Drive Drainage Improvements

APPENDIX A

City of Fayetteville Public Services

Technical Specifications



FAYETTEVILLE NC
PUBLIC SERVICES



TECHNICAL SPECIFICATIONS

MAY 2022

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SECTION 00127

UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Delineation of measurement and payment criteria applicable to Work performed under Contract by the unit price payment method.

1.02 FIELD MEASUREMENT

A. Take measurements and compute quantities for submittal of the monthly pay request unless specified otherwise in the measurement paragraphs as indicated in this Section.

1.03 CHANGE IN QUANTITIES

A. Increase in the quantity of a bid item up to 100% may be authorized by the Engineer above what is indicated in the Bid Form, after 100% increase the contract unit price will be negotiated only by a Change Order as required by the Contract Documents. Revised contract unit prices pertaining to quantity increases will be applicable only to that portion of the overrun in excess to the percentages stated above.

B. A final adjusting Change Order shall be made for adjustment of the actual quantities installed prior to submittal of the final pay request.

1.04 GENERAL

A. Items with a "(X)" in the title of the following bid items represents the size or depth as indicated on the Bid Form.

B. Method of measurement for the individual Bid Items shall be as specified below.

C. Payment for each item shall be in accordance with the Contract Unit Price times the number of units installed in accordance with the Contract Documents.

D. Work for each bid item shall include, but not be limited to, the work listed below and the labor, materials, equipment, and services required and reasonably implied by the Contract Documents for a complete installation.

E. Administrative cost including, but not limited to, video and photographic records, coordination of construction activities (including but not limited to updating master construction schedule, providing weekly tasks schedule, coordination with owner, engineer, utility providers, permitting agencies, etc.), as-built documentation, and office administration for the Project construction shall be included in the individual unit price items. If a Contractor elects to use a trailer, it is at no cost to the Owner.

1.05 MOBILIZATION – LUMP SUM

A. Measurement shall not be made for this item.

B. Work shall include administrative cost including, but not limited to, mobilization, bonds, insurance, project signage, shop drawing submittal and pre-construction video, if required. General office administration for the Project construction shall be included in the individual unit price items.

C. Mobilization will be paid as contract lump sum price. Partial payments for Mobilization will be made with the first and second partial pay estimates paid on the contract and will be made at the rate of 50% lump sum price on each of these partial pay estimates, provided the

amount bid for Mobilization does not exceed 5% of the total amount bid for the contract. Where the amount bid for Mobilization exceeds 5% of the total amount bid for the contract, 2.5% of the total amount bid will be paid on each of the first 2 partial pay estimates. That portion exceeding 5% will be paid on the last partial pay estimate. As an exception to the above, where the work covered by the contract is limited exclusively to the resurfacing of an existing pavement, payment of the entire lump sum price Mobilization will be made with the first partial payment estimate paid on the contract, provided the amount bid does not exceed 5% of the total amount bid for the contract. Where the amount bid for Mobilization exceeds 5% of the total amount bid for the contract, 5% of the total amount bid will be paid on the first partial pay estimate. That portion exceeding 5% will be paid on the last partial pay estimate.

1.06 CLEARING AND GRUBBING

A. Determination of Measurement: The area to be paid for shall be the area in acres, measured horizontally of the areas designated on the plans or directed by the Engineer to be cleared and/or grubbed as called for in the Proposal. Measurement shall be made to the nearest square foot. No measurement or allowance will be made for removing isolated trees within an area designated by the Engineer to be cleared and/or grubbed, nor for cutting and removal of grain, grass, weeds, or other plants. Clearing and grubbing shall include all selective tree removal unless otherwise specified by the Contract.

B. Basis for Payment: The area measured as provided above shall be paid for at the contract unit price bid per acre for clearing and/or grubbing as the case may be.

C. Work: Price and payment shall be full compensation for furnishing all labor, equipment, material, tools, legal disposal of material and all other incidentals necessary to complete the work.

1.07 SELECTED TREE REMOVAL

A. Determination of Measurement: By the number of various sizes of selected trees removed. Diameters will be measured at a height of 4'-6" above the ground.

B. Basis for Payment: Payment shall be for each selected tree removed as indicated in the sizing chart below. Selected trees shall NOT be paid for within an area designated as clearing and grubbing. Trees measuring less than 4” in diameter shall be considered saplings. Payment for saplings is paid for under clearing and grubbing and shall not be paid as selective tree removal.

PAY ITEM SIZE	ACTUAL TREE DIAMETER
6"	4" up to 8"
10"	8" up to 12"
15"	12" up to 18"
18"	Above 18"

C. Work: Price and payment shall be full compensation for furnishing all labor, equipment, material, tools, and all other incidentals necessary for complete removal and legal disposal of selected trees.

1.08 SOIL TYPE BASE COURSE

A. Determination of Measurement: Measurement shall be based on truck quantity minus 25% from certified scale ticket for each load of material. Certified scale tickets must be provided within 24 hours.

B. Basis for Payment: Soil base course will be paid on a contract price per cubic yard.

C. Work: Excavating, loading, hauling, spreading and compacting, etc. as required for placement of soil base course.

1.09 AGGREGATE BASE COURSE

A. Determination of Measurement: Measurement shall be by certified scale ticket with each load of material. Ticket must be provided within 24 hours. Penalty may be assessed if tickets not received timely.

B. Basis for Payment: Contractor will be paid on a contract unit price per ton of stone that is placed.

C. Work: The work consists of providing all labor, material, equipment, and services required for all work as described herein and indicated on drawings.

1.10 UNCLASSIFIED AND UNDERCUT EXCAVATION

A. Determination of Measurement: The number of cubic yards of Unclassified Excavation measured in original position by cross sectioning and computed by the average end area method. When it is not feasible to cross section the volume of excavation which is to be replaced with borrow back-fill, the loads of material hauled in shall be counted.

B. Determination of Measurement: Undercut Excavation will be measured by the volume (cubic yards) of unsuitable material excavated, authorized by the Engineer, to the depths and widths so established. Excavation to greater depths and/or widths, unauthorized, shall be refilled with select backfill material used for backfilling and compacted at no additional cost to the City.

C. Basis for Payment: Contractor will be paid on a contract unit price per cubic yard for unclassified/undercut excavation, which price and payment shall be full compensation for the excavation and hauling; formation and compaction of embankments; removal and disposal of surplus drain pipes, existing walls, steps and surplus materials within the right-of-way, removal and disposal of all roots, stumps, logs, and other debris excavated from drainage ditches; for all sloping and trimming of the ditches, preparation and completion of the sub-grade and shoulders, ditches, slopes, and furnishing of all labor, equipment, tools, and incidentals necessary to complete the work

D. Work: Complete removal and disposal of unstable soil including, but not limited to, excavating, loading, hauling, properly disposing of excavated material, and providing select granular material for backfill. Providing select granular material for backfilling shall include, but not be limited to, material, loading, hauling, placing and compacting.

1.11 REMOVE EXISTING PAVEMENT

A. Determination of Measurement: By the square yard of existing pavement removed. The existing pavement shall be measured by the Engineer prior to its removal.

B. Basis for Payment: Payment will be on a contract unit price per square yard for removal and proper disposal of existing pavement.

C. Work: Shall include labor, equipment, tools, saw cutting, legal disposal, and all other incidentals necessary to complete the work.

1.12 REMOVE EXISTING SIDEWALK

A. Determination of Measurement: By the square yard of the existing sidewalk removed. The existing walks shall be measured by the Engineer prior to its removal.

B. Basis for Payment: Payment will be on a contract unit price per square yard for removal and proper disposal of existing sidewalks.

C. Work: Shall include labor, equipment, tools, saw cutting, legal disposal, and all other incidentals necessary to complete the work.

1.13 SILT FENCE

A. Determination of Measurement: Measure along the base of the silt fence installed.

B. Basis for Payment: Payment will be on a contract unit price per linear foot of silt fence installed.

C. Work: Posts, wire mesh, fabric, base trench, stone, and maintenance during construction, removal and clean up.

1.14 HIGH HAZARD SILT FENCE

A. Determination of Measurement: Measure along the base of the silt fence installed.

B. Basis for Payment: Payment will be on a contract unit price per linear foot of high hazard silt fence installed.

C. Work: Posts, wire fencing, wire mesh, woven filter fabric, base trench, stone, and maintenance during construction, removal and clean up.

1.15 MILLING BITUMINOUS PAVEMENT AND INCIDENTAL MILLING

A. Determination of Measurement: The quantity of milled bituminous pavement and incidental milling to be paid for will be the actual number of square yards of pavement surface which has been milled to depth indicated on drawings in accordance with the requirements of the contract. In measuring this quantity, the length will be the actual length milled, measured along the pavement surface. The width will be the width required by the plans or directed by the Engineer, measured along the pavement surface.

B. Basis of Payment: The quantity of milled bituminous pavement will be paid for at the contract unit price per square yard for "Milling Bituminous Pavement" or "Incidental Milling" as the case may be.

C. Work: Shall include milling and re-milling the pavement, cleaning the milled surface, loading, hauling, stockpiling the milled material for use in recycled bituminous mixtures and disposal of any excess milled materials. Any equipment necessary to remove asphalt in the areas of manholes, water valves, curb and gutter and any other obstructions shall be part of milling contract price.

1.16 PAVEMENT JOINT SEALER

A. Determination of Measurement: Measure total number of pounds of joint sealer placed on the roadway.

B. Basis for Payment: Payment will be on a contract unit price per pound of joint sealer placed.

C. Work: Material, equipment, labor, clean up and all associated appurtenances for installation of pavement joint sealer.

1.17 PLANT MIX BITUMINOUS CONCRETE SURFACE COURSE AND BITUMINOUS CONCRETE BASE COURSE (TYPE B 25.0 C; TYPE I 19.0 C; TYPE S 9.5 B; TYPE S 9.5 C)

A. Determination of Measurement: Measurement shall be per ton of each ton of type placed.

B. Basis for Payment: Payment on a contract price per ton.

C. Work: Production, delivery, placement and compaction to successfully install bituminous pavement.

1.18 INCIDENTAL STONE

A. Determination of Measurement: Measurement shall be per ton of each type placed as approved by the Engineer prior to placement. Contractor shall remove a minimum of two (2) inches of soil or aggregate base course, place and compact stone in order for this item to be applicable.

B. Basis for Payment: Payment shall be on a contract unit price per ton. Contractor shall furnish a "certified scale ticket" with each load of stone to the Engineer within 24 hours in order to be considered for payment. Incidental stone that is stockpiled or not placed will not be considered for payment. No separate payment shall be made for incidental stone placed in mainline or service lateral trenches unless approved by the Engineer.

C. Work: Labor, tools, materials, equipment, furnishing, placing, supplementing stone required for maintenance, grading/leveling stone, hauling, wetting, blading, compacting, removing and disposal of incidental stone immediately prior to asphalt pavement patch.

1.19 REMOVE AND REPLACE CONCRETE CURB AND GUTTER

A. Determination of Measurement: Measurement shall be per linear foot. Measurement of the curb and gutter shall be along the top of the curb excluding catch basin openings.

B. Basis for Payment: Payment shall be on a contract unit price per linear foot.

C. Work: Removal and disposal of existing concrete curb, furnishing, hauling, fine grading sub grade, compacting sub grade, seeding, backfilling behind curb with topsoil, adding soil amendments, placing all materials, and all equipment, materials, tools, labor, and incidentals necessary to complete the work.

1.20 REMOVE AND REPLACE CONCRETE DRIVEWAYS (NO OVERAGES ALLOWED)

A. Determination of Measurement: Measurement shall be to the nearest one-tenth square yards. The designated number of square yards to be removed shall be on the plan or as directed by the Engineer.

B. Basis for Payment: Payment shall be on a contract unit price bid per square yard completed and accepted with a minimum thickness of four (4) inches for residential, six (6) inches for commercial, or matching existing concrete thickness, whichever is greater.

C. Work: Saw cutting and removal of the existing driveway, removing and disposing of excess or unsuitable materials off-site, furnishing, hauling, fine grading the sub-grade, compaction, expansion joint materials, curing and placing all materials, forms and all equipment, tools, labor, and incidentals necessary to complete the work. Replacement of the drive shall be to existing or better condition.

1.21 REMOVE AND REPLACE ASPHALT DRIVEWAYS (NO OVERAGES ALLOWED)

A. Determination of Measurement: Measurement shall be to the nearest one-tenth square yards. The designated number of square yards to be removed shall be on the plan or as directed by the Engineer.

B. Basis for Payment: Payment shall be on a contract unit price bid per square yard completed and accepted with a minimum thickness of two (2) inches or matching existing asphalt thickness, whichever is greater.

C. Work: Saw cutting and removal of the existing driveway, removing and disposing of excess or unsuitable materials off-site, furnishing, hauling, fine grading the sub-grade, compaction,

placing all materials, forms and all equipment, tools, labor, and incidentals necessary to complete the work. Replacement of the drive shall be to existing or better condition.

1.22 REMOVE AND REPLACE GRAVEL DRIVEWAYS WITH AGGREGATE BASE COURSE (NO OVERAGES ALLOWED)

A. Determination of Measurement: Measurement shall be in square yards.

B. Basis for Payment: Payment shall be on a contract unit price bid per square yard completed and accepted. Existing gravel and/or soil driveway shall be replaced with six (6) inch thick stone, compacted Aggregate Base Course (ABC) or whichever matches existing type stone.

C. Work: Removal of the existing driveway, removing and disposing of excess or unsuitable materials off-site, furnishing, hauling, fine grading the sub-grade, compaction, all equipment, tools, labor, and incidentals necessary to complete the work. Replacement of the drive shall be to existing or better condition.

1.23 REMOVE AND REPLACE CONCRETE SIDEWALK

A. Determination of Measurement: Measurement shall be in square yards.

B. Basis for Payment: Payment shall be on a contract unit price bid per square yard completed and accepted.

C. Work: Saw cutting and removal to the nearest joint, proper disposal of the existing concrete sidewalk and unsuitable materials, compaction, furnishing, hauling, and placing all materials, fine grading the sub-grade, installation of necessary expansion joints, installation and removal of forms, concrete placement, curing and all equipment, tools, labor, and incidentals necessary to complete the work.

1.24 PERMANENT ASPHALT PAVEMENT PATCH

A. Determination of Measurement: Measurement shall be to the nearest one-tenth square yards. The designated number of square yards to be removed shall be on the plan or as directed by the Project Coordinator.

B. Basis for Payment: Payment shall be on a contract unit price bid per square yard completed and accepted with a minimum thickness of two (2) inches or matching existing asphalt thickness, whichever is greater and eight (8) inches of Aggregate Base Course or matching existing, whichever is greater.

C. Work: Labor, materials, tools, and equipment necessary to complete the work which shall include saw cutting (NO WHEEL CUTTING ALLOWED) pavement to straight uniform widths parallel and perpendicular to the road with no jagged edges, removal and disposal of asphalt offsite, re-compaction, removing and disposing of excess soil base course, re-compaction of pavement sub-grade, placement and compaction of ten (10) inches of ABC, maintaining ABC as necessary to maintain stone at pavement grade until removal of upper two (2) inches of stone for paving, adjusting castings as required, tack coat, placing and compacting asphalt material, cleanup and all other incidental work as shown on the details.

1.25 CONCRETE CURB AND GUTTER

A. Determination of Measurement: The quantity to be paid for in this section shall be the actual number of linear feet of combination curb and gutter measured in place, completed and accepted. This measurement of curb and gutter shall be along the top of the curb.

B. Basis for Payment: Payment shall be on a contract unit price per linear foot.

C. Work: Furnishing, hauling, and placing all materials, fine grading of sub-grade, installation and removal of forms, compacting subgrade, soil amendments, backfilling behind curb with

topsoil, all equipment, tools, curing and labor and incidentals necessary to complete the work.

1.26 CONCRETE SIDEWALK

A. Determination of Measurement: The quantity shall be measured in square yards of concrete sidewalk in place, completed and accepted.

B. Basis for Payment: Payment shall be on a contract unit price per square yard. The amount of grade work required to obtain the proper sub-grade from the finished grade of the sidewalk will be included as part of the per square yard price for concrete sidewalk

C. Work: Furnishing, hauling, and placing all materials, fine grading of sub-grade, installation and removal of forms, compacting subgrade, soil amendments, backfilling behind curb with topsoil, all equipment, tools, curing and labor and incidentals necessary to complete the work.

1.27 UTILITY PIPING

A. Determination of Measurement: Measure horizontally or from station to station as shown or indicated on the Drawings for the various types and sizes of pipes installed.
   1. (X) inch Storm Sewer: Measure pipe inside wall to inside wall of structures and from pipe end to longest point of opposing pipe end. Depth of pipe will not effect measurement.

B. Basis for Payment: Payment shall be on a contract unit price per linear foot of storm sewer that is installed.

C. Work: Shall include, but not be limited to (unless specifically noted otherwise on the Bid Form and this specification Section), the following:
   1. Excavating, shoring and bracing where required, dewatering as required, installing, backfilling (including Class I material as specified for the pipe bedding, haunching, and initial backfill).
   2. Installation of warning / identification tape over utilities.
   3. Temporary support and protection of existing underground facilities.
   4. Pipe, concrete blocking and encasement, connection to existing piping, and fittings.
   5. Flushing and treatment, as required.
   6. Adjust existing and new manhole and valve boxes to finished surface elevations, if applicable.
   7. Grade disturbed areas to original surface profile prior to seeding.
   8. Pipe bedding.
   9. Joint materials.
   10. Traceable wire.
   11. Clean up.

1.28 SEEDING

A. Measurement: Per acre seeded.

B. Basis for Payment: Payment shall be on a contract unit price per acre that is seeded.

C. Work: Shall include the full width of the disturbed area for the cleanup and seeding. Work shall include, but not be limited to, the following:
   1. Removal and proper disposal of debris and excess material.
   2. Grade disturbed areas to original or proposed surface profile.
   3. Cleaning of paved surfaces.
   4. Proper seeding, fertilizing, mulching and other incidentals necessary to properly seed project area.

1.29 FLOWABLE FILL (EXCAVATABLE AND NON-EXCAVATABLE)

A. Determination of Measurement: Measure by the cubic yard of flowable fill delivered and placed.

B. Basis for Payment: Payment shall be on a contract unit price per cubic yard that is installed.

C. Work: Material, placement, steel plating, backfilling, tools, equipment, etc.

1.30 BID ITEMS LISTED BY THE UNIT "EACH" (EA)

A. Measurement: By the number installed.

B. General work items:
   1. Adjust Existing Manhole Cover with Portland Cement Concrete: Excavating at existing manhole cover as necessary. Raise or lower existing manhole cover as necessary to set cover at desired elevation. Concrete backfill (collar) and clean up. Ramping included if necessary.
   2. Adjust Existing Valve Box with Portland Cement Concrete: Excavating at existing valve box as necessary. Raise or lower existing valve box as necessary to set box at desired elevation, installing new valve box extension if necessary. Concrete backfill (collar) and clean up. Ramping included if necessary.
   3. New Manhole Cover with Portland Cement Concrete: Excavating at existing manhole cover and removal as necessary. Set new manhole cover to desired elevation. Concrete backfill (collar) and clean up.
   4. New Valve Box with Portland Cement Concrete: Excavating at existing valve box and removal as necessary. Set new valve box to desired elevation, installing valve box extension if necessary. Concrete backfill (collar) and clean up.

C. Storm sewer work items:
   1. (X) inch Concrete Flared-End Section: Excavation, backfilling, and compacting for flared-end section.
   2. Catch Basin: Excavation, backfilling and compacting, stone bedding, concrete base, brick work as required for the depth, grate, frame, invert, steps, and weep holes.
   3. Double Catch Basin: Excavation, backfilling and compacting, stone bedding, concrete base, brick work as required for the depth, grate, frame, invert, steps and weep holes.
   4. Open Throat Catch Basin: Excavation, backfilling and compacting, stone bedding, concrete base, brick work as required for the depth, invert, steps, weep holes, and precast top.
   5. Drop Inlet: Excavation, backfilling and compacting, stone bedding, concrete base, brick work as required for the depth, grate, frame, invert steps and weep holes.
   6. Junction Box: Excavation, backfilling and compacting, concrete base, brick work as required for the depth, grate and frame.
   7. Concrete Pipe Collar: Excavation, forms, backfilling, compacting, concrete, and hauling.
   8. Precast Concrete Box: Excavation, materials, pipe boots, grout, backfilling, compaction, grading.
   9. New catch basin frame and grate: Remove and properly dispose of existing grate, frame, and hood. Provide new grate, frame, and hood adjusting to grade of new curb and gutter elevations.

1.31 EROSION CONTROL (LUMP SUM)

A. Measurement shall not be made for this item.

B. Basis for Payment: Payment for Erosion Control shall be made over the life of the project. Initially, 90% of the lump sum bid shall be divided by the number of months scheduled for

the project, and payment shall be made each month in that amount. The final 10% will be held until the final payment.

C. Work: Shall include all labor, equipment, materials and incidentals for all work including monitoring, reporting and maintaining proper erosion control on the project.

1.32 (X)' DIA. MANHOLES, DEPTH (X) –(X) FT

A. Measurement: By the number of various sizes and at the depth installed. Measure depths from manhole cover to lowest pipe invert.

B. Basis of Payment: Payment shall be per unit contract price for each manhole installed.

C. Work: Excavating, backfilling, stone sub base, concrete sections as required for the depth, top adjusting rings, steps, ring and cover, invert and joint sealer.

1.33 THERMOPLASTIC PAVEMENT MARKING LINES

A. Determination of Measurement: The quantity of thermoplastic pavement marking lines to be paid for will be the actual number of linear feet of thermoplastic pavement marking lines which have been satisfactorily placed. The quantity of solid lines will be the summation of the linear feet of solid line measured end to end of the line. The quantity of skip or intermittent lines will be the summation of the linear feet derived by multiplying the nominal length of the marking lines by the number of marking lines in place.

B. Basis for Payment: The quantity of thermoplastic pavement marking lines measured will be paid for at the contract unit price per linear foot for thermoplastic pavement marking lines.

C. Work: Layout, materials, testing, tools, traffic control necessary to install markings, pre-marking, or interim lines/markings, equipment, labor and all other requirements necessary to complete the work.

1.34 THERMOPLASTIC PAVEMENT MARKING SYMBOLS

A. Determination of Measurement: The quantity of thermoplastic pavement marking symbols to be paid for will be the actual number of thermoplastic pavement marking symbols satisfactorily placed.

B. Basis for Payment: The quantity of thermoplastic pavement marking symbols measured will be paid for at the contract unit price per each for thermoplastic pavement marking symbols.

C. Work: Layout, materials, testing, tools, traffic control necessary to install markings, pre-marking or interim markings, equipment, labor and all other requirements necessary to complete the work.

1.35 RAISED REFLECTIVE PAVEMENT MARKERS

A. Determination of Measurement:

1. The quantity of raised reflective pavement markers to be paid for will be the actual number of markers which have been satisfactorily installed and accepted. Any reference to quantities is provided as an estimate only, and shall not serve to obligate the City to purchase any minimum amount, nor shall such reference serve to furnish any maximum amount which the Contractor is required to furnish.

2. The quantities shown in the itemized proposal for the project are considered to be approximate only and are given as the basis for comparison of bids. The City of Fayetteville may increase or decrease the quantity of any item or portion of the work as may be deemed necessary or expedient.

3. An increase or decrease in the quantity of any item will not be regarded as sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work, except as provided for the contract.

B. Basis for Payment: The quantity of raised reflective pavement markers measured will be paid for at the contract unit price per each raised reflective pavement marker installed.

C. Material: Shall be an NCDOT approved material.

D. Work: Adhesive, required traffic control devices, equipment and incidentals, cleaning of pavement surface and furnishing and installing raised reflective pavement markers.

1.36 TRAFFIC CONTROL

A. Determination of Measurement: Measurement shall not be made for this item.

B. Basis of Payment: Traffic control shall be billed and compensated as a lump sum item based on the following percentage schedule:

50%	First Payment
25%	Completion of 50% of project
15%	Completion of 75% of project
10%	Final Payment

C. Work: Materials and labor to provide traffic control.

1.37 REMOVAL OF PAVEMENT MARKING LINES

A. Determination of Measurement: Will be measured and paid as the actual number of linear feet of pavement marking lines satisfactorily removed and accepted by the Engineer. The quantity of solid lines will be the summation of the linear feet of solid line measured end-to-end of the line. The quantity of skip or broken lines will be the summation of the linear feet derived by multiplying the nominal length of lines by the number of marking lines satisfactorily removed.

B. Basis for Payment: The quantity of pavement marking lines removed will be paid for at the contract unit price for each linear foot. No payment will be made for the removal of removable pavement marking tape.

C. Work: Layout, materials, tools, traffic control, equipment, labor and all other requirements necessary to complete the work.

1.38 REMOVAL OF PAVEMENT MARKING SYMBOLS AND CHARACTERS

A. Determination of Measurement: Will be measured and paid as the actual number of pavement marking symbols and characters satisfactorily removed and accepted by the Engineer.

B. Basis for Payment: The quantity of pavement marking symbols and characters removed will be paid for at the contract unit price.

C. Work: Layout, materials, tools, traffic control, equipment, labor and all other requirements necessary to complete the work.

1.39 TEMPORARY PAVEMENT MARKING TAPE LINES

A. Determination of Measurement: The quantity of temporary pavement marking tape to be paid for lines will be the actual number of linear feet which has been satisfactorily installed and accepted. The quantities shown in the itemized proposal for the project are considered to be approximate only and are given as the basis for comparison of bids. The Engineer may

increase or decrease the quantity of any item or portion of the work as may be deemed necessary or expedient. An increase or decrease in the quantity of any item will not be regarded as sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work.

B. Basis for Payment: The quantity of temporary marking tape measured will be paid for at the contract unit price per linear foot installed.

C. Work: Labor, placement, removal, disposal, materials, equipment and any other necessary incidentals.

1.40 TEMPORARY PAVEMENT MARKING TAPE SYMBOLS

A. Determination of Measurement: The quantity of temporary pavement marking tape to be paid for symbols will be the actual number of symbols which have been satisfactorily installed and accepted by the City Traffic Engineer. The quantities shown in the itemized proposal for the project are considered to be approximate only and are given as the basis for comparison of bids. The Engineer may increase or decrease the quantity of any item or portion of the work as may be deemed necessary or expedient. An increase or decrease in the quantity of any item will not be regarded as sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work.

B. Basis for Payment: The quantity of temporary marking tape measured will be paid for at the contract unit price for each symbol installed.

C. Work: Labor, placement, removal, disposal, materials, equipment and any other necessary incidentals.

1.41 EMULSIFIED ASPHALT SLURRY SEAL

A. Determination of Measurement: Measurement shall be in square yards installed.

B. Basis of Payment: The quantity of emulsified slurry seal will be paid for at the contract unit price per square yard.

C. Work: Shall include cleaning, loading, hauling, equipment, labor, compaction, material and any other incidentals required for installation.

1.42 SELECT BORROW

A. Determination of Measurement: Measurement shall be in cubic yards installed. The cubic yards of excavation and the cubic yards of select granular material backfill to be paid for shall be 75 percent of the volume obtained by multiplying the gross volume of the trucks hauling the material by the number of loads hauled.

B. Basis of Payment: The quantity of subsoil will be paid for at the contract unit price per cubic yard of subsoil installed.

C. Work: Shall include material loading, hauling, placing, and compacting, equipment, labor, supplying suitable subsoil material and any other incidentals required for installation.

1.43 TOPSOIL

A. Determination of Measurement: Measurement shall be in cubic yards installed.

B. Basis of Payment: The quantity of topsoil will be paid for at the contract unit price per cubic yard of topsoil installed.

C. Work: Shall include removal of unusable topsoil including rocks and debris, excavation, grading, loading, hauling, equipment, labor, compaction, supplying suitable topsoil material and any other incidentals required for installation.

1.44 MANHOLE ADJUSTMENT

A. Determination of Measurement: Measurement shall be for each manhole adjusted.

B. Basis of Payment: The quantity of adjusted manholes will be paid for at the contract unit price per each adjustment made.

C. Work: Shall include cleaning, equipment, labor, material, leveling, adjustments and any other incidentals required for installation.

1.45 RIP-RAP SWALE

A. Determination of Measurement: Measurement shall be per ton of rip-rap placed on swale.

B. Basis for Payment: Payment will be on a contract unit price per ton of rip-rap swales installed. Contractor shall furnish a "certified scale ticket" with each load of stone to the Engineer within 24 hours.

C. Work: Furnishing, hauling, placing materials, fabric, staples, grading, equipment, tools, labor and other incidentals required to install swale.

1.46 IRRIGATION SYSTEM

A. Determination of Measurement: No measurement shall be made for this item.

B. Basis of Payment: Payment will be lump sum for complete installation of the irrigation system as shown.

C. Work: Shall include labor, material, equipment, services and any other incidentals required for installation.

1.47 FENCE REMOVAL

A. Determination of Measurement: Measurement shall be by the linear foot measured from center post to center post. No deduction will be made for gates.

B. Basis of Payment: Payment will be per linear foot per type of fence removed. Gates will be included in the linear foot price.

C. Work: Shall include labor, material, equipment, grading and any other incidentals required for removal.

1.48 FENCE INSTALLATION

A. Determination of Measurement: Measurement shall be by the linear foot measured from center post to center post. No deduction will be made for gates.

B. Basis of Payment: Payment will be per linear foot per type of fence installed. Gates will be included in the linear foot price.

C. Work: Shall include labor, material, equipment, grading and any other incidentals required for installation. Fence to match existing fence material or as specified by the Engineer.

1.49 SOD

A. Determination of Measurement: Measurement shall be to the nearest square yard.

B. Basis of Payment: Payment will be at the contract unit price per square yard of sod installed.

C. Work: Sod, pest control, disease control, anchoring, placing, soil amendments, fertilizer, topsoil, grading, raking, sod bed preparation, water, maintenance, sod replacement, protection, damage repair and other incidentals required.

1.50 TREES, PLANTS AND GROUND COVER

A. Determination of Measurement: Measurement shall be for each unit.

B. Basis of Payment: Payment will be at the contract unit price per each unit installed.

C. Work: Preparation of subgrade and topsoil, placing soils, planting, watering and maintenance.

1.51 WHEELCHAIR RAMP

A. Determination of Measurement: By the number installed (per type).

B. Basis of Payment: Payment will be for the contract unit price for handicap curb ramps installed.

C. Work shall include the excavation, forming, concrete placement and finishing, truncated dome, construction and expansion joints, and backfill.

1.52 HANDRAIL

A. Determination of Measurement: By the linear foot installed.

B. Basis of Payment: Payment will be for the contract unit price for handrail installed.

C. Work shall include the fabrication, primer, paint, installation, core holes, grout and any other incidental required for installation.

1.53 ENDWALL FOR CAST-IN-PLACE OR PRE-CAST CULVERT

A. Determination of Measurement: By the number installed per type.

B. Basis of Payment: Payment will be for the contract unit price per endwall per type installed.

C. Work shall include the block, brick, concrete, reinforcing steel, materials, excavation, bedding, grading and all other incidentals in order to build endwall.

1.54 PRECAST CONCRETE HEADWALL / FLARED END SECTION

A. Determination of Measurement: By the number installed per type.

B. Basis of Payment: Payment will be for the contract unit price per headwall/flared end section installed.

C. Work shall include the materials, excavation, bedding, grading and all other incidentals needed to construct headwall/flared end section.

1.55 DRIVEWAY APRON (CONCRETE)

A. Determination of Measurement: By square yard per thickness specified by the Engineer. Measurement from back of curb to edge of apron.

B. Basis of Payment: Payment shall be per unit contract price per square yard installed.

C. Work: Complete installation including, but not limited to, excavation, backfilling and compacting of subgrade, form work, concrete, finishing, and backfilling around concrete.

1.56 WHEELCHAIR RAMP AT EXISTING CURB

A. Determination of Measurement: By the number installed.

B. Basis of Payment: Payment shall be per unit contract price for each handicap ramp installed.

C. Work shall include the cutting and removal of the existing concrete sidewalk and curb and gutter, excavation, forming, concrete placement and finishing (including new depressed curb

& gutter), truncated dome, construction and expansion joints, and backfill behind new ramp with topsoil, curing, labor and incidentals necessary to complete the work.

1.57 RIP RAP

A. Determination of Measurement: Measurement shall be in tons per type specified.

B. Basis for Payment: Payment will be on a contract unit price per ton of rip-rap installed. Contractor shall furnish a “certified scale ticket” with each load of stone to the Engineer within 24 hours.

C. Work shall include furnishing filter fabric under stone, stone, hauling, placing material, staples, equipment, tools, labor and incidentals.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 00127

SECTION 00132

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
   1. Project Management.
   2. Coordination.
   3. Administrative and supervisory personnel.
   4. General installation provisions.
   5. Cleaning and protection.

1.02 GENERAL COORDINATION REQUIREMENTS

A. Responsibilities of Contractor:
   1. Coordinate construction activities for the Project to assure efficient and proper installation of each part of the Work.
   2. Where availability of space is limited, coordinate installation of components to assure maximum accessibility for maintenance. Make adequate provisions to accommodate components scheduled for later installation.
   3. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings. A copy of all memoranda shall be submitted to the Engineer.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of schedules.
   2. Installation and removal of temporary facilities.
   3. Delivery and processing of submittals.
   4. Progress meetings.
   5. Installation meetings.
   6. Project Close-out activities.
   7. Payment Applications.

C. Project Meetings: A Pre-construction conference shall be held prior to the beginning of the Work. Construction progress meetings shall be held monthly. Project close-out conference shall be held during the final phases of the Work. The Engineer may schedule additional meetings. The location of meetings is to be determined by the Engineer. The Contractor's project superintendent shall attend meetings. Suppliers and subcontractors will be notified to attend meetings as appropriate or as required by the Engineer. The Contractor shall schedule pre-installation conferences as required in the individual specification sections and shall notify the Engineer of project meetings scheduled by the Contractor. The Engineer will schedule and administer meetings throughout the progress of the Work, except for meetings held by the Contractor for normal coordination of the Work. Meeting agenda shall include, but not be limited to, the following: Project Administration, Submittals, Construction Schedules and Methods, Safety and Health Regulations, Project Coordination, Payment Application, Change Orders, and Site Inspections. Engineer will prepare agenda with copies

to participants, preside at meetings, prepare minutes and distribute to participants for meetings scheduled by the Engineer.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

E. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.03 CLOSE-OUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit set of Record Documents indicating changes during construction as required in Section, Submittal Procedures.

D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and final amount due.

E. Submit the following with final Application for Payment:
1. Affidavit of Release of Liens
2. Consent of Surety for Final Payment
3. Affidavit of Payment of Debts and Claims
4. Final Certified Payroll Information

F. Submit warranties as required by individual equipment specifications.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 SPECIAL REQUIREMENTS

END OF SECTION 00132

SECTION 00150

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, telephone service, water, and sanitary facilities.

B. Work on public right-of-way.

C. Traffic control.

D. Temporary Controls: Barriers, enclosures and fencing, water control, dust control, erosion and sediment control, and protection of the work.

E. Construction Facilities: Access roads, parking, progress cleaning, project signage, and field offices.

1.02 TEMPORARY UTILITIES

A. Electricity
   1. Provide and pay for required power service for construction from Utility source.

B. Lighting
   1. Provide and maintain lighting for construction operations as required by Contractor.
   2. Provide and maintain lighting to exterior staging and storage areas after dark for security purposes as required by Contractor.

C. Telephone Service
   1. Provide, maintain and pay for telephone service to field office as required by Contractor.

D. Water
   1. Provide, maintain, and pay for suitable quality water, including any necessary service(s) required for construction operations. Exercise measures to conserve water during construction.

E. Sanitary Facilities
   1. Provide and maintain required facilities and enclosures as necessary to comply with the laws and ordinances of the authority having jurisdiction and the State of North Carolina.
   2. General Contractor shall provide the above sanitary facilities for all contractors, sub-contractors, Owner and Engineer at the Project Site.

1.03 WORK ON PUBLIC RIGHTS-OF-WAY

A. Work on this Project is along rights-of-way under jurisdiction of the following N.C. Department of Transportation (NCDOT) and/or City of Fayetteville offices and Owner:
   1. NCDOT Division 6, District 2, District Engineer
   2. City of Fayetteville, City Engineer

B. Work shall comply with requirements of the Encroachment Agreement(s) and Driveway Permit as attached to Project Supplementary Conditions.

C. Post Bonds as required.

D. Prior to start of Work notify the Office of the NCDOT as indicated in the encroachment agreement and driveway permit. Also notify the Owner.

E. Work shall conform to the requirements and be subject to the approval of the above agency (ies).

F. Contractor shall be responsible to the Owner for the cost of all DOT inspection that is billed to the Owner by the NCDOT as indicated in the Special Provisions of the Encroachment Agreement.

G. Submit letter to the above District Engineer(s) when work is complete as required by the Encroachment Agreement.

H. Submit letter of approval for completed Work from the above agency (ies) with Final Payment Request.

I. Clean rights-of-way as work progresses and daily.

J. Power broom existing pavement as work progresses.

K. Work shall be in accordance with the latest edition of the N.C. Division of Highways, "Policies and Procedures for Accommodating Utilities on Highway Right-of -Way" and City of Fayetteville standards.

L. Consult with the above agency (ies) in establishing public thoroughfares to be used for haul routes and site access. Truck route permit and bond may be required.

M. Confine construction traffic to designated haul routes.

N. Provide traffic control along haul routes to regulate traffic and to minimize interference with public.

O. Provide and maintain access to fire hydrants, free of obstructions.

1.04 TRAFFIC CONTROL

A. On public and private road rights-of-way provide traffic control devices when construction encroaches within the right-of-way. Devices shall include, but not be limited to, cones, drums, flares, warning signs, temporary pavement marking, warning lights, and flagman.

B. Traffic control devices shall provide the following:
   1. Protection of motorists, pedestrians and workers from accident hazards.
   2. Advance public information of proposed work sites.
   3. Establishment of an orderly and safe flow of traffic and to minimize traffic congestion.
   4. Provision of access for emergency vehicles.

C. Traffic control devices shall be used in accordance with the latest edition of the NC DOT "Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)."

D. Provide personnel trained and certified in traffic control, as required by NCDOT and City of Fayetteville.

1.05 TEMPORARY CONTROLS

A. General
   1. Temporary controls shall be the responsibility of each Contractor for their respective work unless noted otherwise.

B. Barriers
   1. Provide barriers to prevent unauthorized entry to construction areas for the safety of the public, the protection of the work, and to protect existing facilities and adjacent properties from damage from construction operations.
   2. Provide barricades required by agency in (ICS) 1.03A of this section for public rights-of-way and for public access to existing buildings.

3. Provide protection for plant life designated to remain. Replace damaged plant life.
4. Protect vehicular traffic, stored materials, site, and structures from damage.

C. Water Control
1. Grade site to drain. Provide, operate, and maintain pumping equipment to maintain excavations free of water.
2. Protect site from running water.

D. Dust Control
1. Execute Work by methods designed to minimize raising dust from construction operations.
2. Provide positive means to prevent airborne dust from dispersing into atmosphere.

E. Erosion and Sediment Control
1. Provide Erosion and Sediment Control as indicated on the Drawings and Specifications.

F. Protection of Installed Work
1. Protect installed Work and provide special protection where specified in individual specification Sections.
2. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
3. Prohibit traffic from landscaped areas.

1.06 CONSTRUCTION FACILITIES

A. General
1. Construction facilities shall be the responsibility of each Contractor for their respective work unless noted otherwise.

B. Access Roads
1. Contractor shall construct and maintain temporary drives as necessary to access public thoroughfares and existing drives to serve the construction area.
2. Provide means of removing mud from vehicle wheels before entering streets.

C. Parking
1. When site space is not adequate, arrange for temporary off site surface parking areas to accommodate construction personnel.
2. Do not allow vehicle parking in existing right-of-way or to block existing drives.
3. Do not allow vehicle parking on private property without prior approval.

D. Progress Cleaning
1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
2. Remove waste materials, debris, and rubbish from site periodically and dispose off site.

1.07 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, and materials, prior to Final Inspection.

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

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 00150

SECTION 00170

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination.

B. Cutting and patching.

C. General installation provisions.

D. Cleaning and protection.

E. Final inspection and tests.

1.02 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specifications sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

1.03 CUTTING AND PATCHING

A. General
   1. Do not cut, or alter the work of other contractors without written approval of the Engineer.
   2. Work removed shall be replaced or repaired by the Contractor who removed or damaged the work, and a craftsman, skilled in the trade that the particular replacement requires, shall do the work. (i.e.: A mason, not an electrician, shall replace masonry removed by the Electrical Contractor.)
   3. Conduct removal operations in a manner that will eliminate hazards to persons and property and prevent the release of dust and rubbish into the air. Existing work, which is to remain and is damaged by contract operations shall be replaced with new materials at no additional cost to the Owner.
   4. For replacement of work removed, comply with specifications for type of work to be done.

B. Inspection
   1. Inspect existing conditions of work including elements subject to movement or damage during cutting and patching, and excavating and backfilling.
   2. After uncovering work, inspect conditions affecting installation of new products.

C. Preparation prior to cutting
   1. Provide shoring, bracing, and support as required to maintain structural integrity of project.
   2. Provide protection for other portions of project.
   3. Provide protection from elements.

D. Performance
   1. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, finishes.
   2. Execute cutting and demolition by clear sawcut methods, perpendicular to prevent damage to other work and provide proper surfaces to receive installation of repairs and new work.
   3. Execute excavating and backfilling as specified in Section, Trenching for Utilities.
   4. Restore work, which has been cut or removed; install new products to provide completed work in accordance with requirements of contract documents.
   5. Refinish surfaces as necessary to provide an even finish.

1.04 GENERAL INSTALLATION PROVISIONS

A. Require Installer of each major component to inspect conditions under which Work is to be performed. Clean substrate surfaces prior to applying next material or substance. Do not proceed until unsatisfactory conditions have been corrected.

B. Comply with manufacturer's recommendations to the extent that they are more explicit or stringent than requirements contained in Contract Documents.

C. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

D. Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Engineer for final decision.

E. Check dimensions before starting each installation.

F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

H. Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Engineer for final decision.

1.05 CLEANING AND PROTECTION

A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration.

B. Clean and maintain completed construction as frequently as necessary through the construction period. Adjust and lubricate components as required to ensure proper operation.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, or dangerous exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
   1. Excessive static or dynamic loading.
   2. Excessive internal or external pressures.
   3. Excessively high or low temperatures.
   4. Thermal shock.
   5. Air contamination or pollution.

6. Water or ice.
7. Abrasion.
8. Heavy traffic.
9. Misalignment.
10. Improper shipping or handling.
11. Theft.
12. Vandalism.

D. Clean Project prior to final inspection. Project clean up shall include, but not be limited to, the following:
1. Clean glass.
2. Clean surfaces exposed to view as recommended by manufacturer.
3. Remove temporary labels.
4. Vacuum carpeted areas.
5. Clean fixtures to a sanitary condition.
6. Repaint damaged paint surfaces.
7. Clean debris from roofs, gutters, down spouts, and drainage systems.
8. Sweep paved areas.
9. Rake clean landscaped surfaces.
10. Remove waste and surplus materials.
11. Remove temporary construction facilities.

1.06 FINAL INSPECTION

A. Complete punch list items within contract time to avoid liquidated damages.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 00170

SECTION 00405

CLEARING, GRUBBING, AND SELECTED TREE REMOVAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This item should consist of the furnishing of all labor, equipment, and materials in performing all operations in connection with clearing and grubbing and selected tree removal, in accordance with this section of the specifications and the applicable drawings or as designated by the Engineer, and subject to the terms and conditions of the contract.

PART 2 PRODUCTS

2.01 MATERIALS

A. For cut or scarred surfaces, damaged area should be trimmed with a sharp blade to remove shredded or loose outer layer(s) and left to heal on its own. No paint or dressing is required.

PART 3 EXECUTION

3.01 INSTALLATION

A. Protection: Locate and protect property corners and survey control stakes prior to start of clearing operations. Contractor shall protect underground utilities in the area.

B. Clearing: Clearing shall consist of the felling and cutting up of trees, the trimming of trees, and the satisfactory disposal of trees and other vegetation together with down timber, snags, brush and rubbish occurring within the areas to be cleared. Trees and other vegetation, except such individual trees, groups of trees, and vegetation as may be indicated on the drawings or designated by the Engineer to be left standing, and all stumps, roots, and brush in areas to be cleared shall be cut off flush with or slightly below the original ground surface. Trees and stumps that are to be grubbed under the same contract may be cut to any height up to three feet (3'). When it is necessary to remove limbs and branches from trees which are to be left standing, the cut shall be neatly made close to the bole of the tree or to main branches. Individual trees, groups of trees, and other vegetation to be left standing shall be thoroughly protected from damage incident to construction operations by the erection of barriers or by other approved means. Clearing operations shall be conducted so as to prevent damage by falling trees to trees to be left standing, existing structures and installations, and to those under construction, and so as to provide safety of employees and others.

C. No trees, brush, stumps or other refuse from clearing shall be thrown upon adjacent property, but trees unavoidably falling outside the specified limits shall be removed to within the clearing and disposed of there.

D. Grubbing: Grubbing shall consist of the removal and disposal of all stumps, roots larger than three inches in diameter and matted roots from the areas designated to be grubbed. All stumps, roots, logs, or other timber more than three inches in diameter, matted roots, and other suitable debris shall be excavated and removed to a depth not less than three feet below any subgrade, shoulder, or slope. All depressions excavated for or by the removal of stumps and roots, shall be refilled with suitable material thoroughly compacted.

E. Selective Tree Removal: Selected trees to be removed shall consist of trees six inches or more in diameter either shown on the plans or as designated by the Engineer. All roots, or

other timber more than three inches in diameter, and matted roots shall be excavated and removed to a depth not less than three feet below any subgrade, shoulder, or slope. Selected trees shall NOT be paid for within an area designated as clearing and grubbing.

F. Clearing And Grubbing: The combined item of clearing and grubbing shall also include the removal and satisfactory disposal of fences, steps, walls, chimneys, slabs, building foundations, basements, signs and other rubble and debris unless otherwise specified by the Engineer.

G. Disposal of Cleared And Grubbed Material And Trees: All timber, logs, stumps, roots, brush, rotten wood, and other debris from the clearing and grubbing operations shall be disposed of legally by the Contractor

H. Erosion Control: Clear areas required to install erosion control devices, which shall be in place and operational prior to other land disturbing activity. Install erosion control devices in accordance with Project Manual and Drawings and Erosion Control Permit.

I. Access Roads: Clear for access roads. Limit clearing and grubbing for access roads to maximum width necessary or as shown on plans.

END OF SECTION 00405

SECTION 00410

PROOFROLLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This item shall consist of furnishing and operating, at the direction of the Engineer, heavy pneumatic tired compaction equipment or fully loaded tandem dump truck for compacting the roadbed and testing the roadbed for stability and uniformity of compaction.

B. The Contractor may operate the proofrolling equipment at times other than when directed by the Engineer. Such use is at the Contractor's option and is not to be considered as work performed under this section and will not be considered for payment.

C. The requirement for proofrolling may not be eliminated or modified without the approval of the Engineer.

PART 2 PRODUCT

2.01 EQUIPMENT

A. The Engineer shall check to see that the equipment conforms to the requirements of this article. A tandem dump truck legally fully loaded (not less than 28 tons) with soil or stone may be used to proofroll.

B. If requested weight tickets signed by a licensed public weighmaster may be used to determine the weight of the dump truck and the weight of load to be used.

C. Requests by the Contractor to substitute other types of equipment shall be forwarded to the Engineer for approval or disapproval.

D. The Contractor shall not be permitted to drive the loaded dump truck over existing structures or curbing. The Contractor shall use rubber tired or other types of tractive equipment for operation on the roadbed. The Contractor shall protect all structural facilities within the project area, such as, but not limited to, bridges, box culverts, pipe culverts and utilities. Damage resulting from proofrolling equipment shall be repaired by contractor at no cost to the City. The entire assembly, including motivating equipment, shall be capable of executing a 180° turn.

PART 3 EXECUTION

3.01 INSTALLATION

A. Proofrolling is to be done when the roadbed is within plus or minus 0.5 foot of finished grade and the roadbed shall be rolled for a width located between points 2 feet outside the proposed edges of pavement including shoulder pavement.

B. A coverage is considered to be that stage in the rolling procedure when the entire area to be proofrolled has been in contact with the pneumatic tires of the roller or loaded dump truck. One complete coverage shall be made with additional coverage as required when failure is suspected. Areas which have failed and been repaired shall be given a complete coverage after repair has been completed.

C. Equipment shall be operated at a speed between 225 ft/min and 300 ft/min.

D. The Engineer shall follow (walking is preferable) a short distance behind the proofroller observing the action of the roadbed produced immediately behind the tires of the roller.

When the roadbed material compresses and remains compressed, the roadbed is satisfactory. When the roadbed material compresses and then rebounds to any appreciable extent, further testing and investigation shall be made. Horizontal slippage or crust breakage is not considered as failure. Any slippage or breakage shall be repaired.

E. The Engineer shall take immediate steps to determine the cause of any failure observed. Failures are usually due to the necessity for underdrains, unsuitable materials or excessively wet materials. These conditions may be found to be as much as 6 feet below the roadbed surface. Assistance in determining corrective action required when needed, may be obtained from the Engineer.

F. Should it be determined that the failure is due to negligence or weather, the City Engineer shall so inform the Contractor, verbally and in writing and shall document all work (including equipment, personnel and time) necessary for correction of the area.

END OF SECTION 00410

SECTION 00415

SOIL TYPE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section consists of the construction of a base composed of one or more natural materials proportioned and blended on the road, compacted, and shaped to conform to the lines, grades, depths, and typical sections shown on the plans and established by the Engineer.

B. Conditioning Existing Base: The work covered in this section consists of scarifying, shaping, and compacting the existing base to conform to the required lines, grades, depths, and typical sections established by the plans or modified by the Engineer.

1.02 DESIGN REQUIREMENTS

A. The soil type base course is to conform to the Table below:

Requirements	Limits Type A	Limits Type B	Limits Type C
Passing 2" Sieve		100%	
Passing 1" Sieve	100%	70% - 100%	
Passing ½" Sieve		55% - 100%	
Passing No. 4 Sieve		35% - 100%	
Passing No. 10 Sieve	65% - 100%	25% - 65%	100%
Passing No. 40 Sieve		15% - 45%	
Passing No. 200 Sieve		5% - 25%	

B. The base course material shall be free from vegetative matter and lumps or balls of clay.

PART 2 PRODUCTS

2.01 MATERIALS

A. Soil type base course shall be either Type A, B, or C.

2.02 SOURCE QUALITY CONTROL AND TESTS

A. Samples will be tested for gradation in accordance with AASHTO T-88. The liquid limit test will be in accordance with AASHTO T-89 and the plasticity index will be tested in accordance with AASHTO T-90.

B. Gradation testing shall be performed a minimum of one test per road or every 2,000 feet for roads less than 27 feet in width and every 1,000 feet for roads greater than 27 feet in width.

C. Sand cone test shall be utilized for density testing. Density testing shall be performed a minimum of one test per road or every 1,000 feet for roads less than 27 feet in width and every 500 feet for roads greater than 27 feet in width.

PART 3 EXECUTION

3.01 INSTALLATION

A. Soil type base course shall be placed on a sub-grade that has been cut to the required depth as shown on the plans. Sub-grade should be checked by the inspector or Engineer before

any base course can be placed. Upon the placing of the base material the Contractor shall start mixing operations. Mixing shall be done in a manner which will produce a thoroughly and uniformly mixed soil base course.

B. The base shall be finally shaped to conform to the lines, grades, and typical sections shown on the plans. Care shall be taken to prevent the formation of slippage planes in the surface. All soft or unstable areas shall be thoroughly dried, re-mixed, or reworked and replaced.

END OF SECTION 00415

SECTION 00420

AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work consists of providing all labor, material, equipment, and services required for all work as described herein and indicated on drawings.

1.02 REFERENCES

A. Standard Specifications for Roads and Structures: Section 520, most recent edition by the North Carolina Department of Transportation will govern the work under these specifications except as they are modified hereinafter.

1.03 SCHEDULING

A. No aggregate base course will be laid until the sub-grade is approved for grade and density by the Engineer.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL AND TESTS

A. Gradation testing may be required by Engineer if visible segregation in material is noted.

B. Sand cone test shall be utilized for density testing. Density testing shall be performed a minimum of one test per road or every 1,000 feet for roads less than 27 feet in width and every 500 feet for roads greater than 27 feet in width.

PART 3 EXECUTION

NOT USED

END OF SECTION 00420

SECTION 00425

EXCAVATION/BACKFILLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roadway: This item shall consist of the removal and satisfactory disposal of all materials excavated within the area of the street to be paved, the removal and replacement of unsuitable sub-grade material with satisfactory material, the formation, compacting, and shaping of all embankments to the lines and grades established by the Engineer, excavation from borrow areas of suitable materials to be hauled in and used as fill or back-fill, when sufficient quantities of suitable material are not available from the roadway, all in accordance with this section of the specification, and subject to the terms and conditions of the contract. The classification of all material excavated shall be either "Unclassified Excavation" or "Undercut Excavation."

B. Storm Sewer: The Contractor shall provide labor, equipment and material to perform required excavating, backfilling and compacting for storm sewer utilities and related structures to the depths shown on the plans or as directed by the Engineer. The width of the trench shall not exceed the width required to properly tamp backfill material around pipe or to adequately shore trench, but shall be limited to pipe diameter plus two feet or pipe diameter plus ½ pipe diameter, whichever is greater.

C. All pipes shall be laid true to lines and grades shown on the plans or as designated by the Engineer. Recesses shall be excavated to receive the bells of the pipe.

D. When the foundation materials are of poor supporting value, the pipe foundation shall be reinforced by one of the following methods:
   1. By replacing the unsuitable material in a minimum depth of six inches, or as directed by the Engineer with sand, sand-clay, gravel or crushed stone and thoroughly tamped.
   2. By constructing supporting cradles of concrete under each joint.

E. Excavation below grade shall be back-filled at the Contractor's expense, as directed by the Engineer, and thoroughly tamped. When select borrow material is required by the Engineer, it shall be paid for as Select Borrow.

F. The ground adjacent to all excavation shall be graded to prevent surface water running in. The Contractor shall, at his expense, remove by pumping or other means approved by the Engineer any water accumulated in the trench.

G. All banks or trenches shall conform to City and OSHA safety standards (whichever more stringent). The Contractor shall, at his expense, do all bracing, sheeting, and shoring necessary to perform and protect all excavations, as required for safety, and as directed by the Engineer or when the Contractor deems it necessary.

H. The excavation for manholes and catch basins shall be of sufficient width and depth to permit ready construction.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 INSTALLATION

A. Construction Methods: The Contractor shall proceed with excavation and disposal of material at such locations and in such sequence as the Engineer may approve.
   1. All excess excavated material from a project shall be disposed of by the Contractor at his expense unless ordered to another project by the Engineer. The Contractor's obligation to remove and dispose of excess materials shall in no manner convey to him any right of property in any material taken from any excavation.

B. Sub-Grade: The sub-grade shall be graded and regulated either by hand labor, the use of one-man motor graders or other approved methods. The sub-grade of the area to be paved shall be in a true plane parallel with and to the grade line established by the Engineer. Should soft or yielding places develop in the sub-grade, the unsuitable material shall be removed and replaced with suitable material and thoroughly compacted. Care shall be taken to ensure that all utility excavations have been thoroughly backfilled and compacted. Any settlement evident after base has been placed shall be corrected at the Contractor's expense. No soil, sand-clay or other base material shall be placed on the sub-grade until the sub-grade has been checked and approved by the Engineer. A variation of more that one-half inch (½") shall be cause for rejection of the sub-grade. Compaction testing for subgrade and for base is 100% compaction.

C. Unclassified Excavation: All excavation of every description and of whatever substance including rock and rock-like material encountered shall be to the lines and grades indicated or otherwise as specified. The classification of all material excavated shall be "Unclassified Excavation." The work shall consist of the excavation, placement, compaction or satisfactory disposal of all materials encountered within the limits of the work, necessary for the construction of the roads, parking lots, building pads, and utilities. Suitable material excavated shall be transported to and placed in fill areas within the work limits. Excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. All excess unsuitable excavated material from the project shall be legally disposed of by the Contractor at his expense.

D. Undercut Excavation: All undercut excavation consists of the excavation, placement, and compaction and/or satisfactory disposal of materials removed from a location below finished grade roadway cross section.

E. Drainage Ditches: Drainage ditches shall be excavated in accordance with the plans, sections, and grades, and at the time directed by the Engineer. No deviation from alignment, grade, or section will be allowed except by the Engineer.
   1. The Contractor shall, in general, be required to excavate all drainage ditches in proper sequence or at the time directed by the Engineer. All roots, stumps, and objectionable matter in the sides and bottom of the ditch shall be cut to conform to the slope, grade, and shape of the section. The Contractor shall dispose of the excavated material as directed by the Engineer and no excavated material or spill from a drainage ditch shall be deposited or left within three feet of the edge of the ditch, but shall be scattered back and not left piled up in a ridge along the ditch, unless otherwise shown on the plans or directed by the Engineer in writing.

F. Removal of Old Pipe, Walls, Steps, Curb, Gutter, Sidewalk and Pavement: All old pipe, walls, steps, curb, gutter, sidewalks, and pavement shall be removed (including saw cutting) as directed by the Engineer, and legally disposed of by the Contractor. None of the above pay items shall be removed until measured in place by the Engineer.

G. Private Driveways: The Contractor shall keep private driveways open and unobstructed as far as practicable and shall regrade same from curb to property line when directed by the Engineer.

END OF SECTION 00425

SECTION 00430

EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work consists of providing all labor, material, equipment, and services required to conduct erosion control as described herein and indicated on drawings in accordance with the requirements of the North Carolina Sedimentation Pollution Control Act of 1973 and the rules and regulations promulgated pursuant to the provisions of said act. Erosion control devices shall be selected based on field conditions.

PART 2 PRODUCTS

A. Products specified are for establishing the type, design and quality required. Products of equal type, design and quality produced by other manufacturers will be considered.

B. Filter Cloth (Silt Fence) shall be a synthetic, permeable barrier sheet that is resistant to soil chemicals and mildew, stable under freeze-thaw cycles, will not shrink or expand under wet conditions, and will not unravel or become clogged during use. The filter cloth shall have a minimum tensile strength of 120 pounds. Allowable open area shall not exceed 36 percent and shall not be less than 4 percent. Percent open area is defined as the summation of the open areas divided by the total area of the filter cloth. Equivalent opening size (EOS) shall not be finer than the U.S. Standard Sieve No. 70. EOS is defined as the number of the U.S. Standard sieve having openings closest in size to the filter cloth openings.

C. Erosion Control Stone

1. Use field stone or rough unhewn quarry stone for plain rip rap. Use stone that is sound, tough, dense, resistant to the action of air and water and suitable in all other respects for the purpose intended. Where broken concrete from demolished structures or pavement is available, it may be used in place of stone provided that such use meets with the approval of the Engineer. However, the use of broken concrete that contains reinforcing steel will not be permitted.

2. All stone shall meet the approval of the Engineer. While no specific gradation is required, there shall be equal distribution of the various sizes of the stone within the required size range. The size of an individual stone particle will be determined by measuring its long dimension.

3. Stone or broken concrete for rip rap shall meet the following for the class and size distribution.

ACCEPTANCE CRITERIA FOR RIP RAP AND STONE FOR EROSION CONTROL

	Required Stone Sizes, Inches		
Class	**Minimum**	**Midrange**	**Maximum**
A	2	4	6
B	5	8	12
1	5	10	17
2	9	14	23

No more than 5.0% of the material furnished can be less than the minimum size specified nor no more than 10.0% of the material can exceed the maximum size specified.

D. Erosion Control Matting:

Matting for erosion control shall be excelsior matting or straw matting. Furnish a material certification certifying that the matting meets this article. Other acceptable material manufactured especially for erosion control may be used when approved by the Engineer in writing before being used. Matting for erosion control shall not be dyed, bleached or otherwise treated in a manner that will result in toxicity to vegetation.

1. Excelsior Matting

   Excelsior matting shall consist of a machine produced mat of curled wood excelsior at least 47" in width and weigh 0.975 lb/sy with a tolerance of ± 10%. At least 80% of the individual excelsior fibers shall be 6" or more in length. Evenly distribute the excelsior fibers over the entire area of the blanket. Cover one side of the excelsior matting with an extruded plastic mesh. The mesh size for the plastic mesh shall be no more than 1" x 1".

2. Straw Matting

   Straw matting shall consist of a machine produced mat of 100% grain straw. The straw matting shall have a width of at least 48" and no more than 90" and weighing at least 0.50 lb/sy and no more than 0.75 lb/sy. Evenly distribute the straw over the entire area of the blanket. Cover one side of the blanket with photodegradable netting with a maximum mesh (netting) size of 0.75" x 0.75" sewn together with a degradable thread. The grain straw shall contain no weed seeds. Package each roll separately.

3. Wire Staples

   Staples shall be machine made of No. 11 gauge new steel wire formed into a U-shape. The size when formed shall be not less than 6" in length with a throat of not less than 1" in width.

PART 3 EXECUTION

A. Install Erosion Control Devices:
   1. Install erosion control devices, which shall be in place and operational prior to other land disturbing activity.
   2. After installing erosion control devices as indicated on the Drawings, verify that reasonable measures have been taken to prevent the sedimentation of nearby watercourses, existing and new facilities, and adjacent property.
   3. Should Contractor believe that additional measures are necessary to adequately prevent erosion, immediately notify Engineer. If rain is predicted before the Engineer can be notified, take measures as necessary to prevent siltation of nearby water courses.
   4. After installing erosion control devices, request an inspection by the local agency having jurisdiction and the Engineer.
   5. Incorporate permanent erosion control work into the project at the earliest practicable time. Coordinate temporary erosion control measures with permanent erosion control measures and other work on the project to assure effective and continuous erosion control throughout the construction and post construction period.
   6. Maintain erosion control devices during construction until the disturbed areas are stabilized and the agency having jurisdiction and the Engineer have approved the removal of the erosion control devices.

B. Borrow and Disposal Areas:
   1. Obtain and pay for erosion control permit for borrow and disposal areas as required by Engineer and the local agency having jurisdiction. (NCDENR)
   2. Install and maintain erosion control devices in accordance with Contractor's approved plan.

C. Silt Fences: Provide posts and metal fence fabric as detailed on the drawings and cover with filter cloth as indicated to furnish an effective filtering medium to separate soil sediment from the storm water runoff. The filter cloth shall be permanently attached to the fence to prevent displacement and the bottom of the filter cloth shall be buried to prevent under-washing in heavy rainstorms.

D. Filters: Gravel filters as detailed on the drawings, consisting of piles of #57 stone shall be placed around permanent and temporary drainage structures to allow storm water to flow into natural drainage channels while separating soil sediment from the storm water runoff.

E. Rock Inlet Sediment Traps: Provide posts, staples, hardware cloth and stone of type and class as detailed on the drawings. Structural stone, per class specified, shall be placed around the outside perimeter of the inlet structure with approximately 2:1 side slopes and plate the upstream side with #57 stone.

F. Rock Pipe Inlet Sediment Traps: Provide stone of type and class detailed on the drawings. Surround structure with a sediment storage area built to 3600 cubic feet per disturbed acre. Dam must be a minimum of 18 inches high.

G. Temporary Swales and Ditches: Temporary swales and ditches shall be graded to the profiles and sections indicated and in the locations directed. Slope all swales and ditches to drain to the basins and/or filters as indicated.

H. Erosion Control Matting:
   Matting for erosion control shall be excelsior matting or straw matting. Furnish a material certification certifying that the matting meets this article. Other acceptable material manufactured especially for erosion control may be used when approved by the

Engineer in writing before being used. Matting for erosion control shall not be dyed, bleached or otherwise treated in a manner that will result in toxicity to vegetation.

1. Excelsior Matting

   Excelsior matting shall consist of a machine produced mat of curled wood excelsior at least 47" in width and weigh 0.975 lb/sy with a tolerance of ± 10%. At least 80% of the individual excelsior fibers shall be 6" or more in length. Evenly distribute the excelsior fibers over the entire area of the blanket. Cover one side of the excelsior matting with an extruded plastic mesh. The mesh size for the plastic mesh shall be no more than 1" x 1".

2. Straw Matting

   Straw matting shall consist of a machine produced mat of 100% grain straw. The straw matting shall have a width of at least 48" and no more than 90" and weighing at least 0.50 lb/sy and no more than 0.75 lb/sy. Evenly distribute the straw over the entire area of the blanket. Cover one side of the blanket with photodegradable netting with a maximum mesh (netting) size of 0.75" x 0.75" sewn together with a degradable thread. The grain straw shall contain no weed seeds. Package each roll separately.

3. Wire Staples

   Staples shall be machine made of No. 11 gauge new steel wire formed into a U-shape. The size when formed shall be not less than 6" in length with a throat of not less than 1" in width.

I. Seeding: Refer to Section 00480.

J. Maintenance
   1. The Contractor shall be responsible for periodic reviews of the conditions of the erosion control measures and shall remove all soil sediment and debris as it accumulates in and around the sediment collection structures.
   2. The Contractor shall make all necessary repairs to the erosion control measures to insure their proper operation and function throughout the duration of the project.

K. Self-Inspection and Monitoring:
   1. Provide self-inspection and reporting as required by the Sedimentation Pollution Control Act for the duration of the project. These inspections will be performed to ensure that the approved sedimentation and erosion control measures on the Drawings are installed, maintained, and working adequately.
      a. The inspections need to be conducted after each phase of the project, and continue until permanent ground cover is established.
      b. The self-inspection forms and information regarding this program are provided at the following website: http://www.dlr.enr.state.nc.us/pages/sedimentation new.html.
      c. Documentation of inspections shall be recorded on a single copy of the approved erosion and sedimentation control drawings. These Drawings and inspection reports shall be made available at the project site.
   2. Provide weekly self-monitoring in accordance with the NPDES Stormwater permit for all construction activities

L. Removal of Temporary Erosion Control Measures: Remove erosion control devices upon the approval of the permanent stabilization of the site by the agency having jurisdiction of the area (NCDEQ) and the Engineer. Dress sediment deposits remaining in place after the erosion control devices are removed to conform to the existing grade, prepared and seeded.

Include cost of removal and cleanup in the cost of the installation of the device. All grassed areas disturbed as a result of this removal shall be re-grassed as called for in Section 00480.

END OF SECTION 00430

SECTION 00435

TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall design, furnish, and install any trench stabilization necessary to maintain excavations for pipe and drainage structure installation. The Contractor shall be responsible for installation and removal of any trench stabilization. The Contractor shall also be responsible for any damage to adjacent structures resulting from the installation, removal or absence of trench stabilization. Payment for all labor, equipment, and materials involved in this specification will be considered incidental to the cost of construction.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 00435

SECTION 00440

MILLING BITUMINOUS PAVEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Summary Of Work: The work covered by this section consists of milling bituminous pavement at locations, depths, widths, and typical sections indicated in the plans and special provisions or as directed by the Engineer.

B. The work also includes removing, transporting, and disposing of the milled material and cleaning the milled pavement surface.

C. The milled material shall become the property of the Contractor. All milled material shall be legally disposed of by the Contractor in areas provided by him which are outside the right-of-way, except where the milled material is used in the work. Milled material must be removed and disposed of on same day.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Equipment shall include a self-propelled unit capable of removing the existing bituminous pavement to the depths, widths, and typical sections shown in the plan, special provisions or as directed by the Engineer. The equipment shall have been designed and built exclusively for pavement milling operations and shall have sufficient power, traction, and stability to accurately maintain depth of cut and slope. The milling machine shall be equipped with a grade control system which will automatically control the longitudinal profile and cross slope of the milled surface by the use of one or more skid sensors moving along the pavement surface. The machine shall be capable of leaving a uniform surface suitable for handling traffic without excessive damage to the underlying pavement structure. The milling machine and other loading equipment shall be capable of loading milled material to be used in other parts of the work without excessive segregation. The milling machine must be on tracks, not wheels.

B. Additional equipment necessary to satisfactorily remove the pavement in the area of manholes, water valves, curb and gutter, and other obstructions shall be provided.

C. The milling equipment shall be equipped with a means of effectively limiting the amount of dust escaping from the removal operation in accordance with local, State and Federal air pollution control laws and regulations.

2.02 TOLERANCES

A. Tolerance: Removal of the existing pavement shall be to the depth required by the plans or project special provisions. The Engineer may vary the depth of milling by not more than one inch.

PART 3 EXECUTION

3.01 INSTALLATION

A. The existing pavement shall be milled in a manner which will restore the pavement surface to a uniform longitudinal profile and cross section at the locations and in accordance with typical sections shown in the plans. Where indicated in the plans or project special provisions, removal shall be to a specified depth and shall produce a specified cross slope. The Contractor shall mill intersections and other irregular areas as indicated in the plans, project special provisions, or as directed by the Engineer.

B. The Contractor may elect to make multiple cuts to achieve the required depth of cut or cross slope required by the plans.

C. The longitudinal profile of the milled surface shall be established by a mobile string line on the side of the cut nearest the centerline of the road or as directed by the Engineer. The cross slope of the milled surface shall be established by an automatic cross slope control mechanism or by a second skid sensing device located on the opposite edge of the cut. The Engineer may waive the requirement for automatic grade and cross slope controls where conditions warrant.

D. The milling equipment shall be operated in such a manner as to prevent damage to the underlying pavement structure, utilities, drainage facilities, curb and gutter, paved surfaced outside the milled area, and reasonably smooth and free of excessive scarification marks, gouges, ridges, continuous grooves, or other damage as determined by the Engineer. Any leveling or patching required as a result of negligence by the Contractor shall be repaired with hot bituminous plant mix at no cost to the City of Fayetteville and in a manner acceptable to the Engineer. The Contractor shall coordinate the adjustment of manholes, meter boxes and valve boxes with the milling operation.

E. Milling limits will be determined by Engineer before operation begins.

F. Inspector must be present during milling.

G. The Engineer may require re-milling of any area exhibiting defects such as lamination or other defects. If the defects are determined to be the result of the Contractor's negligence, then measurement of the re-milling, as specified in Unit Prices, will not be made. If, however, the Engineer directs the re-milling of an area which is not due to the Contractor's negligence, measurement of the re-milled area will be made under provisions of Unit Prices.

H. The milled pavement surface shall be thoroughly cleaned of all loose aggregate particles, dust and other objectionable material by the use of power brooms, power blowers, power vacuums or other means. Disposal or wasting of oversized pavement or loose aggregate material will not be permitted within the right-of-way.

I. The pavement removal operations shall be conducted to effectively minimize the amount of dust being emitted. The operations shall be planned and conducted so that it is safe for persons and property adjacent to the work including the traveling public.

END OF SECTION 00440

SECTION 00445

PAVEMENT JOINT SEALER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section consists of the furnishing and placement of joint sealer material in accordance with these specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. Joint sealer shall be hot poured rubber asphalt conforming to AASHTO M 173, except as otherwise provided below.

B. The joint sealer shall be free of all foreign material. When melted it shall be free of lumps. The composition of the material shall be a mixture of virgin synthetic rubber, or a combination of both, with asphalt, plasticizers, and tackifiers. Under no circumstances shall ground cured rubber scrap be used in place of virgin or reclaimed rubber.

C. The requirements of AASHTO M 173 for flow and bond shall be modified as follows:
   1. Flow test at 140 degrees F. 1.0 CM Max.
   2. Bond test shall be performed at minus 20 degrees F. instead of 9 degrees F.
   3. Ductility shall be not less than 40 CM when tested in accordance with ASTM D113.

PART 3 EXECUTION

3.01 INSTALLATION

A. Construction Methods: All existing pavement cracks in excess of 1/8 inch but less than 1 ½ inches will be cleaned using a hot compressed air lance. The cracks shall be sealed with hot poured rubber asphalt meeting the requirements with these specifications.

B. The joint sealer shall be allowed to dry tack free prior to placing traffic on a sealed area of roadway. Apply DeTack (brand name) or equivalent to remove tackiness. Material shall be placed using the wand followed by a "V- shaped" asphalt squeegee. This method will allow uniform filing of the cracks and reduce excess material due to over-banding.

C. The Contractor shall provide all traffic control in accordance with the Manual on Uniform Traffic Control Devices.

END OF SECTION 00445

SECTION 00450

PLANT MIX BITUMINOUS CONCRETE SURFACE COURSE
AND
BITUMINOUS CONCRETE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section consists of the production, delivery, placement and compaction of all types of bituminous plant mixed bases and surface courses.

1.02 REFERENCES

A. The "Standard Specification for Roads and Structures" current edition and any revisions by the North Carolina Department of Transportation (NCDOT) will govern in its entirety the work under these specifications except as they are modified hereinafter.

B. Bituminous Plants Production: All bituminous plants shall meet specification 610 of the Standard Specifications of Roads and Structures current edition and any revisions by the NCDOT. All bituminous plants that produce bituminous mixes that are to be used within the rights-of-way of the City of Fayetteville, or on any new street that is to be accepted by the City of Fayetteville, shall have a current and up to date certification of the asphalt plant on file with the City of Fayetteville.

1. Any bituminous mix that is produced by a plant that does not have NCDOT certification is unacceptable for use within the City of Fayetteville.

C. Quality Management System for Asphalt Pavements: The Contractor shall produce and construct asphalt mixtures and pavements in accordance with a quality management system as described in Section 609 of the NCDOT Standard Specifications. The Contractor shall submit only NCDOT approved mix design and must be approved by the Engineer prior to delivery. Apply these specifications to all materials and work performed in accordance with Division 6 of the NCDOT Standard Specifications. Perform all quality control activities in accordance with NCDOT “Hot Mix Asphalt Quality Management System (HMA/QMS)” Manual.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Weather and Temperature Limitations: This section addresses air temperature, road surface temperatures, seasonal limitations, weather requirements, the layer thickness that apply when producing and/or placing the various mixture types. Bituminous mixtures shall not be produced or placed during rainy weather, when the sub-grade or base course is frozen, nor when the moisture on the surface to be paved would prevent proper bond. Bituminous material shall not be placed when the air temperature, measured in the shade away from artificial heat at the location of the paving operations, is less than the following temperatures:

	TEMPATURE OF LAYER BEING PLACED	
Material Type	Minimum Air Temperature	Minimum Road Surface Temperature
ACBC, Types B 25.0C, B 37.5 C, PADC	35 degree F (2 degree C)	35 degree F (2 degree C)
ACIC, Types I 19.0C	35 degree F (2 degree C)	35 degree F (2 degree C)
ACSC, Types S 4.75A, SF 9.5B	40 degree F (5 degree C)	40 degree F (5 degree C)
ACSC, Types S 9.5C	40 degree F (5 degree C)	40 degree F (5 degree C)

* For final layer of surface mixes containing recycled asphalt shingles (RAS) the minimum surface and air temperature shall be 50°F.

1. In addition, surface course material, which is to be the final layer of pavement, shall not be placed between December 15 and March 16, except that open-graded asphalt friction courses (OGAFC) will not be placed between October 31 and April 1 of the next year, unless otherwise approved by the Engineer.
2. As an exception to the above, when in any day's operations the placement of a layer of bituminous base course material or binder material 2" or greater in thickness has started, it may continue until the temperature drops to 32 degrees Fahrenheit (F).

PART 2 PRODUCTS

2.01 MATERIALS

A. Composition of Mixtures (Job Mix Formula): All bituminous plant mixes that shall be used within the rights-of-way of the City of Fayetteville shall be produced in a NCDOT certified bituminous plant.

B. All bituminous base courses and surface course mixes that are to be use within the rights-of-way of the City of Fayetteville shall be NCDOT approved and have all job mix formulas on file with the City of Fayetteville. No other bituminous mixes will be acceptable. Must submit mix design for the project.

C. All binder shall meet the appropriate requirements of Section 610 of the NCDOT Standard Specifications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Construction Requirement: The production, spreading, finishing, weather limitation, joints, compaction, density and surface requirements shall be in accordance with the Standard Specifications for Roads and Structures current edition and any revisions by the NCDOT.

B. Transportation of Bituminous Mixture: The mixture shall be transported from the mixing plant to the point of use in vehicles which have tight, clean, smooth metal beds that have been sprayed with a lime solution, a soap and oil solution, or other approved material, to prevent the mixture from adhering to the beds. Fuel oil is not permitted for this purpose. Truck beds shall be drained prior to loading. Each load of mixture shall be fully covered with a canvas or other suitable material. All covers shall be so constructed and secured as to prevent the entrance of moisture and the rapid loss of temperature. A 3/8 inch diameter hole shall be provided on each side of the vehicle body near the center of the body and 6 inches above the bed of the vehicle for the purpose of inserting a thermometer.

C. The temperature of the mixture immediately prior to discharge from the hauling vehicle shall be within a tolerance of plus 15 degrees F to minus 25 degrees F of the specified job mix temperature.

TABLE 610-1 MIXING TEMPERATURE AT THE ASPHALT PLANT

Binder Grade	JMF Temperature
PG 64-22	300°F
PG 70-22	315°F
PG 76-22	335°F

D. The contractor is required to have a certified Roadway Technician with each paving operation at all times. This person is responsible for monitoring all roadway paving operations and directly supervising all quality control processes and activities. Provide a certified nuclear gauge operator when nuclear density control is being used. Provide the City of Fayetteville with an organizational chart, including names, telephone numbers, and current certification numbers of all personnel responsible for the quality control program while asphalt paving work is in progress.

E. Utilize the 30 foot minimum length mobile grade system to control longitudinal profile when placing the initial lanes and all adjacent lanes of all courses, including resurfacing, leveling courses, and asphalt in-lays, unless otherwise approved by the Engineer. Where public traffic is being maintained, apply only as much tack coat as can be covered during the same day's operation. In addition, the Engineer may limit the application of tack coat in advance of the paving operation depending on traffic conditions, project location, proximity to business or residential areas, or other reasons. In the event that tack coat material is not covered in the same day's operation, the Engineer may require the application of suitable granular material or other means to provide a safe traffic condition at no additional cost to the City of Fayetteville. The contractor will be responsible for any clean-up of the materials that was placed at no cost to the City of Fayetteville.

F. Contractor will furnish with each load of asphalt a scale ticket by a certified weigh master showing the amount of asphalt on the truck. Contractor will be paid on a unit price per ton of asphalt that is actually placed and rolled to a finish asphalt surface or base course.

G. The Engineer may prohibit or restrict the use of vibratory rollers where damage to the pavement being placed, the underlying pavement structure, drainage structures, utilities, or other facilities is likely to occur or is evident.

H. The final surface course material shall be compacted using two steel-wheel rollers and a pneumatic tired roller. For any paving operations, two rollers required on site.
   1. Initial rolling shall be achieved using an 8 to 10 ton steel wheel roller.
   2. Intermediate rolling shall be achieved using a pneumatic tired roller.
   3. Final rolling shall be achieved using an additional steel wheel roller.

I. Surface Smoothness:
   1. Base Course – 1/4" in 10 feet.
   2. Surface Course – 1/8" between any two contact points, 10 foot straight edge.

3.02 SPECIAL CONSIDERATION

A. Traffic Loops: When paving intersections requiring loop installations, the Owner shall be given ten (10) calendar days between completion of the first course and beginning of the second course in which to execute said loop installation. Contractor shall install loops before final layer, no later than five (5) days from when milled or as approved by the Engineer.

END OF SECTION 00450

SECTION 00451

PERMANENT PAVEMENT PATCH

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removing pavement in parking lots, roads, sidewalks, curb and gutters, drives etc. Installation of the permanent patch shall be completed in accordance with City of Fayetteville Specifications and Drawings. Maximum widths for trenches have been established for all sanitary sewer mains, force mains, sewer laterals, water mains, water laterals and storm drainage, regardless of the depth of excavation or type of existing pavement. Maximum widths shown include a minimum cutback of twelve (12) inches each side of the trench prior to placing pavement trench patch. Any pavement removed or damaged beyond the limits specified herein, shall be replaced by the Contractor at his own cost unless directed otherwise by the Engineer. No payment for overage beyond the quantity shown in the Bid Form will be made.

Maximum Widths for Pavement Trench Patch

Storm Drainage	6’	(for pipe 24” in diameter and less)
Storm Drainage	8’	(for pipe 30” up to 42” in diameter)
Storm Drainage	10’	(for pipe 48” up to 54” in diameter)
Storm Drainage	12’	(for pipe greater than 54”)
Sanitary Sewer	10’	(0’ to 10’ depth, measured to invert of pipe)
Sanitary Sewer	12’	(greater than 10’ depth, measured to invert of pipe)
Sewer Laterals	6’	
Water Main	4’	
Water Services	4’	

B. Contractor shall be required to remove installed patch, re-compact base and sub-base, dispose of unsuitable material off-site and re-patch any areas of settlement at no expense to the Owner. When excavating prior to paving, transitions shall be made to accommodate road travel at no additional cost to the Owner.

C. After completion of the excavation, etc., any trench or opening in any street or sidewalk shall be properly backfilled following City standards for compaction. The material used in replacing the surface course shall be of the same type and thickness and equal in quality to that which was removed. Excavatable flowable fill in accordance with the City’s specifications may be used instead of backfill from the invert to the base layer elevation at the discretion of the Engineer.

D. Any street that is degraded 25% or greater between intersection shall be overlayed with a minimum of 1-½ (1.5) inches of asphalt for the entire length between the intersecting streets. Percentage of degradation will be determined prior to excavation including existing and new degradation. A temporary patch flush with the existing asphalt elevation is to be used for one (1) year to allow settlement prior to final asphalt layer. The contractor may elect to pay in-lieu-of overlay in accordance with the City’s fee schedule. For additional requirements on excavation in the right of way, refer to Chapter 24, Article 11.

E. Contractor shall repair any pavement markings, signal loops and any other traffic device damaged during work.

F. All work shall be performed with the appropriate traffic control standards and in accordance with the latest edition of MUTCD and City Standards.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PERMANENT ASPHALT PAVEMENT PATCH

A. Remove and replace asphalt pavement as described in the unit prices section and as indicated on the bid form. Asphalt and stone shall be installed as indicated in applicable specifications and details or as directed.

3.02 REPLACE GRAVELS/SOIL DRIVEWAYS WITH AGGREGATE BASE COURSE (NO OVERAGE ALLOWED)

A. Existing gravel and/or soil driveway shall be replaced with six (6) inch thick stone; compacted Aggregate Base Course (ABC) or whichever matches existing type stone. Replacement of the drive shall be to existing or better condition.

END OF SECTION 00451

SECTION 00455

CONCRETE (CURB AND GUTTER, SIDEWALK, DRIVEWAY)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This work shall consist of Portland cement concrete combination curb and gutter, sidewalk and driveway constructed on a prepared sub-grade, in one course, in conformity with the lines, grade and typical cross section shown on the plans and in accordance with these specifications.

1.02 DESIGN REQUIREMENTS

A. Proportioning of Concrete: The concrete shall be mixed in proportions approved by the Engineer. The concrete shall develop at 28 days a minimum compressive strength of 3,000 pounds per square inch. The consistency range in slump of the concrete shall be two to four inches.

B. Air Entrainment of Concrete: All exposed concrete shall have 6 percent (+ or - 1.5 percent) entrained air as discussed in ASTM C 494-80. Measurement shall be with a roll-meter in accordance with ASTM C173-81 or a pressure meter in accordance with ASTM C281-81. Use of other testing procedures will be considered if requested in writing.
   a) The concrete from a central plant shall be delivered by a mobile agitator type mixer and deposited at the consistency specified without segregation. The time lapsing from mixing to placing the concrete shall be in accordance with NCDOT requirements.
   b) Concrete shall be mixed only in such quantities as are required for immediate use and all such material shall be used while fresh and before initial set has taken place. Any concrete in which set has begun shall not be used in the work. Re-tempering of concrete will not be allowed.

C. Finished grade of the sidewalk shall be based on the top of curb elevation.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather and Night Concreting: Concreting shall be done when weather conditions are favorable unless otherwise directed by the Engineer. Concrete operations shall be discontinued when the temperature of 40° Fahrenheit is reached on a falling thermometer. No concreting shall be attempted when local weather bureaus indicate temperatures below freezing within the ensuing 24 hours unless proper precautions are made to protect concrete by covering with straw and plastic or other thermal insulation satisfactory to the Engineer. The Contractor shall be responsible for the quality and strength of the concrete laid during cold weather and any concrete damaged by frost action or freezing shall be removed and replaced as directed by the Engineer at the Contractor's expense.
   a) No more concrete shall be laid than can be properly finished and covered during daylight, unless adequate artificial light satisfactory to the Engineer is provided.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: The cement used in this item shall be a standard brand of Portland cement or high-early-strength Portland cement conforming to the requirements of AASHTO Specifications. Different brands of cement, or the same brand from different mills, shall not

be mixed nor shall they be used alternately in any one continuous pouring between transverse joints.

2.02 SOURCE QUALITY CONTROL

A. Testing: The Engineer shall engage and pay an approved independent testing agency to conduct the routine testing of material for compliance in accordance with ACI 301-72, Chapter 16.

B. Test reports shall be furnished to the Engineer in quadruplicate at the earliest possible date following the testing.

C. If cylinder test results indicate that the concrete has not or will not reach the required 28-day compressive strength, the Engineer shall have the right to require any additional testing as necessary to determine the actual in-place strength of the concrete. Such additional testing will be at the Contractor's expense.

D. The Engineer shall have the right to require the removal and subsequent replacement of any concrete not meeting the minimum 28-day compressive strength. Such removal and replacement shall be at the Contractor's expense.

2.03 CONCRETE

A. The concrete shall be an approved NCDOT certified mix.

PART 3 EXECUTION

3.01 PREPARATION

A. Cleaning Site: Prior to the acceptance of the work, unsightly objects such as stones, stumps, limbs, roots, concrete, etc., shall be removed from the site and disposed of to the satisfaction of the Engineer. Work shall not be considered complete until all cleaning up has been done and the site is of a neat appearance.

3.02 INSTALLATION

A. Sub-grade: The sub-grade shall be excavated to the required depth below the finished surface in accordance with the plans and lines and grades established by the Engineer. All soft and yielding material or other unsuitable material shall be removed and replaced with approved material, and compacted thoroughly at the expense of the Contractor. If the sub-grade is in a filled section, the entire area shall be compacted to an unyielding surface.

B. Forms: Forms shall be set true to the lines and grades established by the Engineer. Sections less than 5 feet will not be accepted. Forms shall be held rigidly in position and shall be of sufficient strength to resist springing out of line when the concrete is placed. Forms shall be metal of the necessary dimensions to construct the combined curb and gutter, sidewalk or driveway shown on the drawings or specified. Wood forms may be used only where conditions make the use of metal forms impractical, and then only when approved by the Engineer. Forms for straight curb and gutter or radius curb and gutter having a radius of 350 feet or over shall be of steel of an approved type. Bent steel forms or steel forms with top or bottom flanges out of square sides or forms without pin lugs shall not be used and shall be removed from the construction site. Flexible steel forms shall be used on all radius curb having less than a 350 foot radius.

C. Placing of Concrete (Curb and Gutter): The curb and gutter shall be constructed in place in uniform sections 10 feet in length. The joints between sections shall be formed by steel templates 3/16 inches in thickness. Templates shall conform strictly to the curb and gutter

section. All joints shall be at right angles to straight curb and in radius line in radius curb. Any broken edges or joints may be cause for rejection. Templates must be pulled halfway out before concrete is set in order that concrete may run under the template. After concrete is set and while the forms are still in place, the templates are to be completely removed. When a curbing machine is used, the Contractor should use all precautions to prevent curb from settling when first starting, especially when grade is critical (below 1 percent). Contractor shall check grade on new poured curb before concrete has set so that correction can be made to the flow line of the curb.

a) Expansion joints of approved material for curb and gutter shall be provided every 90 feet or as directed by the Engineer. Joint material shall be not less than ½ inch in thickness, cut true to section, and shall be placed against the steel template forming the joint. Care shall be taken not to disturb the position of the expansion joint filler material during the removal of the templates.

b) Prior to placing of concrete, the sub-grade shall be moistened and the contact side of the forms shall be coated with a heavy oil. After the placing of the concrete within the forms, the sides of the forms shall be spaded with a flat spade of approved type. All voids that may appear after forms have been removed, shall be wetted thoroughly and plastered. An excess of voids will be cause for rejection. A slip form concrete machine may be used only on a trial basis and must meet the approval of the Engineer.

D. Placing of Concrete (Driveways and Sidewalks): Thickness shall be minimum of 4" for residential driveway aprons and 6" for commercial driveway aprons. Expansion joints of approved material shall be provided every 10 feet or as directed by the Engineer. Joint material shall be not less than ½ inch in thickness, cut true to section, and shall be placed against the template forming the joint. Care shall be taken not to disturb the position of the expansion joint filler materials during the removal of the templates. Seal expansion joints where sidewalk and curb ramps are placed adjacent to concrete curb and/or gutter. Do not seal grooved joints.

a) Prior to placing of concrete, the sub-grade shall be moistened and the contact side of the forms shall be coated with heavy oil. After the placing of the concrete within the forms, the sides of the forms shall be spaded with a flat spade of approved type. All voids that may appear, after forms have been removed, shall be wetted thoroughly and plastered. An excess of voids will be cause for rejection. A Slip Form Concrete Machine may be used only on a trial basis and must meet the approval of the Engineer.

E. Finishing: All concrete within forms shall be brought to true section by the use of an approved straight edge and shall be tamped with straight edge to bring mortar to the surface, after which it shall be floated smooth by means of wood floats. No steel floats will be permitted. After true surface of section has been obtained, and after initial set has taken place, the entire surface shall be broom finished with a dampened broom. Broom finished in direction of flow, all joints and all exposed edges shall be rounded off with approved jointing and edging tools.

F. Curing: Immediately after finishing operations have been completed, the entire surface of the concrete shall be sprayed with white curing compound (type 11 white pigment). The use of liquid retarding agents shall conform to standards specified by current AASHTO or ASTM specifications.

G. Removal of Forms: Forms shall not be removed from freshly placed concrete until it has set for at least 24 hours. They shall be carefully removed and in such a manner as to prevent damage to the edges of the concrete. Honeycombed areas shall be promptly filled with mortar composed of one part cement and two parts sand.

3.03 FIELD QUALITY CONTROL

A. The Engineer shall have the authority to require the Contractor to remove and replace any curb and gutter, sidewalk, or driveway which has been placed at grade elevations other than those shown on the plans and/or cut sheet. The finished grade of sidewalk is based on the top of curb. Such curbing, sidewalk, or driveway shall be removed and replaced at the Contractor's expense.

B. Curbing, sidewalk, or driveway found to be holding "ponding" water will be removed and replaced at the Contractor's expense.

3.04 PROTECTION OF FINISHED WORK

A. Protection of Concrete: After 72 hours the forms may be removed. Immediately after the forms have been removed and all honeycombed areas repaired, the back of the curb shall be back-filled to prevent under-wash. Traffic shall be excluded from crossing the concrete for a period of approximately 7 days by erection and maintenance of suitable barricades. Contractor shall be responsible for any damage resulting from traffic within the 7 day period and he shall remove and replace any concrete damaged as directed by the Engineer.

END OF SECTION 00455

SECTION 00465

ADJUSTMENT OF EXISTING MANHOLE COVERS AND VALVE BOXES PORTLAND CEMENT CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section consists of adjustment to existing manhole covers and valve boxes.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 INSTALLATION

A. Excavate all material from around casting to a width of 12 inches and to a depth of at least 2 inches below existing brickwork, existing structure or valve box. Remove and dispose of all loose material.

B. The height of any casting adjustment shall be determined by the use of a string line. The string line is to be pulled across casting and for at least 10 feet on each side of casting parallel to curb. Hold string at height of adjustment. Example: 1 inch above existing pavement for resurfacing and/or 2 inches above sand/clay or stone base. Then string is pulled perpendicular across casting from edge of pavement at curb to center line of street. The string shall be set at same adjustment height. Every effort shall be taken to ensure that the surface course and casting shall provide as smooth a ride as possible.

C. When setting casting higher than existing, all brick are to be placed in a "spoke" pattern and laid in a bed of clean fresh mortar. The Contractor is to ensure all brick are set firm to eliminate movement of casting.

D. When setting casting lower than existing, all brick and concrete are to be cut away, leaving a smooth surface. A cap of clean fresh mortar shall be applied to surface as a setting bed for casting.

E. The casting is then placed back on brick and care shall be taken to ensure that it is set on a bed of clean fresh mortar to eliminate movement. Mortar shall meet requirements of N.C. Department of Transportation Standard Specifications current edition and any revisions Section 1040-9 for mortar and Section 1014-1 for mortar sand.

F. The excavated area shall then be back-filled with 3,000 psi Portland cement concrete level to existing surface. The top of concrete shall then be struck smooth with existing surface. Casting is to be cleaned of any concrete spillage. Asphalt shall not be used to back-fill around casting.

G. All adjustments shall then be protected for at least 72 hours before the placement of any surfacing material. A finish surface tolerance shall not vary more than 1/4 inch in any direction.

H. After casting has been adjusted to grade, all excess debris and mortar shall be removed from manhole or valve box.

END OF SECTION 00465

SECTION 00471

NEW MANHOLE COVERS AND VALVE BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section consists of new manhole cover and valve box installations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manhole covers and valve boxes shall be constructed in accordance with the *North Carolina Department of Transportation Standard Specifications for Roads and Structures,* latest edition and revisions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Excavate all material from around casting to width of 18 inches and to a depth of at least 2". Remove and dispose of all loose material.

B. The height of casting adjustment shall be determined by the use of a string line. The string line is to be pulled across casting and for at least 10 feet on each side of casting parallel to curb. Hold string at height of adjustment. Example: 1 inch above existing pavement for resurfacing and/or 2 inches above sand/clay or stone base. Then string is pulled perpendicular across casting from edge of pavement at curb to centerline of street. The string shall be set at same adjustment height. Every effort shall be taken to ensure that the surface course and casting shall provide as smooth a ride as possible.

C. When setting new casting higher than existing, all brick are to be placed in a "spoke" pattern and laid in a bed of clean fresh mortar. The Contractor is to ensure all brick are set firm to eliminate movement of casting.

D. When setting new casting lower than existing, all brick and concrete are to be cut away, leaving a smooth surface. A cap of clean fresh mortar shall be applied to surface as a setting bed for casting.

E. The casting is then placed back on brick and care shall be taken to ensure that it is set on a bed of clean fresh mortar to eliminate movement. Mortar shall meet requirements of NC DOT Standard Specifications current edition and any revisions, Section 1040-9 for mortar and Section 1014-1 for mortar sand.

F. The exposed brick work and face of the existing asphalt shall be cleaned. The excavated area shall be back-filled with 3000 lb. strength concrete to within 2" of finished grade. Concrete shall comply with NCDOT mix design. Casting is to be cleaned of any concrete spillage.

G. All adjustments shall then be protected for at least 24 hours before the placement of any surfacing material. A finish surface tolerance shall not vary more than 1/4 inch in any direction.

H. After casting has been adjusted to grade, all excess debris and concrete shall be removed from manhole cover or valve box.

END OF SECTION 00471

SECTION 00475

STORM SEWER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This item shall consist of storm sewer pipes and structures of the classes, sizes, and dimensions designated, furnished and installed at such places as are designated in accordance with the lines and grades given and in conformity to these specifications. This item shall also include furnishing and construction of such joints and connections to other pipes, catch basins, manholes, endwalls, etc., as may be required to complete the work as shown on the plans.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipes: All pipes shall be of the type and class indicated on the plans.

1. Reinforced concrete pipe shall conform to A.S.T.M. Specifications C-76, Class III, and 15" through 36" diameter shall be of modified or improved tongue and groove type. No plain or straight wall grooves shall be used.

2. Corrugated galvanized metal pipe shall conform to latest AASHTO Specifications. All metal pipe culverts used shall be fully coated inside and outside with an asphalt cement to a minimum thickness of 0.05 of an inch when measured on the crest of the percent soluble in carbon disulfide. The pipe shall be coated with the bituminous material in a manner so that a smooth pavement will be formed in the invert (inside bottom of pipe when installed), filling the corrugation for at least 25 percent of the periphery of the pipe. The pavement shall have a minimum thickness of 0.125 of an inch then measured on the crests of the corrugations.

3. Castings: All casting shall be of the type and duty shown on the plans and shall be approved by the Engineer prior to installation. Castings shall be made of gray iron, ASTM A-48 – class 30, or ductile iron, ASTM A536, grade 65-45-12. Castings shall be free from imperfections not true to pattern. Casting tolerances shall be plus or minus 1/16 inch per foot of dimension. Top shall set neatly in frame, with edges machined for even bearing and proper fit to prevent rattling and flush with the edge of frame. All covers and gratings shall seat firmly without rocking. The Contractor shall replace all faulty castings installed by him at his expense.

4. Mortar*:* Mortar used in brick masonry and joints shall be composed of one-part Portland cement and hydrated lime, (not more that 10 percent of lime, based on the volume of cement, shall be used) and two-parts sand. Portland cement and hydrated lime shall meet the requirements of the latest A.S.T.M. specifications. The sand shall be composed of clean, well graded aggregate. The mortar shall be mixed in a tight mortar box or in an approved mechanical mixer. Mortar shall be used within *45* minutes after mixing.

5. Bedding material shall be #57 washed stone. Stone depth shall be 6” below the pipe (or as specified by the Engineer) and full width of trench as specified in Section 00435 and in standard details.

6. Tracer wire shall be installed on non-metallic pipe. Tracer wire shall be #12 AWG solid-copper wire with green insulation.

PART 3 EXECUTION

3.01 INSTALLATION

A. The trench shall be shaped true to line and grade, and bedding surface for the pipe shall provide a firm foundation. Grooves shall be cut in the trench for bells so that each joint of pipe shall be bedded for its full length.

B. Concrete pipe culverts shall be carefully seated with bells or grooves upgrade and ends fully closed. Joints of concrete pipe shall be thoroughly wet before making the mortar joint. RAM-NEK can be used instead of mortar to seal joints.

C. Modified Tongue and Groove Concrete Pipes: Before succeeding sections of pipe are laid, the lower portions of the bell or groove of the pipe shall be filled on the inside with cement mortar of sufficient thickness to bring the inner surface of the abutting pipes flush and even. After the pipe is laid, the remainder of the joint shall be solidly filled with mortar and sufficient additional mortar to form a bead or ring around the outside of the joint. The inside of the joint shall be wiped and finished smooth. All pipe runs 100 LF or greater shall be videoed to ensure proper alignment and joint sealing. Pipe which is not true to alignment or which shows any settlement after laying shall be taken up and reinstalled without extra compensation.

D. Manholes, Inlets, Junction Boxes, Catch Basins, Etc.: Excavation shall be made to the required depth. The foundation on which the brick masonry is to be laid shall be approved by the Engineer prior to the laying of bricks. The bricks shall be laid so that they will be thoroughly bonded into the mortar by means of the *"shove joint"* method; buttered or plastered joints will not be permitted. The headers and stretchers shall be so arranged as to bond the mass. Brick work shall be of alternate headers and stretchers with consecutive courses breaking joints. All mortar joints shall be completely filled with mortar. No spalls or bats shall be used except for shaping around irregular openings or when unavoidable to finish out a corner. Competent bricklayers shall be employed on the work and all details of construction shall be in accordance with approved practice and to the satisfaction of the Engineer.

1. Steps shall be in accordance with ASTM C478 and made of ½-inch grade 60 steel encapsulated by co-polymer polypropylene and have serrated tread and tall end lugs. Steps as shown on the plans shall be placed in all manholes, catch basins and inlets when they are greater than 42" in depth. The steps shall be set in the masonry as the work is built up, thoroughly bonded and accurately spaced and aligned. Place steps on narrow side of structure.

2. Existing manholes, catch basins and inlets shall be adjusted by the Contractor when designated by the Engineer. The work will be considered an adjustment where the manhole, catch basin or inlet in question is extended or lowered three feet or less in elevation, or where a catch basin can be adjusted to line without tearing out and rebuilding an entire wall. More work than this will not be considered an adjustment, but shall be classified as reconstruction.

3. Inverts in appurtenances shall be shaped to form smooth and regular surfaces free from sharp or jagged edges. They shall be sloped adequately to prevent sedimentation.

4. The casting shall be set in full mortar beds. All castings when set shall conform to the finished grade as established by the Engineer. Any castings not conforming shall be adjusted to the correct grade without extra compensation.

5. Concrete pipe collars may be used for repairing storm drain pipes. Concrete collars may not be installed within 16’ of any structure. Damage within 16’ of structures shall be replaced with new pipe. See detail for more information on installation.

END OF SECTION 00475

SECTION 00480

SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work consists of providing all labor, material, equipment, and services required for all work as described herein and indicated on drawings.
   1. Work specified in this section:
      a. Preparation and placement of top soil. Seeding required within 24 hours after preparation.
      b. Initial maintenance of all planting.

1.02 SUBMITTALS

A. Construction sequence and time schedule.

B. Soil additives and mulch materials.

C. Fertilizers, sterilants, herbicides.

D. Monthly maintenance record: List all herbicides, insecticides, and disease control chemicals used; list a corrective action or replacement of work performed.

E. Suggested maintenance plan for maintenance by City to include chemical recommendations, amount of watering and all other proper care necessary to assure quality plant growth.

F. All other materials: Manufacturer and the product designation.

1.03 MAINTENANCE

A. The Maintenance Period shall extend for a period of one (1) year dating from final inspection.

B. Maintenance requirements:
   1. Maintenance shall include mowing, watering, weeding, leaf raking, fertilizing, and all other care dictated by the standard of the best horticultural practices. (In the event the irrigation system is inoperable or in the absence of such system, it shall be the responsibility of the landscape Contractor to supply sufficient watering from the beginning of planting through the one (1) year warranty period at no additional cost to the City).
   2. Maintain all seeded areas from the time of installation until final acceptance of the entire work.
   3. Keep all seeded areas clean and free of weeds, rubbish, and debris at all times.
   4. Seeded areas shall be protected at all times against trespassing and damage of all kinds for the duration of the maintenance period. If any areas become damaged or injured, they shall be treated or replaced as directed by the City at no additional cost to the City.

C. Final inspection and acceptance:
   1. Prior to request for final inspection, Contractor shall again thoroughly clean all seeded areas.
   2. Final inspection will be made upon request and upon notification that Maintenance Period has ended.
   3. Acceptance will be given upon satisfactory findings in the final inspection or upon satisfactory correction of any deficiencies disclosed by the final inspection.

1.04 REGULATORY REQUIREMENTS

A. City Contract Policies

1.05 COORDINATION

A. Coordinate with installation of irrigation system.

B. Coordinate with all earth work and site work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Substitutions for any materials will not be permitted unless authorized in writing by the City.

B. Topsoil:
   1. Topsoil shall be fertile, friable, natural topsoil typical of topsoil of the locality. The topsoil shall be stripped so that there is no admixture of subsoil and shall be free from clay clumps, stones, roots, or similar substances two inches or more in diameter, debris, or other objects which might be a hindrance to planting operations. The City reserves the right to reject topsoil in which more than 60 percent of the materials passing V.S.S. #100 sieve consist of clay as determined by the Bonyoucous Hydrometer by the dried weights of the materials.

C. Soil Additives:
   1. Manure: Well-rotted, unleached, sterilized stable manure which is free of wood shavings, sawdust, or other undesirable litter and contains no chemical or other ingredients harmful to plants and shall not be less than 9 months old and not more than 2 years.
   2. Peat: Domestic product consisting of partially decomposed vegetable matter of natural occurrence. It shall be brown, clean, and low in content of mineral and wood material, mildly acid, and granulated or shredded.
   3. Lime: Shall be ground limestone (Dolomite) containing not less than 85 percent of total carbonates and shall be ground to such a fineness that 50 percent will pass through a 100 mesh sieve and 90 percent will pass through a 20 mesh sieve. Coarser material will be acceptable, provided the specified rates or application are increased proportionately on the basis of quantities passing through the 100 mesh sieve.
   4. Fertilizer:
      a. Turf Areas, Ground Covers, and Flowers shall be a controlled release formula and shall conform to the applicable State Board of Agriculture fertilizer laws. It shall be uniform in composition, dry and free-flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which has become caked or otherwise damaged making it unsuitable for use will not be acceptable.
      b. All fertilizer and soil conditioners shall be first quality, standard brand agricultural products.

D. Mulch: Use grain straw as mulch at any time of the year. If permission to use material other than grain straw is requested and the use of such material is approved by the Engineer, the season limitations, the methods and rates of application, the type of binding material or other conditions governing the use of such material will be established by the Engineer at the time of approval. Apply mulch within 24 hours of seeding unless otherwise permitted. Spread mulch uniformly by hand or by approved mechanical spreader or blower.

E. Plant Materials: Certificates of inspection shall accompany the invoice for each shipment of seeds as may be required by laws for transportation. File certificates with the City prior to acceptance of the material.

2.02 SOURCE QUALITY CONTROL AND TESTS

A. Testing and Inspection: Within ten days following acceptance of the bid, the City shall be notified of the sources of the materials required, desired to be inspected or tested.

B. Testing:
   1. Top Soil: All new loam or stripped topsoil used in the work of this section of the specifications shall be tested and approved for use by the Engineer prior to being spread. Stripped material may be used if approved and shall be stockpiled so as not to interfere with the other work or with other subgrade of fill materials.
   2. Testing other than soil testing shall be paid for by the City if the City deems the testing necessary.

C. Inspections:
   1. All areas to be planted shall be inspected by the Planting Contractor before starting work. Any defects, such as incorrect grading, etc., shall be reported to the City prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas to be planted, and he shall assume full responsibility for the work of this Section.
   2. During construction and installation, onsite inspections by the City will be made periodically to ensure proper implementation of design. The City retains the right to accept or reject any material or other incidentals needed to complete the project in whole or part and also may stop all work until all discrepancies are resolved.
   3. Any work scheduled beyond normal working hours or on weekends, shall be brought to the attention of the City Inspector for approval. Any work accomplished during these hours and in question will be subject to being done over at the request of the City, at no additional cost to the City.
   4. The City will inspect topsoil to be used to determine whether or not it meets the requirements specified.
   5. City representative shall be present during the application of post emergent sterilization.
   6. After completion of project, Contractor will provide a one (1) year warranty letter.

PART 3 EXECUTION

3.01 INSTALLATION

A. Soil Preparation:
   1. Add any amendments necessary to bring topsoil up to City Standards.
   2. All topsoil must be approved by Engineer.
   3. Coordinate with irrigation work, if any, to assure all lines have been installed prior to placement of topsoil or any other preparation for planting areas.
   4. Rough grades for planting areas have been left 8-12 inches below adjacent paving and/or curbing under work of General Contractor. (Landscape Contractor should plan to provide soil and labor to backfill curbing and sidewalk and should coordinate the work with the general Contractor as his work progresses. It shall be the responsibility of the Landscape Contractor to provide the specified grade for planting areas -- City will not be responsible for any excavation needed to acquire desired depth.)
   5. Debris removal: In all seeding areas, remove and dispose of all wire, rubbish, debris, concrete waste, base rock, or other plant materials which might hinder soil preparation, grading, seeding, or subsequent maintenance. Rake to smooth soil.
   6. Scarify existing earthwork: Soil in all on-grade paling areas shall be ripped or cultivated to depth of 10 inches. Water shall be added and ripping or cultivating shall be continued until the entire specified depth is loose and friable. All debris, pavement,

concrete, and rocks over 2 inches in diameter shall be removed to the specified depth and shall be removed from the site.

7. Place approved topsoil at grade in seeding areas.
8. Rake soil smooth to finished grade, pitched evenly for drainage. Round all changes in gradient and eliminate all depressions where water will pool.
9. Water areas to settle soil. After drying, correct low spots, irregularities, and reestablish finished grade.

B. Finished Grading: When weeding, soil preparation, and soil conditioning have been completed and soil has been thoroughly water settled, all planting areas shall be smooth graded, ready for placement of plant materials and for seeding and/or sodding.

C. Seeded Lawn Areas:
   1. General:
      a. Once site is prepped with lime and fertilizer, it shall be seeded within a 24 hour period.
      b. Seed all lawn areas not covered by sod or other planting areas within scope of construction.
      c. After the areas have been loosened, conditioned, and finish graded as previously specified, they shall be hand raked to remove all clods, weeds, roots, debris and rocks 1 inch in diameter and larger.
      d. Final grades shall be approved by the City prior to seeding.
      e. After final grading has been accepted, no heavy equipment (except lawn rollers) will be allowed onto planting surfaces. Any damaged areas will be prepared using previous method.
      f. De-thatching shall be done in areas not requiring topsoil and grading work and in areas where existing lawn will be top seeded. Use a motor driven de-thatcher to remove all thatch buildup and loosen all areas to be seeded. Area should be hand raked and all debris promptly removed. All seeding shall take place within 24 hours following dethatching. City shall approve all areas for seeding prior to doing so.
   2. Seed Selection:
      a. Seed quantities and mixtures as specified on drawings.
      b. Provide seed complying with the official seed analysis of North America with respect to purity and germination percentages.
      c. Seed should be newly packaged seed (not greater than one year) and should arrive at the job site in the original container. City retains the right to inspect seed specification tag remaining intact on container.
      d. Do not use any seed that has been dampened, moldy, or suffered any other damage in transit or storage.

3. Seed Schedule

COMMON NAME	MIN SEED PURITY	MIN GERMINATION	MAX WEED SEED
Bermuda	90%		1.00%
Fescue tall, (Ky, 31)	98%		1.00%
Wheat	98%	MIN 90%	0.10%
German Millet	98%	MIN 90%	0.10%

POUNDS PER ACRE				
	K-31 Fescue	**German Millet**	**Bermuda Hulled**	**Bermuda Unhulled**
March 15 – Sept 15	100	25	25	--
	K-31 Fescue	**Wheat**	**Bermuda Hulled**	**Bermuda Unhulled**
Sept 15 – March 15	100	30		30

4. Once the seed is applied, the area shall be very lightly raked, either by hand or by mechanical means. All road right-of-ways and/or private grounds shall also be reseeded or sodded with the same type of grass previously found. The seed mixture specifications shall be used as a guide and the Contractor is charged with the responsibility of seeding areas with the proper type of grass existing.
5. All seeded areas will be mulched with 4000 pounds per acre of small grain straw spread uniformly. Approximately 1/4 of the ground should be visible to avoid smothering seedlings. Asphalt emulsion may be used to anchor the straw applied at 150 gal/ton of straw. If asphalt emulsion is used, the Contractor shall not deface buildings, curbs or plantings with asphalt materials. The Contractor shall take sufficient precautions to prevent mulch from entering drainage structures through displacement by wind, water or other causes and promptly remove any blockage which may occur.

3.02 CLEANING

A. Any soil or similar material which has been brought into paved areas by hauling operations or otherwise shall be removed promptly, keeping these areas clean at all times.

B. Upon completion of work under this section, all excess stones, debris, and soil resulting from work under this section which have not previously been cleaned up shall be cleaned up and removed from the project site.

C. All pavements shall be broomed and hosed clean.

3.03 CONTRACT CLOSEOUT

A. Final Inspection:
1. Prior to requesting final inspection, Contractor shall have completed all of the work of seeding. All seeding areas shall be cleaned of all rubbish and debris, all adjacent pavement or surfaces shall be clean, and entire work shall be neat and presentable.
2. The final inspection will be made upon request and upon notification that all work installation is completed.
3. Approval will be given upon satisfactory findings in the final inspection or upon satisfactory correction of any deficiencies disclosed by the final inspection.

END OF SECTION 00480

SECTION 00485

FLOWABLE FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this specification consists of furnishing and placing flowable fill. Flowable fill is a controlled low strength material consisting of Portland cement, fly ash, fine aggregate, and water. It is suitable for filling underground storage tanks and pipe culverts and for back-filling culverts, bridges (where culverts or pipes are installed under a bridge), retaining walls, and roadway trenches.

B. The Contractor shall state on Form 312 the intended use of the flowable fill. The Form shall be accompanied by a listing of compressive strength of at least three 4" x 8" cylinders at the age of 7 and 28 days. The Engineer will advise the Contractor in writing of the acceptability of the mix design.

C. The Contractor may use flowable fill as an option to conventional fill and backfill methods with the approval of the Engineer.

1.02 DELIVERY, HANDLING, AND STORAGE

A. Mixing and Delivery: The Contractor shall comply with the applicable portions of Section 00455.

B. Temperature Requirements: The temperature requirements of Section 00455, Paragraph 1.03A., shall apply.

1.03 DESIGN REQUIREMENTS

A. Composition and Design: The Contractor shall submit to the Engineer the proposed mix design(s) on M&T Form 312 at least 35 day prior to use. Mix proportions shall be determined by a testing laboratory which has been approved by the NC Division of Highways and shall be based on laboratory trial batches meeting the following requirements:

BATCH ITEM	FILL TO BE EXCAVATED	FILL TO REMAIN IN PLACE
Compressive Strength @ 28 Days	80-150 PSI Max	500 PSI Min.
Approximate Quantities Per C.Y.		
Cement	40-100 Lbs. Min.	150 Lbs. Min.
Fly Ash	250-600 Lbs. Min.	300 Lbs. Min.
Fine Aggregate	2000-2500 Lbs. SSD	2650 Lbs. SSD
Water	60 Gals	60 Gals

1.04 To achieve desired placement consistency, flowability may be adjusted by varying the water content approximately + or - 5 gallons per cubic yard without quantitative changes in other materials. Less flowable mixes are desirable when it is necessary to put traffic back on a roadway quickly (i.e., within 8 to 10 hours) or when less buoyant fill is needed to backfill pipes that could float out of position. Pipes that could float shall be anchored or placement shall be in stages to prevent the pipe from floating.

PART 2 PRODUCTS

2.01 MATERIALS

A. All materials shall meet the requirements of N.C. Department of Transportation Standard Specifications dated January 2012, or current edition, Division 10 shown below:

Fine Aggregate	Article 1014-1
Portland Cement	Article 1024-1
Type IP Blended Cement	Article 1024-1
Fly Ash	Article 1024-5
Type IS Blended Cement	Article 1024-1
Water	Article 1024-4
Chemical Admixtures	Article 1024-3

B. Steel plates shall be Grade A36 steel and of a size to cover openings completely and shall be of suitable thickness to support all traffic that may pass over the plate. Steel plates shall be solid with only small holes on the sides to aid in lifting and moving the plates.

PART 3 EXECUTION

3.01 INSTALLATION

A. Placing: Flowable fill shall be discharged directly from the truck into the space to be filled, or by other methods approved by the Engineer. The mix may be placed full depth or in lifts as site conditions dictate. In roadway trenches, the flowable fill shall be brought level with the bottom of the pavement and then paved over. Between filling and paving operations, steel plates may be placed over the trench to accommodate traffic.

END OF SECTION 00485

SECTION 00490

PRECAST DRAINAGE STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section includes round and rectangular pre-cast concrete drainage structures including inlet structure components, sub-grade structure components, grates, covers and accessories.

B. The Contractor shall build inverts in all drainage structures in accordance with NCDOT standards. The additional work and materials required to install inverts will not be measured for payment as this work will be considered incidental to the construction of Drainage Structures.

1.02 REFERENCES

A. Pre-stressed Concrete Institute: Manual for Quality Control for Plants and Production of Pre-cast and Pre-stressed Concrete Products.

B. National Pre-cast Concrete Association: Quality Control Manual for Pre-cast Concrete Plants.

C. American Society for Testing and Materials:
   1. ASTM C478: Standard Specification for Precast Reinforced Concrete Manhole Sections.
   2. ASTM C890: Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Pre-cast Concrete Water and Wastewater Structures.
   3. ASTM C891: Standard Practice for Installation of Underground Pre-cast Concrete Utility Structures.
   4. ASTM C913: Standard Specification for Pre-cast Concrete Water and Wastewater Structures.

D. American Association of State Highway and Transportation Officials Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets (AASHTO M198).

E. American Concrete Institute: Building Code Requirements for Reinforced Concrete (ACI 318).

F. Occupational Safety and Health Administration: Standard 1926.704, Requirements for Pre-cast Concrete.

1.03 SUBMITTALS

A. The following information must be submitted to the project Engineer:
   1. Schedule of the drainage structure components to be provided on the project including the following:
      a. Sheet number where the structure plan and profile are shown.
      b. Line number when applicable.
      c. Drainage structure number or station number.
      d. Invert elevation of the influent and effluent lines as shown on the plans.
      e. Inlet structure flow-line elevation as shown on the plans.
      f. Total height required from top of base slab to top of structure.
      g. Total height of the individual and assembled drainage structure components.
      h. Top and bottom elevation of the drainage structure as calculated.

i. Manufacturer's part or catalog number and number required of each component.
j. Each pipe size, type and hole size and its distance from top of base slab.
k. Pipe location in degrees clockwise from step centerline on round structures.
l. Pipe location on rectangular structures by wall and intersecting angle relative to wall.
m. Minimum round inside diameter or rectangular inside dimensions required.

B. Detail of each pre-cast concrete component to be provided, sealed by the registered Professional Engineer including the following:
1. Manufacturer's part number or catalog number.
2. Inside diameter or dimensions and lay length.
3. Wall thickness and base or top thickness where applicable.
4. Handling weight and lift hole or insert or loop description and location.
5. Wire size, spacing and area provided per vertical foot (when applicable).
6. Reinforcing bar size and spacing or location.
7. Design loads for all rectangular components and round top slab components.
8. Step locations on round structures.
9. Concrete design strength and manufacturer's mix number.
10. Height, width, slope and annular space of the tongue and groove for products requiring tongue and groove joints.

C. Step detail and material specifications.

D. Joint material detail, material specifications and calculations showing that the joint material cross section is greater than the joint's annular space times its height.

E. Lifting device and hole detail including design loads.

F. At the request of the Engineer or owner, submit the following:
1. Structural analysis and design calculations for precast rectangular components and round top slab components, performed in accordance with applicable codes and standards, showing that allowable stresses will not be exceeded. All calculations must be sealed by a Registered Professional Engineer.
2. Calculations or test results verifying that the lifting device components and holes are designed in accordance with OSHA Standard 1926.704.
3. Concrete 28 day compression strength results for every day production of Pre-cast Components for the project was performed, showing the required strength according to the guidelines established in ACI 318.
4. Reinforcing and cement mill reports for materials used in the manufacture of Pre-cast Components for this project.
5. The above test reports for similar Pre-cast Components recently produced, submitted prior to production of Pre-cast Components for this project.

1.04 QUALIFICATIONS

A. The pre-cast manufacturer shall comply with the following requirement:
1. The Precast Manufacturer shall be a NCDOT approved manufacturer of precast concrete structures and have a minimum of 5 years of experience in manufacturing the required components.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to a minimum 40 degrees F prior to, during, and 48 hours after completion of masonry, grouting or concreting work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete shall conform to ASTM C478, C858 and as follows:
   1. Compressive strength: 4000 psi minimum at 28 days.
   2. Air Content: 6% ± 1.5%.
   3. Cementitious Materials: Minimum of 564 pounds per cylinder yard.
   4. Course Aggregates: ASTM C33, bound, crushed, angular granitic stone only.
   5. Fine Aggregates: ASTM C33 free from organic impurities.
   6. Chemical Admixtures: ASTM C494 calcium chloride or admixtures containing calcium chloride shall not be used.
   7. Air Entraining Admixtures: ASTM C260.

B. Reinforcing steel shall be ASTM A615 Grade 60 deformed bar, ASTM A82 wire or ASTM A185 welded wire fabric.

C. Lift Loops shall be ASTM A416 steel strand. Lifting loops made from deformed bars shall not be allowed.

D. Flexible joint sealants shall be butyl rubber based conforming to Federal Specification SS-S-210A, AASHTO M-198, Type B - Butyl Rubber and as follows: maximum of 1 percent volatile matter and suitable for application temperatures between 10 and 100 degrees F.

E. Epoxy gels shall be a 2-component, solvent-free, moisture-insensitive, high modulus, high-strength, structural epoxy paste adhesive meeting ASTM C-881, Type I and II, Grade 3, Class B and C, Epoxy Resin Adhesive.

2.02 COMPONENTS

A. Pre-cast Components shall be designed and manufactured as described in this paragraph and in the following paragraphs for the specific components.
   1. Lifting Inserts, Holes and Devices shall comply with OSHA Standard 1926.704. Lift holes and inserts shall be sized for a precision fit with the lift devices. Lifting devices shall be provided by the Pre-cast Manufacturer.
   2. Joints shall be sealed internally between the tongue and groove and additionally around the external perimeter of the joint as follows:
      a. External Seals shall consist of a polyethylene backed flat butyl rubber sheet no less than 1/16 inch thick and 6 inches wide applied to the outside perimeter of the joint.
      b. Internal Seals shall consist of a plastic or paper-backed butyl rubber rope no less than 14 feet long and having a cross-sectional area no less than the annular space times the height of the joint
      c. At the option of the Contractor, Internal Seals on round joints may consist of an O-Ring Gasket conforming to ASTM C443, installed according to the Pre-cast manufacturer's recommendation.
   3. Rings, Covers, Grates, and Frames shall be Class 30 gray cast iron and shall be designed for 16,000 pound wheel loads when located in roadways.
   4. Pre-cast Base Sections shall be cast monolithically without construction joints or with approved galvanized or PVC water-stop cast in the cold joint between the base slab and the walls. The minimum size of the base section shall be as specified in the schedules.
   5. Wall and inside slab finishes resulting from casting against forms standard for the industry shall be acceptable. Form ties through the wall are not allowed. Exterior slab surfaces below grade shall have a float finish. Small surface holes, normal color variations, normal form joint marks, and minor depressions, chips and spalls will be tolerated. Dimensional tolerances shall be as set forth in the appropriate References. Exposed Drainage Structure Top Components shall have a form finish or a light broom finish on their exposed surfaces. Fins, voids, chips, or fractures over 3/8 inch in diameter shall be filled with thin cement paste and finished to a color and texture

reasonably consistent with that of formed finish. Rings and covers cast in exposed tops shall be free from cement paste build up.

6. Provisions for pipe entrances in the structures shall be cast or cored openings.
    a. Pipe openings in round structures shall remain 6 inches clear of other pipe openings.
    b. Pipe openings in rectangular structures shall not extend into the corners and may extend across a joint only when structural analysis shows stresses to be within the allowable.
7. Components shall be designed in accordance with ACI, ASTM C890 and following loads:
    a. Horizontal Load on Walls: An earth load of 80 psf per foot of burial depth plus a live lateral surcharge due to HS20 traffic loads of 80 psf.
    b. Vertical Load on Below Grade Adapter Slabs and Tops: An earth load of 120 psf per foot of overburden plus a live HS20 traffic load.
    c. Vertical Load on Exposed Inlet tops: A live 300 psf load.
    d. Vertical Load on Cast Iron Covers and Grates Supported Around Perimeter: A live HS20 load.

B. Round Sub-grade Components shall be designed and manufactured in conformance with ASTM C478 and as follows:
1. Riser Sections shall have a minimum lay length of 16 inches.
2. Pre-cast Concentric and Eccentric Cone Sections shall have an inside diameter at the top of 24 inches. The width of the top ledge shall be no less than the wall thickness required for the cone section.
3. Pre-cast Transition Cone or Top Sections may be used to provide an eccentric transition from 60 inch and larger structures to 48 inch diameter risers, cones, and adaptor slabs. Transition tops shall only be used in areas not subject to vehicle traffic with no more than 20 feet of cover.
4. Provide Steps in Bases, Risers, Cones, Transition Cones, and Transition Top sections aligned vertically on 16 inch centers when 42” deep or greater. Secure steps to the wall with a compression fit in cast or drilled holes or cast in place. Steps shall not be vibrated or driven into freshly cast concrete or grouted in place. The steps shall be Copolymer Polypropylene Plastic reinforced with a ½ inch diameter grade 60 bar and have serrated tread and tall end lugs. Pullout strength shall be a minimum of 2,000 pounds when tested according to ASTM C497.
5. Joints of Bases, Risers and Cones shall be manufactured to the joint surface design and tolerance requirements of ASTM C361.

C. Rectangular Sub-grade Components shall be no less than 22 inches wide, 34 inches long, designed and manufactured in conformance with ASTM C913 and as follows:
1. Riser sections shall not be allowed on boxes smaller than 4 feet long by 4 feet wide.
2. Pre-cast Transition Top Sections may be used to provide an eccentric transition from 4 foot by 4 foot and larger storm drain structures to 48-inch diameter risers, cones and adapter slabs. The maximum amount of fill over the transition top section shall be 20 feet.
3. Joints between precast components shall be keyways or tongue and groove. Joints to accept cast iron frames shall be flat and no less than 5" wide.

D. (Access Manhole) Inlet Components shall have cast iron rings and covers shall be as shown in the details with an opening diameter of 22 inches. Adapter slabs and cones shall have a minimum opening diameter of 24 inches. Precast grade rings conforming to ASTM C478, with a minimum lay length of 4 inches and totaling no more than 12 inches in height shall be used to adjust rings and covers to finished grade.

2.03 CONFIGURATION

A. Construct (Access Manhole) Structures to the elevations shown on the plans and as follows:
   1. A 24-inch diameter Cast Iron Ring and Cover
   2. A Concentric or Eccentric Cone or an Adapter Slab and a Round or Rectangular Subgrade Structure sized according to the schedule.

B. Drainage Structures greater than 8 feet deep shall be no less than 48 inches in diameter or 48 inches wide by 48 inches long.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect Precast components prior to unloading from the delivery truck.

3.02 PREPARATION

A. Product Delivery, Storage and Handling: Coordinate delivery with the manufacturer, handle and store the Precast Components in accordance with ASTM C891 and the manufacturer's recommendations using methods that will prevent damage to the components and the joint surfaces.

3.03 PLACING PRECAST CONCRETE SECTIONS

A. Excavate to the required depth and remove materials that are unstable or unsuitable for a good foundation. Prepare a level, compacted foundation extending 6" beyond the precast base and follow ASTM C891 excavation standards.

B. Set base plumb and level, aligning pipe opening with pipe invert.

C. Thoroughly clean joint tongue and grooves to remove dirt and other foreign materials that may prevent sealing. Unroll the Butyl Sealant rope directly against bottom groove. Leave protective wrapper attached until sealant is entirely unrolled against groove. Do not stretch. Overlap from side to side not top to bottom.

D. Set risers and tops, aligning internal wall surfaces, so that proper alignment is achieved, taking particular care to clean, prepare and seal joints.

E. When recommended by the manufacturer, fill the void between horizontal joint surfaces with a sand cement grout around the outside perimeter as risers are set.

F. After joining precast sections, apply the butyl sealant sheet around the outside perimeter of the joints below grade.

G. Secure Pipe Connectors to Pipe according to the Connector Manufacturer Instructions. When pipe stub outs are installed, provide restraint from longitudinal movement before backfill.

H. Lift Holes leaving less than 2" of wall thickness shall be plugged from the outside using a sand cement mortar and then covered with butyl sealant sheet. Lift Holes penetrating the wall shall be additionally sealed with an interior application of an epoxy gel 1/8" thick extending 2" beyond the penetration.

I. Perform the final finishing to the Structure interior by filling all chips or fractures greater than 1/2" in length, width or depth and depressions more than 1/2" deep in inverts with a sand cement mortar. Clean the interior of the Structure, removing all dirt, spills or other foreign matter.

3.04 SCHEDULES

A. Round Storm Drain Structures.

1. Provide round sub-grade structures with minimum inside diameters in inches based on the pipe's outside diameter and the angle formed with the adjacent entering pipe as shown in the table below:

Lar□e□t	Mini□u□ De□ree□ □et□een Pipe Enterin□ □tructure										
Pipe OD	□□□	□□□	□□□	□□□	□□□	□□□	□□	□□	□□	□□	□□
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2. Structures with smaller inside diameters may be supplied when pipes are of different diameters and calculations or shop drawings show that a minimum of 6 inches clearance will be maintained between pipe openings.
3. The minimum lay length of the base section shall be no less than the diameter of the pipe opening for pipe OD up to 87 inches.

B. Rectangular Storm Drain Structures

1. Provide rectangular sub-grade structures with minimum inside wall widths based on the entering pipe's outside diameter and the angle formed with the penetrated wall as shown in the chart below:

Lar□e□t	Mini□u□ De□ree□ □et□een Pipe and □ all						
Pipe OD	□□	□□	□□	□□	□□	□□	□□
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2. Structures with narrower walls may be supplied when pipes are different diameters than shown and calculations of shop drawings show that the pipe will not penetrate the corners of the structure.

END OF SECTION 00490

SECTION 00495

THERMOPLASTIC PAVEMENT MARKINGS
(Alkyd/Maleic)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section consists of the furnishing and placement of Alkyd/Maleic Thermoplastic Reflective Markings in the form of lines and symbols as shown on the pavement marking plans. These markings shall be installed at the locations shown on the pavement marking plans or where directed by the City Traffic Engineer. Installation shall be performed in accordance with the lines, symbols, and dimensions shown on the pavement marking plans or as directed by the City Traffic Engineer. The Contractor shall furnish all materials, services, labor, and equipment necessary for the required pavement preparation and pavement marking installation. The Contractor shall provide sufficient personnel experienced in handling and applying the thermoplastic pavement marking materials to assure that the work is done properly.

1. The work shall meet the requirements of this section and the *North Carolina Department of Transportation Standard Specifications for Roads and Structures*, current revision, and any attached standard pavement marking typical drawings and/or project plans.

B. This special provision covers machine applied hot Alkyd/Maleic Thermoplastic Pavement Marking Material with both incorporated glass beads and drop-on glass beads. The material shall be plainly visible to the motorist both day and night. Nighttime visibility shall be enhanced by retroreflection induced by standard automobile headlights.

1.02 QUALIFICATIONS

A. All Alkyd/Maleic thermoplastic reflective pavement marking products shall be pre-qualified by the City of Fayetteville Traffic Services Division. The process of pre-qualification shall be handled through the Traffic Services Division.

1.03 DELIVERY, STORAGE, AND HANDLING

A. All thermoplastic and glass bead material shall be delivered to the project in containers filled by the manufacturer. Each material container shall be clearly and adequately marked to indicate the material, the date of manufacture, the process, batch or lot number, and the manufacturer's name and location.

B. Dry mixed thermoplastic material shall be shipped in leak proof moisture proof containers.

C. The thermoplastic pavement marking material shall be in block or granular form packaged in either suitable corrugated containers or thermal degradable plastic bags to which it will not adhere during shipment or storage. The packages shall weigh approximately 23 kg (50 pounds). The corrugated containers shall consist of blocks approximately 14 inches x 28 inches x 2 1/4 inch size. Each container shall designate the color, manufacturer's name, batch number and date of manufacture. The label shall warn the user that the material shall be heated in the range of 204° to 227°C (400° to 440° Fahrenheit [F]) during application.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Thermoplastic pavement markings shall not be applied on existing pavement surfaces or new concrete pavements unless the ambient air temperature and the temperature of the pavement is 50° Fahrenheit and rising.

B. Thermoplastic pavement markings shall not be applied on new asphalt surfaces unless the ambient air temperature is 50° F and rising and the temperature of the pavement is 50° F.

C. Thermoplastic pavement markings shall not be placed when the pavement surface shows visible evidence of containing moisture.

1.05 WARRANTY

A. Thermoplastic Pavement Marking Observation Period

1. The Contractor shall warrant the thermoplastic pavement markings in accordance with the Contract.
2. During the warranty period the thermoplastic pavement marking material furnished and installed under this contract shall be warranted against failure due to blistering, excessive cracking, bleeding, staining, discoloration, oil content of the pavement materials, smearing, or spreading under heat, deterioration due to contact with oil, grease deposits, diesel fuel or gasoline drippings, chipping, spalling, poor adhesion to the pavement materials, loss of reflectivity, damage from traffic, and wear.
3. The Contractor, at no expense to the City of Fayetteville shall replace any pavement markings that will not perform satisfactorily under traffic during the warranty period due to defective materials and/or workmanship in manufacture and/or application. (Failure to comply with any portion of this specification shall be considered as unsatisfactory performance of the thermoplastic pavement marking material.)
4. Marking replacement shall be performed in accordance with the requirements specified herein for the initial application, including but not limited to surface cleaning, pavement marking removal, seasonal and weather limitations, etc.
5. Traffic shall be operating on the facility during the warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The material manufacturer has the option of formulating the Thermoplastic Material according to his own specifications, however, the Contractor shall provide to the City Traffic Engineer a certificate of certification that the thermoplastic meets North Carolina Department of Transportation Standard Specification for Roads and Structures, current edition and any revision, Division 10, Section 1087.

PART 3 EXECUTION

3.01 PREPARATION

A. To ensure maximum possible adhesion, the pavement surface upon which the thermoplastic markings are to be placed shall be properly cleaned and free of oil, mud, dust, dirt, grass, loose gravel, and other deleterious material, prior to the application of the thermoplastic pavement markings. Cleaning shall be performed on all surfaces which are to receive new thermoplastic pavement markings. The area to be cleaned shall be a minimum of 2 inches wider that the thermoplastic pavement markings to be placed, such that, an additional 1 inch of cleaned area is on each side of the thermoplastic pavement markings after they are applied.

B. Where cleaning of objectionable material is obscuring existing pavement markings of a lane occupied by public traffic, the residue including but not limited to dust, shall be removed immediately from the surface being treated. Such removal shall be by methods approved by the City Traffic Engineer.

C. On Portland Cement Concrete surfaces, a liquid epoxy resin primer-sealer or equivalent shall be applied to the area where new thermoplastic pavement markings are to be placed unless otherwise recommended by the manufacturer or Engineer. The primer-sealer shall be that recommended by the manufacturer of the thermoplastic material, and shall be approved by the City Traffic Engineer. The material shall form a continuous film which shall dry rapidly and which shall adhere to the pavement surface, thermoplastic material. The primer-sealer shall not discolor nor cause any noticeable change in the appearance of the thermoplastic pavement markings and/or the pavement outside the edge of the finished pavement markings. A sample of the primer-sealer shall be submitted to the City Traffic Engineer, and shall be approved by the City Traffic Engineer prior to application.

D. No direct payment shall be made for this surface preparation (pavement cleaning and application of primer-sealer) as such work shall be considered incidental to the work being paid for by the various thermoplastic pavement marking items in this contract.

3.02 PREMARKING

A. Where no existing markings are in place, the existing markings are not visible, and/or the existing markings are to be removed, the Contractor shall be required to pre-mark each installation of thermoplastic pavement marking materials prior to application. The pre-marking shall be of a manner that will be helpful to the Contractor and the Engineer in placing the thermoplastic pavement markings as directed in the plans. The actual placement of the thermoplastic pavement marking materials shall not be performed until the pre-marking has been inspected and approved by the Engineer.

B. No direct payment shall be made for this pre-marking as such work shall be considered incidental to the work being paid for by the various thermoplastic pavement marking items in the contract.

3.03 METHODS OF APPLICATION

A. The Contractor shall furnish and install by the specified method of application, thermoplastic pavement markings as directed by and in accordance with the pavement markings plans:
   1. Machine applied, hot extruded thermoplastic with glass spheres in the proper ratio to immediately produce a highly reflective marking as described elsewhere in this proposal conventional extrusion equipment or “ribbon gun” extrusion devices.
   2. Machine applied, hot sprayed thermoplastic with glass spheres in the proper ratio to immediately produce a highly reflective marking as described elsewhere in this proposal form. This method shall be approved by the Engineer prior to application.

B. The thermoplastic pavement markings shall be applied to the road surface in a molten state with a homogenous surface application of glass spheres. When applied properly and at the designated uniform thickness and width, the marking shall, upon cooling, be uniformly reflectorized and have the ability to resist deformation caused by traffic throughout its entire length.

C. Application of Thermoplastic Marking Material
   1. The parts of the application and pre-melting equipment shall be thoroughly cleaned of foreign material prior to the introduction of the thermoplastic pavement marking proposed in this specification.
   2. Openings of three to six inches in length shall be provided at intervals of 250 feet in edge-lines placed on the inside of curves and in edge-lines on the low side of tangents as directed by the City Traffic Engineer.
   3. The material shall be heated uniformly throughout and shall have a homogenous dispersant of binder, pigment, and glass beads when applied to the surface of the pavement.

4. To avoid blistering and poor adhesion, the thermoplastic pavement marking material shall be applied to dry pavements in a molten state at a minimum temperature of 205° C (400° F) for Bituminous Pavements and at a minimum temperature of 218° C (425° F) for Portland Cement Concrete Pavements. The temperature shall be checked every 10 minutes for compliance with the specified application temperature range.
5. "Drop-on Beads" shall be uniformly applied to the surface of the molten thermoplastic pavement marking material so that the beads are partially embedded. The beads shall be applied at a rate of 7 pounds per 100 square feet of marking. The cross-sectional thickness of the thermoplastic pavement marking material above the surface of the pavement for center lines, skip lines, transverse lines, mini skip lines, legends, and median islands shall be a minimum of 0.120 inches; edgelines, gorelines, 12-inch crosswalk lines, arrows and diagonals shall be a minimum of 0.90 inches.
6. The thermoplastic pavement marking materials, when formed into traffic symbols and lines, shall have a uniformly thick and smooth surfaced cross-section throughout its entire length.
7. All pavement marking widths, as a minimum, shall not vary by more than ½ inch.
8. Pavement marking lines shall be straight or of uniform curvature and shall conform with the tangents, curves, and transitions as specified in the plans and/or directed by the City Traffic Engineer. Longitudinal lines shall be offset a minimum of 2 inches from longitudinal construction joints of pavements. Longitudinal lane lines of multilane roads shall be offset 2 inches toward the median.
9. The finished lines shall have well defined edges and be free of horizontal fluctuations. The lateral deviation of the finished lines shall not exceed ½ inch from the proposed location alignment, as specified in the plans and/or directed by the City Traffic Engineer, at any point. Any greater deviations shall be sufficient cause for requiring the Contractor to remove and correct such pavement markings at no additional expense to the City of Fayetteville.
10. All pavement marking lines shall be applied with one pass of the pavement marking equipment, except the "X" of the railroad crossing symbol, 24 inch stop bars and 24 inch transverse bands, where two passes of the equipment will be permitted.
11. The stem portion of the straight arrows is to be applied in a single pass and the stem portion of turn arrows is to be applied in a maximum of two passes of the application equipment. Arrow heads may be applied by multiple passes of the application equipment, not to exceed three passes.
12. All pavement marking lines and symbols installed by multiple passes of the application equipment shall exhibit no gaps separating the application passes.
13. The various letters and symbols shall conform to the size and shape outline in the most recent edition of the Manual on Uniform Traffic Control Devices for Street and Highways, and NCDOT Standard, and as shown on the pavement marking plans.
14. The thermoplastic pavement marking material, when formed into traffic symbols and stripes, shall be readily renewable by placing a thin overlay of compatible new material directly over the old material.
15. The Contractor shall protect the pavement markings until they are track free by placing warning devices as directed by the Engineer.
16. Any molten pavement marking which is crossed by a vehicle shall be reapplied, and any subsequent marking made by the vehicle shall be removed by methods acceptable to the Engineer and at no additional expense to the Owner.
17. The Contractor shall be responsible for removing all pavement marking materials spilled upon the road surface by a method acceptable to the Engineer.

END OF SECTION 00495

SECTION 00496

RAISED REFLECTIVE PAVEMENT MARKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section consists of furnishing and installing raised reflective pavement markers.

B. All work performed is to be in accordance with:
1. The North Carolina Department of Transportation Standard and Specifications for Roads and Structures, current edition.
2. The North Carolina Department of Transportation's Highway Design Branch Roadway Standard Drawings, current edition.
3. The Manual on Uniform Traffic Control Devices (MUTCD).
4. The North Carolina Supplement to the MUTCD.
5. Any project plans or sketches.
6. Any project special provisions as attached.
7. The Engineer.

C. All work will be subject to inspection by the City of Fayetteville Traffic Services Division before final payment is made.

D. Under this contract, the Contractor is to install materials identified by the City of Fayetteville. Any tools and/or installation equipment not specifically shown as being furnished by the City of Fayetteville in these special provisions is the responsibility of the Contractor.

1.02 REFERENCES

A. Refer to Roadway Standard Drawing in pavement marking section of the North Carolina Department of Transportation Highway Design Branch Roadway Standard Drawings, current edition for placement of pavement markers.

1.03 QUALIFICATIONS

A. Pre-qualifications: Raised reflective pavement markers are required to be pre-qualified by the City of Fayetteville Traffic Services Division. The process of pre-qualification will be accomplished through the City of Fayetteville Traffic Services Division at (910) 433-1660.

1.04 REGULATORY REQUIREMENTS

A. The Contractor shall comply with all applicable local ordinances and regulations prior to beginning work. He shall obtain all permits and licenses required by state and local agencies having jurisdiction in his area of work.

PART 2 PRODUCTS

2.01 MATERIALS

2.02 All materials for raised reflective pavement markers, shall meet the requirements of the most recent edition of the North Carolina Standard Specifications for Roads and Structures.

A. Your quote shall be at the contract unit price each for the following items for all work http://arcg.is/1rjP9Tinvolved in this project and needs to be submitted on the enclosed bid sheet.
1. Type 1 - Raised non-snow-plowable crystal/white.
2. Type 2 - Raised non-snow-plowable yellow/yellow.

3. Type 3 - Raised non-snow-plowable crystal/red.

B. The work to be performed by the Contractor includes the material, labor, equipment, and traffic control necessary to install these devices.

C. Hot bitumen adhesive shall be used for mounting the pavement markers to the pavement. Other adhesives such as epoxy or cold bituminous adhesive pads will not be acceptable.

D. The pavement marker reflector lens shall be of the glass face type and as illustrated in the most recent edition of North Carolina Department of Transportation Highway Design Branch Roadway Standard Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Construction Methods
1. Construction methods shall meet the requirements of the North Carolina Department of Transportation Standard Specifications for Roads and Structures, current edition and any revisions.
2. The markers shall be seated on the bituminous adhesive with all edges of the marker lapped by adhesive. Markers shall not be installed on the asphalt seam or joint.
3. Traffic control will be installed in accordance with the most recent edition of North Carolina Department of Transportation Standard Specifications for Roads and Structures.

B. Completion and final acceptance of the project shall be contingent upon successful completion of the observation period. The observation period shall be considered a part of the work required to be completed after the final completion date specified herein (15 days after the date of availability of the work).

C. After the completion of the work, the Contractor shall have the work inspected as required by local inspectors having jurisdiction in the area and receive written approval of his work. The Contractor shall be responsible for maintaining traffic in a safe and efficient manner at all work sites. Local ordinances involving the time of day the Contractor may work are to be observed.

END OF SECTION 00496

SECTION 00497

TRAFFIC CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section consists of furnishing, erecting, maintaining, relocating and removing traffic control devices for maintenance of traffic during construction operations.

1.02 REFERENCES

A. All work performed is to be in accordance with:
   1. The North Carolina Department of Transportation Standards and Specifications for Road and Structures, current edition and any revisions.
   2. The North Carolina Department of Transportation Highway Design Branch Roadway Standard Drawings, January 2018 edition and revisions or current edition and any revisions.
   3. The Manual on Uniform Traffic Control Devices (MUTCD).
   4. The North Carolina Supplement to the MUTCD.
   5. Any project plans or sketches.
   6. Any project special provisions.

1.03 SUBMITTAL

A. If the traffic control plan is not included as a part of the project plans, the individual project traffic control plan must be submitted to the City Traffic Engineer within two weeks of being declared the lowest responsible bidder. The City Traffic Engineer will approve or revise and approve the traffic control plan within 5 working days of submittal.

PART 2 PRODUCTS

2.01 MATERIALS

A. The Contractor shall use interim pavement marking paint as described in the most recent edition of The North Carolina Department of Transportation Standard Specifications for Roads and Structures.

B. Traffic cones may be used when approved by the City Traffic Engineer. When cones are used, they shall be either double stacked or have special heavy bottoms such that they will not be blown over by traffic.

C. All traffic control devices furnished by the Contractor shall remain the property of the Contractor, unless otherwise required by the Special Provisions.

PART 3 EXECUTION

3.01 PREPARATION

A. Street Closure
   1. Intended street closures must be requested, in writing to the City of Fayetteville Traffic Engineer, a minimum of five (5) working days prior to the desired closure date. The

request shall state the street name, the from and to locations, and the length of closure time of the individual street to be closed.

2. The request must also be accompanied by a traffic control plan, showing the detour information of through traffic. This plan must be in accordance with the current edition of the MUTCD.
3. After approval, in writing, the Contractor bears full responsibility for the closure to include installation, maintenance and removal of all traffic control devices, as well as all implied liability.

B. No work shall start until all the traffic control devices required for the particular work activity have been installed, inspected, and approved by the Traffic Engineer or his representative.

3.02 TEMPORARY ROAD CLOSURE

A. Conditions represented are for work that requires closings during daytime hours only.

B. This application is intended for a planned temporary closing not to exceed 15-20 minutes.

C. The flaggers shall stop the first vehicle from the position shown, then move to the centerline to stop approaching traffic.

D. A portable message sign may be used in addition to the initial warning sign.

E. NOTE: The spacing between signs has a recommended standard of 200' but can be modified by the City Inspector according to the location of the work space.

3.03 LANE CLOSURE ON MINOR STREET

A. The traffic control procedure shown is appropriate only for low volume, low speed facilities, such as local residential streets.

B. Traffic can regulate itself when volumes are low and the length of the work space is short, thus enabling drivers to readily see the roadway beyond.

C. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

D. NOTE: The spacing between signs has a recommended standard of 200' but can be modified by the City Inspector according to the location of the work space.

3.04 SIDEWALK CLOSURES

A. Additional advance warning may be necessary.

B. Only the traffic control devices controlling pedestrian flows are shown. Other devices may be needed to control traffic on the streets. Use lane closure signing as required.

3.05 INSTALLATION

A. The furnishing, erecting, maintaining, relocating and removing of traffic control devices will be in accordance with the current edition of *The Manual on Uniform Traffic Control Devices* for streets and highways.

B. All traffic control devices must be in place before beginning work each day, removed during intervals when work is not ongoing and removed at the end of the workday.

C. The Contractor shall not obstruct or impede any of the traffic on adjacent streets while installing traffic control or doing construction work.

D. The Contractor shall not close a lane to through traffic at night and during periods of construction inactivity, unless otherwise approved by the Engineer.

E. The Engineer may restrict the Contractor from placing lane closures during certain hours, holidays, or special events because traffic may be unusually heavy. All lane closure types, hours of installation and lengths, will be controlled by and required to be approved by the Engineer.

F. When working within the travelway, the Contractor shall use a standard lane closure or a moving operation caravan utilizing a shadow vehicle and truck mounted impact attenuator, as approved by the City Traffic Engineer. A moving operation caravan shall only be used if the marker operation maintains a minimum speed of 3 MPH at all times with no stops that would narrow or close a lane of travel.

G. The use of police and/or trained flaggers to control traffic through the work site will be provided by the Contractor as required. The Contractor will be responsible for obtaining trained personnel to direct traffic and contacting local authorities for use of police for traffic control where applicable.

H. Time limitation for placement and replacement on pavement markings and markers completed by contractors on newly resurfaced areas:
   1. Marking By Contractor
      a. Divided and Multi-Lane Facilities
         1) For all Interstate highways and access ramps, place all markings including symbols and legends, by the end of each workday's operation.
         2) For all divided and multi-lane facilities, place all center line and lane line markings and railroad and school symbols and stop bars by the end of each workday's operation. Place all edge lines, gore lines, and other symbols within 3 calendar days after they have been obliterated by the resurfacing operation.
         3) A Multi-lane facility is defined as any roadway having more than two lanes to include a two-lane, two-way with two-way center left turn lane.
      b. Two-Lane, Two-Way Facilities
         1) For all two-lane, two-way facilities, place all centerline markings, railroad and school symbols within 5 calendar days after they have been obliterated by the resurfacing operation. Place all edge lines and other symbols within 15 calendar days after they have been obliterated by resurfacing operations.
      c. All Facilities
         1) Place two applications of paint on newly resurfaced asphalt which will remain in place over three (3) months. Place the second application of paint upon ample drying time of the first, as determined by the Engineer.
         2) Install permanent markers within sixty (60) calendar days after completing the resurfacing on each map.

END OF SECTION 00497

SECTION 00499

TEMPORARY PAVEMENT MARKING TAPES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work covered in this section consists of furnishing and applying temporary pavement marking tapes.

B. All work performed is to be in accordance with:

1. The North Carolina Department of Transportation Standard and Specifications for Roads and Structures, current edition.
2. The North Carolina Department of Transportation's Highway Design Branch Roadway Standard Drawings, current edition.
3. The Manual on Uniform Traffic Control Devices (MUTCD).
4. The North Carolina Supplement to the MUTCD.
5. Any project plans or sketches.
6. Any project special provisions as attached.
7. The Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials to be used are 3-M Scotch Lane removable tape #5710 (white or yellow) and Black Line mask #145 or approved equal.

B. Materials other than those listed above must be determined to be an approved equal by the City Traffic Engineer prior to use.

PART 3 EXECUTION

3.01 TEMPERATURE

A. Air and pavement temperature must be at least 50 degrees F and rising.

3.02 PREPARATION

A. Road surface shall be cleaned with high pressure air or by sweeping.

B. Mark pavement where tape is to be applied.

3.03 INSTALLATION

A. Temporary pavement marking tapes shall be applied per manufacturer's instructions.

B. Do not overlap material--use butt splices.

3.04 TAMPING

A. Tape must be tamped, a minimum of three (3) passes back and forth, using one of the following methods:
   1. Roller tamper cart with a minimum load of 200 pounds.
   2. Driving a vehicle tire slowly (2-3 MPH) over the tape.

B. Do not twist or turn the tamping device on the tape.

C. Insure all edges have firmly adhered before opening to traffic.

3.05 REMOVAL

A. For your own safety, wear gloves and eye protection when removing temporary pavement marking tape.

B. Use a chisel-like tool to pry up the edge of the tape.

C. Pull the tape up at a 90 degree angle to the pavement.

D. Burning or grinding is <u>not</u> recommended.

END OF SECTION 00499

SECTION 00900

EMULSIFIED ASPHALT SLURRY SEAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered by this section consists of furnishing and applying and emulsified asphalt slurry seal in accordance with the North Carolina Department of Transportation Standard Specifications for Roads and Structures, current edition, hereinafter referred to as the Specifications, and these Special Provisions.

1.02 REFERENCES

A. The Specifications will govern in its entirety the work under these specifications except as they are modified hereinafter.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Emulsion: The emulsified asphalt shall conform to the requirements of Section 1020 of the NCDOT Specifications.

B. Quick Setting Emulsion: Quick setting emulsion shall be used and the following requirements shall apply:

1. The emulsion shall meet the requirements of Cationic Type CRS-1H of ASTM D 2397. Each change in formulation requires a test as referenced in NCDOT Specifications indicated above.

C. Fine Aggregate: Fine aggregate shall be polish resistant natural or manufactured sand, slag, or a combination thereof. The quality of fine aggregate shall conform to the requirements of Section 1014 of the NCDOT Specifications.

D. Mineral Filler: Mineral filler shall conform to the requirements of Section 1012.1 of the NCDOT Specifications.

E. Water: Water used in the mix shall conform to the requirements of Section 1024.4 of the NCDOT Specifications.

F. Mix Requirements: The Contractor shall submit to City of Fayetteville a mix design and results of the wear loss by the Wet Track Abrasion Test (WTAT) as prepared by an approved testing laboratory. The WTAT will be performed in accordance with ADSTM D 3910. The wear loss by the WTAT shall not be greater than 100 grams per square foot. The wear loss shall apply to the asphalt content limits designated on the job mix formula.

1. The Contractor shall place a test strip for approval by the Engineer prior to beginning the work. Once the consistency of the mix has been approved by the Engineer, the total water content shall be maintained within 3 percent of the approved blend during the course of operation.

2. The gradation of the mix produced shall conform to the job mix range. The asphalt content (residual asphalt)* shall not vary more than 1.5 percent from the approved mix design.

JOB MIX RANGE

TYPE SIEVE SIZE	C PERCENT PASSING
3/8”	100
# 4	90-100
# 8	70-90
# 16	32-54
# 30	23-38
# 50	16-29
#100	9-20
#200	5-15
Design Asphalt Content, Percent #	8.5-11.5

* Residual Asphalt content by Weight of Dry Aggregate.

G. Sampling Requirements: Samples for gradation will be taken from aggregate stockpiles designated by the Contractor for use. Samples for asphalt content and total water content shall be taken from the completed mixture. Samples of aggregate, filler, and emulsion for WTAT will be taken from the job site. The frequency of sampling and testing will be established by the Engineer.

2.02 EQUIPMENT

A. General: All equipment and tools used in the performance of this work shall be furnished and maintained in satisfactory working condition. The mixing and spreading equipment shall be combined in a single mobile operating unit. A burlap drag approximately 19 inches wide shall be attached to the back of the unit for the purpose of smoothing the slurry seal.
   1. The mobile unit shall be equipped with an approved feeder which will accurately meter or otherwise introduce a predetermined amount of material into the mixer simultaneously with the aggregate. The feeder shall be used whenever mineral fill is added to the mix.
   2. The mobile unit shall be equipped with a water pressure system and fog spray bar capable of completely fogging the surface to which slurry seal is to be applied.
   3. The mobile unit shall be capable of an operative speed of at least 60 ft/min and have sufficient storage capacity to mix and apply a minimum of 5 tons of slurry.

B. Mixer: The mixer shall be a continuous flow type mixer and shall be capable of delivering water and a predetermined proportion of aggregate and asphalt emulsion to a revolving multi-blade mixer tank. The mixer shall discharge the thoroughly mixed product on a continuous basis. The blades of the mixing unit shall be capable of thoroughly blending all ingredients.

C. Spreader: The spreader shall be equipped with a flexible type squeegee positioned in contact with the pavement surface. The spreader shall be designed to apply a uniform spread with a minimum loss of slurry.

D. Auxiliary Equipment: Hand squeegees, shovels, and other hand equipment shall be provided as necessary to perform work in areas which are inaccessible to the unit.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall notify the Engineer at least five (5) working days prior to beginning work. The Contractor shall give the Engineer sufficient notice of all operations for any sampling, inspections or acceptance testing required.

B. Preparation of Surface: the surface upon which slurry seal is to be applied shall be thoroughly cleaned of all loose material, vegetation, silt spots, and other objectionable materials immediately preceding application by either brooming or the use of compressed air.

C. Application: Aggregate shall be wetted immediately prior to mixing with the emulsion. The Engineer may direct that the surface of the pavements be fogged with water (approximately 0.05 gallon per square yard) immediately preceding the pass of the spreader. The slurry mixture shall be of a consistency such that it "rolls" in the spreader box in a continuous mass. Slurry that segregates in the spreader box, so that flowing of liquids (water and emulsion) is evident, is not acceptable and shall not be applied. The liquid portion of slurry mixture shall not flow from either the spreader box or the applied slurry. Evidence of such flow shall be sufficient cause for rejection of the applied material. The slurry shall be placed on the road in full lane widths up to and including 12 feet. A mechanical device such as an auger shall be used to distribute the slurry mix in the spreader box.
   1. Excess buildup of slurry on longitudinal and transverse joints shall be corrected.
   2. Treated areas shall not be opened to traffic until such time as the slurry seal has cured to the extent that it will no longer be damaged by traffic. The applied slurry mixture shall be uniform in texture and shall not flush under traffic. Any areas not considered satisfactory by the Engineer shall be corrected by the Contractor at no additional cost to the City of Fayetteville. Nothing contained herein is intended to relieve the Contractor from sharing in the responsibility and performance of the treatments, should a failure occur prior to acceptance of the contract.
   3. Slurry Seal surface shall not be applied on surfaces containing ponding water and the minimum surface temperature shall be 50 degrees F.
   4. The Engineer may require the surface area to which the slurry has been applied by hand to be rolled using a pneumatic-tire roller. The roller shall be operated at an approximate tire pressure of 50 pounds per square inch and the paved area shall be subjected to a minimum of two coverages.
   5. Should oversize aggregate be encountered in the stockpile, the Contractor shall immediately cease operations and remove the oversize aggregate by screening.

D. Thickness of Application: The average minimum thickness of application shall not be less than 5/16" for Type C unless otherwise specified.

E. In the event of a test failure on compatibility and/or WTAT (loss greater than 100 grams per square foot) for a sample of material being applied to the road, corrective action shall be taken by the Contractor prior to start-up of another's day run. Should the sample taken following adjustment also fail the compatibility and/or WTAT, the Contractor shall cease application on the road. The Contractor shall be responsible for furnishing additional compatibility and/or WTAT results and field application site(s) and will not be permitted to return to the road until he clearly demonstrates the acceptability of seal.

END OF SECTION 00900

SECTION 01020

ALLOWANCES

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

B. Selected materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is evaluated. If necessary, additional requirements will be issued by Change Order.

C. Types of allowance include the following:

1.02 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise the Owner of the date when the final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the work.

B. At the Owner's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the work.

C. Purchase products and systems selected by the Owner from the designated supplier.

1.03 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.04 CONTINGENCY ALLOWANCES

A. Use the allowance(s) only as directed for the Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Change Orders authorizing use of funds from the allowance(s) will include Contractor's related cost and maximum fifteen (15) percent combined overhead and profit. (7.5% overhead plus 7.5% profit).

1.05 UNUSED MATERIALS

A. Return unused materials to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.

B. When requested by the Owner, prepare unused material for storage where it is not economically practical to return the material for credit. When directed by the Owner, deliver unused material to the Owner's storage space. Otherwise, disposal of unused material is the Contractor's responsibility.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine products covered by an allowance promptly upon delivery for damage or defects.

3.02 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION 01020

SECTION 02205

SOIL MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Subsoil materials.

B. Topsoil materials.

1.02 REFERENCES

A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.

B. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

C. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

D. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

E. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

F. ASTM D2487 - Classification of Soils for Engineering Purposes.

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

H. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.03 SUBMITTALS FOR INFORMATION

A. Materials Source: Submit name of imported materials source.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of North Carolina standards. Maintain one copy on site.

PART 2 PRODUCTS

2.01 SUBSOIL MATERIALS

A. Subsoil Type S1: Conforming to State of North Carolina standard.

B. Subsoil Type S2:
   1. Excavated and re-used material.
   2. Graded.
   3. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

2.02 TOPSOIL MATERIALS

A. Topsoil Type S3: Conforming to State of North Carolina standard.

B. Topsoil Type S4:
   1. Excavated and reused material.

2. Graded.
3. Free of roots, rocks larger than ½ inch, subsoil, debris, large weeds and foreign matter.

C. Topsoil Type S5:
1. Imported borrow.
2. Friable loam.
3. Free of roots, rocks larger than ½ inch, subsoil, debris, large weeds, and foreign matter.
4. Acidity range pH of 5.5 to 7.5.
5. Containing a minimum of 4 percent and a maximum of 25 percent inorganic matter.

PART 3 EXECUTION

3.01 SOIL REMOVAL

A. Excavate subsoil and topsoil from areas designated.

B. Remove lumped soil, boulders, and rock.

C. Stockpile excavated material on approved site and remove excess material, not being used, from site.

D. Remove excavated material from site. When no on site, stockpile area is approved.

3.02 STOCKPILING

A. Stockpile materials on approved site.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.03 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition, with permanent ground cover. Grade site surface to prevent free standing surface water.

B. If a borrow area is indicated, leave area in a clean and neat condition, with permanent ground cover. Grade site surface to prevent free standing surface water.

END OF SECTION 02205

SECTION 02532

MANHOLE ADJUSTMENT RINGS

PART 1 GENERAL

1.01 SUMMARY

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

B. The work covered in this section includes furnishing and installing adjustment rings for manholes requiring a rise of one inch or greater. Adjusting rings less than one inch are not acceptable.

C. The adjustment of manholes and valve boxes shall not be attempted until after the placement of the base course and any leveling course, and prior to placement of the overlay. Any debris that has fallen into the manholes or water valves during the adjustment process shall be removed before cleanup is complete.

D. Badly damaged or worn castings shall be replaced with new castings provided by OWNER at no cost to the contractor. Contractor is responsible for exchanging castings at the OWNER'S facility.

E. Final surface overlay will be placed within 10 days after adjustments have been completed on each individual street.

PART 2 PRODUCTS

2.01 MATERIALS

A. Riser rings shall consist of domestic A-36 steel 3/4 inch thickness steel inner ring, and domestic A-36 1/2 inch thickness steel outer ring. The riser system shall be anchored to the manhole frame to prevent any movement from traffic loads and shall be pre-approved by the Engineer. The adjustment device shall be fabricated from stainless steel, have a positive lock and be in line with the lower bearing bar. It shall be capable of adjustment plus or minus 3/8 inches from nominal.

B. The manhole adjustment ring shall fit within the existing casting without interference and the manhole lid shall have bearing on all of the surface of the inner ring to prevent locking. The lid shall be able to be removed without binding.

C. The inner and outer ring shall be securely welded to prevent any differential movement between the inner and outer rings under traffic loads, and shall be fabricated to plus or minus 1/16 inch concentricity. The outer riser ring shall have an inside diameter no greater than 3/16 inch larger than the outside diameter of the manhole lid.

D. All material shall be bituminous asphalt coated.

E. All welding shall be in accordance with AWS D1.5 by certified welders.

PART 3 EXECUTION

3.01 MEASUREMENT

A. Each manhole to receive adjusting rings shall be inspected and properly measured, with the measurements following all manufacturers' guidelines. Measurement for the height of

adjustment shall be made only after any asphalt-leveling course has been placed. The contractor will be required to provide personnel to individually measure each structure in the presence of the OWNER. The measurements will include top and bottom lid diameters, lid thickness, as well as the required rise.

B. Adjustment rings for rise less than one inch shall be unacceptable.

C. Special attention shall be given to structures needing replacement rings due to wear or other factors which may not be suitable for adjustment rings. Adjustment rings shall not be placed on any existing casting which has been deemed unacceptable by the OWNER.

3.02 INSTALLATION

A. The adjusting ring shall be adjusted to the outside diameter of the manhole lid before placement can proceed. The outer ring shall have an inside diameter of no greater than 3/16 inch larger than the outside diameter of the lid. The area on the existing casting where the ring will seat shall be thoroughly cleaned using a steel wire brush. The ring can then be placed making sure there is full bearing of the lower section to the existing casting. The set screws can be tightened to assure no movement due to traffic.

B. Frames and covers shall be set to proposed grade and sloped to match slope and crown of road within 0.25 inches of the final surface.

C. The contractor shall provide personnel to assist the OWNER in inspecting the adjustment. The height of adjustment shall be checked by the following procedure:
   1. Pull string line parallel to the curbing across the casting for at least 10 feet on either side of the casting.
   2. Hold string at a height of 1 inch above the required adjustment and subtract 1 inch from the measurements.
   3. Measurements shall be made from the top of lid (and ring) to the string line.
   4. The height shall then be checked with the same string line pulled perpendicular to the curbing.
   5. The final adjustment height shall not vary more than 1/4 inch from the thickness of the over lay, in either direction

D. The contractor shall open the manhole for inspection of how the lid fits and a field check to assure the ring is secure.

E. Any unacceptable adjustments shall be repaired by the Contractor or replaced with a concrete adjustment, with no additional expense to the OWNER.

END OF SECTION 02532

SECTION 02542

FILTER FABRIC

REFERENCE – North Carolina Department of Transportation (Raleigh, N.C.) – Standard Specifications for Roads and Structures, current edition and any revisions.

PART 1 GENERAL

1.01 The fabric shall consist of strong rot-proof synthetic fibers formed into a woven fabric or a nonwoven needle punched fabric meeting all applicable requirements of this section.

1.02 The fabric shall be free from any treatment or coating which might significantly alter in physical properties before or after installation. The fabric fibers shall contain stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from ultraviolet or heat exposures. The fabric shall be a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative position with respect to each other. The edge of the fabric shall be finished to prevent the outer fibers from pulling away from the fabric. The fabric shall be free of defects or flaws which significantly affect its physical and/or filtering properties. Sheets of fabric may be sewn or bonded together with a fungus resistant material. No deviation from any physical requirements will be permitted due to the presence of the seam.

1.03 During all periods of shipment and storage, the fabric shall be wrapped in a heavy duty protective covering to protect the fabric from direct sunlight, mud, dust, dirt, and debris. The fabric shall not be exposed to temperatures greater than 140°.

1.04 When anchor pins are required, they shall be fabricated of steel, and installed per manufacturer's recommendation unless otherwise specified by the Engineer.

PART 2 INSTALLATION

2.01 This item shall include all labor, equipment and materials necessary for the placement of filter fabric under Rip Rap and Reno Mattress as required by the plans. Filter fabric shall be placed as shown on the plans and in strict accordance with manufacturer's written instructions. To be acceptable for use, all filter fabric must be certified by the manufacturer to meet the specified requirements (minimum roll average) and shall be packaged and labeled according to ASTM procedures. Filter fabric for this job shall meet the following specifications:

PROPERTY	TEST PROCEDURE	VALUE
Grab Tensile	ASTM D-4632	300 lbs.
Grab Elongation	ASTM D-4632	15%
Mullen Burst	ASTM 3786	600 lbs.
Puncture	ASTM D-4633	120 lbs.
Trapezoidal Tear	ASTM D-4633	120 lbs.
AOS	ASTM D-4751	30/70 US Sieve

PART 3 ACCEPTANCE

3.01 The Contractor shall furnish a Type I Certified Mill Test Report, Type 2 Typical Certified Mill Test Report, or Type 4 Certified Test Report for the fabric in accordance with Article 106-3 of the NCDOT Standard Specifications for Roads and Structures, current edition and any revisions.

Additionally, the material shall be subject to inspection, test or rejection by the Engineer at any time.

3.02 Fabric will be rejected if more than 72 hours has elapsed between the time the protective wrapping has been removed and the fabric is covered up during installation except where the fabric is used for temporary silt fence.

END OF SECTION 02542

SECTION 02723

RIP RAP SWALE

PART 1 GENERAL

1.01 SCOPE

A. The work includes all stone placement used to reduce the velocity of flow within the swale and control the amount of erosion that takes place.

B. All swales shall be constructed of materials specified or indicated in the drawings. The intent and purpose of these specifications is to require a complete and satisfactory installation. Any defect in manner or workmanship shall be cause for the replacement and correction of such defect as directed by the Engineer at no expense to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. All rip-rap lining shall be in accordance with the North Carolina Department of Transportation (NCDOT) – Standard Specifications for Roads and Structures, current edition and any revisions. 1042-2 for Class A Rip-Rap. The stones should vary in size from 2" to 6".

B. Filter fabric shall conform to NCDOT – Standard Specifications for Roads and Structures, current edition and any revisions Section 1056. The fabric shall consist of strong rot-proof synthetic fibers formed into a woven fabric or a non-woven needle punched fabric. The fabric shall be free from any coatings or treatments which might significantly alter its physical properties. The fabric fibers shall contain a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative position with each other. The edge of fabric shall be finished to prevent the outer fibers from pulling away from the fabric. Sheets of fabric may be sewn or bonded together with a fungus resistant material. The fabric shall meet the requirements for Type 2 fabric as stated in the NCDOT – Standard Specifications for Roads and Structures, current edition and any revisions, Table 1056-1.

2.02 INSTALLATION

A. The rip-rap shall be placed and graded as specified in the NCDOT – Standard Specifications for Roads and Structures, current edition and any revisions, Section 876 and other applicable sections. The stone shall be placed on the slopes as indicated on the plans, or as the Engineer directs. The stone shall be graded so that the smaller stones are uniformly distributed throughout the mass. The Contractor may place the stone by mechanical methods, augmented by hand placing, provided that when completed, the rip-rap shall be at a depth of at least that which is shown on the plans.

B. Surfaces to receive filter fabric shall be graded to the lines and grades shown on the plans, unless otherwise directed by the Engineer. The surface shall be free of obstructions, debris, and pockets of soft or low density material. The fabric shall be laid smooth and free from tension, stress, folds, wrinkles, or creases. Horizontal overlaps shall be a minimum of 18" with the upper fabric overlapping the lower. Vertical overlaps shall be a minimum of 18" with the upstream fabric overlapping the downstream. The Engineer reserves the authority to reject any material that is felt to not meet the necessary requirements.

C. The stone lining shall be placed upon the filter fabric and smooth graded to a depth as shown on plans in such a way as to not damage the underlining fabric liner. Any damage to the fabric liner shall necessitate the removal and replacement of the damaged area.

D. The finished slope should be free of pockets of small stone or clusters of large stones. Hand placing may be necessary to achieve the proper distribution. The finished grade of the rip-rap should blend with the surrounding area. No over fall or protrusion of rip-rap should be apparent.

PART 3 EXECUTION

NOT USED

END OF SECTION 02723

SECTION 02810

IRRIGATION SYSTEM

PART 1 GENERAL

1.01 SCOPE

A. Work to be done includes furnishing all labor, materials, equipment and services required to complete all irrigation work indicated on the Drawings, as specified herein, or both.

B. The mechanical point of connection for the irrigation system shall be a new tap of the domestic water supply provided by others, as specified.

C. The electrical point of connection for the irrigation system shall be to a 120-volt, 20-amp building electrical circuit provided by others.

D. The Drawings and Specifications must be interpreted and are intended to complement each other. The Contractor shall furnish and install all parts, which may be required by the Drawings and omitted by the Specifications, or vice versa, just as though required by both. Should there appear to be discrepancies or question of intent, the Contractor shall refer the matter to the Engineer for decision, and his interpretation shall be final, conclusive and binding.

E. All necessary changes to the Drawings to avoid any obstacles shall be made by the Contractor with the approval of the Engineer.

F. Trench excavation, backfilling and bedding materials, together with the testing of the completed installation shall be included in this work.

G. The work shall be constructed and finished in every respect in a good, workmanlike and substantial manner, to the full intent and meaning of the Drawings and Specifications. All parts necessary for the proper and complete execution of the work, whether the same may have been specifically mentioned or not, or indicated on the Drawings, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.

H. Record Drawing as well as Operating & Maintenance Manual generation, in accordance to these specifications shall also be included in this work.

I. The irrigation system shown on the Drawings and described within these Specifications represents a single controller, turf and landscape irrigation system supplied from municipal water. The system is designed for 27 gallons per minute. Minimum 65-psi static and 55-psi dynamic pressure at full system flow is required from the point of connection.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements that affect the Work of this Section.

1.03 ORDINANCES, PERMITS AND FEES

A. The Work under this Section shall comply with all ordinances and regulations of authorities having jurisdiction.

B. The Contractor shall obtain and pay for any and all permits, tests and certifications required for the execution of Work under this Section, including water supply tap fee.

C. Furnish copies of Permits, Certifications and Approval Notices to the Owner's Representative prior to requesting payment.

D. The Contractor shall include in his bid any charges by the Water Department, Utility Company, or other authorities for work done by them and charged to the Contractor.

1.04 EXAMINATION OF CONDITIONS

A. The Contractor shall fully inform himself of existing conditions on the site before submitting his bid, and shall be fully responsible for carrying out all work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual Work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the GENERAL CONDITIONS.

1.05 QUALITY ASSURANCE

A. Installer: A qualified firm which has experience in work of the type and size required by this Section, and which is acceptable to the Engineer.

B. Applicable requirements of accepted Standards and Codes shall apply to the Work of this Section and shall be so labeled or listed:
   1. American Society for Testing & Materials (ASTM)
   2. National Plumbing Code (NPC)
   3. National Electric Code (NEC)
   4. National Sanitary Foundation (NSF)
   5. American Society of Agricultural Engineers (ASAE)
   6. Underwriters Laboratories, Inc. (UL)
   7. Occupational Safety and Health Regulations (OSHA)

1.06 TESTS

A. Observation: The Engineer will be on site at various times to ensure the system is being installed according to the Specifications and Drawings.

B. Operational Test: After completion of the system, test the operation of entire system and adjust sprinklers as directed by the Engineer. Demonstrate to the Engineer that all irrigated areas are being adequately covered (See Part 3 - Execution).

1.07 SHOP DRAWINGS

A. The Contractor shall provide copies of product specification sheets on all proposed equipment to be installed to the Engineer for approval prior to the start of work, in accordance with the parameters of Division-1. Work on the irrigation system may not commence until product sheets are submitted and approved. Submittals shall be marked up to show proper nozzles, sizes, flows, etc. Equipment to be included:
   1. Sprinkler Heads
   2. Valves: Manual and Automatic
   3. Controller
   4. Valve Boxes
   5. Pipe and Fittings
   6. Wire and Connectors
   7. Quick Coupling Valves
   8. Rain Sensor
   9. Backflow Preventer/ Enclosure
   10. Miscellaneous Materials

B. The Contractor shall maintain complete Record Drawings of the system as the project proceeds. Record Drawings shall specify sprinkler type; pop up height and nozzle for each sprinkler installed. Each valve box location to be referenced by distance from a minimum of two permanent locations. Controller, rain sensor, quick coupling valves, water meters, back flow prevention device and all other equipment shall be indicated on the drawings. All wire routing, wire size and splices shall be indicated. Main line pipe and wire route shall have two (2) distinctly different graphic symbols (line types).

1.08 DELIVERY, STORAGE AND HANDLING

A. Store and handle all materials in compliance with manufacturer instructions and recommendations. Protect from all possible damage. Minimize on-site storage.

1.09 GUARANTEE

A. The Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities that the Contractor may have by law.

B. In addition to the manufacturer’s guarantees, the Contractor shall warrant the entire irrigation system, both parts and labor for a period of one (1) year from the date of acceptance by the Owner.

C. As part of the one-year warranty the Contractor shall perform the first year-end winterization and spring start-up for the irrigation system.

1.10 COORDINATION

A. The Contractor shall at all times coordinate his work closely with the Engineer to avoid misunderstandings and to efficiently bring the project to completion. The Engineer shall be notified as to the start of work, progression and completion, as well as any changes to the drawings before the changes are made. The Contractor shall also coordinate his work with that of his sub-contractors.

B. The Contractor shall be held responsible for and shall pay for all damage to other work caused by his work, workmen or sub-contractors. Repairing of such damage shall be done by the Contractor who installed the work, as directed by the Engineer.

1.11 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Contractor shall include in his Bid an allowance for four (4) hours of instruction of Owner and/or Owner's personnel upon completion of check/test/start-up/adjust operations by a competent operator (The Engineer shall be notified at least one (1) week in advance of check/test/start-up/adjust operations).

B. Upon completion of work and prior to application for acceptance and final payment, a minimum of three (3) three ring, hard cover binders titled MAINTENANCE AND OPERATING INSTRUCTIONS FOR THE “Project Name”, shall be submitted to the Engineer’s office. After review and approval, the copies will be forwarded to the Owner. Included in the Maintenance and Operating binders shall be:
   1. Table of Contents
   2. Written description of Irrigation System.
   3. System drawings:
      a. One (1) copy of the original irrigation plan;
      b. One (1) copy of the Record Drawing;
      c. One (1) reproducible of the Record Drawing;
      d. One (1) copy of the controller valve system wiring diagram

4. Listing of Manufacturers.
5. Manufacturers' data where multiple model, type and size listings are included; clearly and conspicuously indicating those that are pertinent to this installation.
    a. "APPROVED" submittals of all irrigation equipment;
    b. Operation:
    c. Maintenance: including complete troubleshooting charts.
    d. Parts list.
    e. Names, addresses and telephone numbers of recommended repair and service companies. A copy of the suggested "System Operating Schedule" which shall call out the controller program required (zone run time in minutes per day and days per week) in order to provide the desired amount of water to each area under "no-rain" conditions.
6. Winterization and spring start-up procedures.
7. Guarantee data.

1.12 PROCEDURE

A. Notify all city departments and/or public utility owners concerned, of the time and location of any work that may affect them. Cooperate and coordinate with them in the protection and/or repairs of any utilities.

B. Provide temporary support, adequate protection and maintenance of all structures, drains, sewers, and other obstructions encountered. Where grade or alignment is obstructed, the obstruction shall be permanently supported, relocated, removed or reconstructed as directed by the Engineer.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of the system. All material overages at the completion of the installation are the property of the Contractor and shall be removed from the site.

B. No material substitutions from the irrigation products described in these specifications and shown on the drawings shall be made without prior approval and acceptance from the Engineer.

2.02 PVC IRRIGATION PIPE

A. All pipe in sizes 1-1/2 inches and smaller shall be PVC, Class 200, Type 1120, SDR 21, Solvent-Weld PVC, conforming to ASTM No. D2241 and D3036 as manufactured by Certainteed, Cresline, JM or equal.

2.03 PVC PIPE SLEEVES

A. All pipe sleeves beneath non-soil areas shall be PVC, Class 160 water pipe as manufactured by Certainteed, Cresline, JM or equal. Minimum sleeve size to be 2-inch.

2.04 WIRE CONDUIT

A. Conduit for wiring beneath non-soil areas shall be PVC, SCH-80 conduit, as manufactured by Certainteed, Cresline, JM or equal.

B. Conduit for above ground wiring to rain sensor or controller shall be galvanized, rigid metallic conduit.

2.05 PVC IRRIGATION FITTINGS

A. Fittings for solvent weld PVC pipe, shall be Schedule 40 solvent weld PVC fittings as manufactured by Dura, Lasco, Spears or equal.

B. All PVC threaded connections in and out of valves shall be made using Schedule 80 toe nipples and Schedule 40 couplers or socket fittings. Schedule 40 male threads will not be approved for installation.

C. PVC solvent shall be NSF approved, for Type I and Type II PVC pipe, and Schedule 40 fittings. Cement is to meet ASTM D2564 and FF493 for potable water pipes. PVC solvent cement shall be Rectorseal Gold, or equal, and shall be used in conjunction with the appropriate primer.

D. All nipples to be schedule 80 PVC.

2.06 SPRAY SPRINKLERS

A. Full and part circle pop up spray sprinklers shall be pressure regulating, plastic construction with ratcheting riser, removable nozzle and check valve. Nozzle size shall be as indicated on the Drawings and in the legend. Pop-up height shall be 6 inches for turf and ground cover, 12 inches for shrubs and annual beds.

B. Sprinkler shall carry a minimum 3-year exchange warranty against defects. Sprinklers shall be manufactured by Toro model 570Z-PRX, Rain Bird model 1800-SAM-PRS or approved equal.

2.07 ROTARY SPRINKLERS

A. Rotary sprinklers shall be gear-driven, rotary type heads, designed for in-ground installation with integral check valves. Sprinkler shall be capable of covering a 34-40 foot radius and flow range of 1.6-6.8 gpm at 40 pounds per square inch of pressure. Sprinklers shall have a one hundred percent warranty for two years minimum against defects in workmanship.

B. The nozzle assembly shall elevate a minimum of four inches when in operation and retraction shall be achieved by a stainless steel spring. Riser assembly shall be plastic. A nozzle wiper seal shall be included in the sprinkler for continuous operation under the presence of sand and other foreign material.

C. All sprinkler parts shall be removable through the top of the unit through the removal of a heavy-duty threaded cap. The sprinkler shall have a three quarter-inch (3/4") IPS water connection on the bottom of the sprinkler.

D. Sprinkler shall be manufactured by Toro, model S700C-XX-15/30/60-LA, Hunter Industries, model I20-ADV-15/35/80 or approved equal.

2.08 ELECTRIC CONTROL VALVES

A. Electric control valves shall be one, one and one half and two-inch remote control, diaphragm type, fiberglass or reinforced nylon body plastic valves with manual flow control, manual bleed screw and 150 psi pressure rating. Valves shall be globe/angle combination configuration.

B. Valves shall be manufactured by Toro, model 252, Rain Bird, model PGA or approved equal.

2.09 VALVE BOXES

A. Valve boxes for single electric valves, isolation valves and quick coupling valves shall be 10-inch round valve boxes with metal detection and bolt down covers

B. Valve boxes for dual electric valves shall be 12-inch standard valve boxes with metal detection and bolt down covers.

C. Valve box extensions shall be provided as required for proper box depth.

D. Valve boxes shall be manufactured by Ametek or approved equal.

2.10 AUTOMATIC CONTROLLER

A. Controller shall be electronic in construction with capability of up to 10 hour run times per zone in increments of 1 or 10 minutes. Controllers to have minimum two independent programs, auto/off switch and be capable of manual, semi-automatic and automatic operation. Controller shall have water budgeting feature, sensor input terminal, locking, weather resistant plastic cabinet and internal transformer. Terminal strip connection shall be easily accessible. The controller shall be U.L. listed, 120 volt, 60 Hertz, A.C. type.

B. Controller shall be as manufactured by Toro, Custom Command Series, model CC-P-24, Rain Bird, Model ESP-24LX+ or approved equal.

C. Station quantity shall be minimum of 24.

2.11 QUICK COUPLING VALVES

A. The valve body shall be of cast brass construction with a working pressure of 125 psi. The valve seat disc plunger body shall be spring loaded so that the valve is normally closed under all conditions when the key is not inserted.

B. The top of the valve body receiving the key shall be equipped with a single slot and smooth face to allow the key to open and close the valve slowly with a one-half turn. The quick coupling valve shall be equipped with a locking vinyl cover.

C. The valve body construction shall be such that the coupler seal washer may be removed from the top for cleaning or replacement without disassembling any other parts of the valve.

D. Keys shall be single lug with 1-inch male thread and 3/4 inch female thread at the top.

E. Contractor shall provide two (2) keys for quick couplers, two (2) 1 inch x 1 inch swivel hose ells and two (2) cover keys for quick coupling valves.

F. Quick coupling valves, keys and swivels shall be manufactured by Toro models 474-03, 464-01 and 477-02, Rain Bird models 44NP, 44K and SH-2 or approved equal.

2.12 WIRE

A. All valve control wire shall be minimum #14-awg, common #12-awg, single strand, solid copper, 600v, direct burial (UF) and shall meet all state and local codes for this service. Individual wires must be used for each zone valve. Common wire shall be white in color, control wire for spray and rotor zones shall be red in color, and spare wires, installed where indicated on the drawings shall be blue.

B. In ground wire connections shall be UL listed, manufactured by 3M, model DBY-6 splice kits or approved equal. All wire splices shall be made in valve boxes, at controller, or at valves.

C. Wire type and method of installation shall be in accordance with local codes for NEC Class II circuits of 30-volt A.C. or less.

2.13 ISOLATION VALVES

A. Isolation valves 2-1/2 inches and smaller in size shall be gate type, of bronze construction, US Manufacture, 600 WOG with steel cross handle and 200 psi rating. Gate valves to be as manufactured by Nibco, model T-113-irr, or approved equal.

2.14 SWING JOINTS

A. Sprinklers shall be installed on swing pipe assemblies, minimum length 6 inches, maximum 18 inches.

B. Quick coupling valves to be installed on one-inch brass swing joint, minimum 12-inches in length with Leemco model LS-120 stabilizer, or approved equal.

2.15 AUTOMATIC RAIN SENSOR

A. Rain sensor shall be plastic in construction with adjustable interruption point and 1/2-inch IPS threads. Rain sensor shall be manufactured by Hunter Industries, model Mini-Clik-C or approved equal.

2.16 BACKFLOW PREVENTION DEVICE

A. Back flow prevention device shall be 1-1/2-inch Reduced Pressure Assembly. Back flow prevention device shall have maximum 8-psi pressure loss at system flow.

B. Back flow prevention device shall be as manufactured by Watts model 909-M1or approved equal.

2.17 CRUSHED STONE

A. Crushed stone shall be used under valve boxes and below all sprinklers.

2.18 SAND

A. Sand shall be used for backfilling of trenches; under, around and over PVC lines.

2.19 CONCRETE

A. Cement concrete for concrete base under enclosure shall be 2,500 psi, 1-1/2 inch aggregate.

2.20 BACK FLOW ENCLOSURE

A. The back flow prevention device enclosure shall be of a vandal and weather resistant nature manufactured entirely of marine grade aluminum alloy 5052-H32, with a wall thickness of 1/8 inch.

B. The mounting base shall be manufactured entirely of stainless steel. The main housing shall be of solid sheet construction punched on the sides with a rectangular pattern for viewing back flow prevention device operation. The length of the enclosure shall be expandable to allow for site adjustment. The enclosure shall have a mounting lip on one end and a locking mechanism on the other end. The mounting base shall be submerged into the concrete a minimum of two inches, and position the enclosure two and one half inches above the concrete for drainage purposes.

C. The locking mechanism shall be of the full release type, which allows for complete removal of the enclosure from its mounting base without the use of tools. The handle controlling the locking mechanism shall be concealed within the surface of the enclosure and provide for a padlock.

D. The enclosure shall be 30 inches high, 16 inches wide and 45 inches long. Unit shall be as manufactured by VIT Products, Inc., model SBBC-45AL or approved equal.

PART 3 EXECUTION

3.01 GENERAL

A. Examine all contract documents applying to this Section noting any discrepancies and bringing the same to the attention of the Engineer for timely resolution.

B. Make all field measurements necessary for the work noting the relationship of the irrigation work to the other trades. Coordinate with other trades (landscaping and other site work trades). Project shall be laid out essentially as indicated on the Irrigation Plans, making minor adjustments for variations in the planting arrangement. Major changes shall be reviewed with the Engineer prior to proceeding.

C. At all times, protect existing irrigation, landscaping, paving, structures, walls, footings, etc. from damage. Any inadvertent damage to the work of another trade shall be reported at once.

3.02 PIPE AND FITTINGS INSTALLATION

A. Using proper width trencher chain, excavate a straight and true trench.

B. Loam encountered within the limits of trench excavation for irrigation mains and branch lines shall be carefully removed to the lines and depths as shown on the Drawings and stockpiled for subsequent replacement in the upper 6 inches of the trench from which it is excavated. Such removal and replacement of the quantities of loam shall be considered incidental to the irrigation system and no additional compensation will be allowed therefore.

C. Pipe shall be laid on undisturbed trench bottom provided suitable base is available - no rock larger than 1 inch or sharp edges; if not, excavate to 2 inch below pipe invert and provide sand base or #57 washed stone upon which to lay pipe.

D. Back filling shall be accomplished as follows: the first 10-inch of backfill material shall contain no foreign matter and no rock larger than 1 inch in diameter. Carefully place material around pipe and wire and tamp in place. Remainder of backfill shall be laid-up in 6-inch (maximum) lifts and tamped to compaction with mechanical equipment matching adjacent undisturbed area. Frozen material shall not be used for backfill.

E. Make all solvent-weld joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of primer or solvent, and wiping off excess solvent from each connection. Allow connections to set minimum 24 hours before pulling or pressure is applied to the system. Provide for expansion and contraction as recommended. Wire shall be laid in same trench as mainline and at pipe invert (see Wire Installation).

F. Mainline pipe shall have minimum 24 inches of cover (excavate to invert as required by pipe size). Lateral pipe shall have minimum 16 inches of cover (excavate to invert as required by pipe size).

G. Cut plastic pipe with handsaw or pipe-cutting tool, removing all burrs at cut ends. All pipe cuts are to be square and true. Bevel cut end as required to conform to Manufacturer's Specifications.

H. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. At times, when installation of the piping is not in progress, the open end(s) of the pipe shall be closed by a watertight plug or other means. All piping, which cannot temporarily be joined, shall be sealed to make as watertight as possible. This provision shall apply during the lunch hour as well as overnight. Pipe not to be installed that day shall not be laid out. Should water enter the trench during or after installation of the piping, no additional piping may be installed or back filled until all water is removed from

the trench. Pipe shall not be installed when water is in the trench, when precipitation is occurring, or when the ambient temperature is at 35ºF or below. PVC pipe shall be snaked in the trench to accommodate for expansion and contraction due to changes in temperature.

I. In installing irrigation pipe the Contractor shall route the pipe as necessary to prevent damage to tree roots. Where trenching must occur near trees, the Contractor shall provide proper root pruning and sealing methods to all roots 1 inch and larger.

J. Throughout the guarantee period it will be the responsibility of the Contractor to refill any trenches that have settled due to incomplete compaction.

K. Pulling of pipe will be allowed provided soil is suitable and specified depth of bury can be maintained.

3.03 ELECTRICAL WIRE CONDUIT INSTALLATION

A. Electrical conduit shall be installed in all non-soil areas, as well as for all above ground wiring to controllers and rain sensor.

3.04 PIPE SLEEVING INSTALLATION

A. Sleeving shall be installed wherever piping is going under a non-soil area, generally where indicated on the Drawings. Minimum cover over all sleeving pipe shall be 24 inches as shown on the detail.

3.05 ISOLATION VALVE INSTALLATION

A. Install isolation valves per detail where indicated on the Drawings. Install all isolation valves on a level #57 washed stone base so that they can be easily opened or closed with the appropriate valve wrench. Install specified valve box over each isolation valve.

3.06 VALVE BOX INSTALLATION

A. Furnish and install a valve access box for each electric valve, quick coupling valve, isolation valve, and wire splice.

B. All valve access boxes shall be installed on a minimum 4-inch #57 washed stone base. Finish elevation of all boxes shall be at grade. All stone to be supplied by the Contractor and installed before valve box. Stone shall not be poured into previously installed valve boxes.

3.07 24 VOLT CONTROL VALVE INSTALLATION

A. Control valves shall be installed on a level #57 washed stone base. Grade of bases shall be consistent throughout the project so that finish grades fall within the limits of work. Valves shall be set plumb with adjusting handle and all bolts, screws and wiring accessible through the valve box opening.

B. Adjust zone valve operation after installation using flow control device on valve.

3.08 WIRING INSTALLATION

A. Wiring shall be installed along with the main line. Multiple wire bundles shall be cinched together at maximum 12-foot centers using plastic cable cinches and shall be laid beside, and at the same invert as, the irrigation lines. Sufficient slack for expansion and contraction shall be maintained and wiring shall at no point be installed tightly. Provide an additional 8 inches to 12 inches slack at all changes of direction. Wiring in valve boxes shall be a sufficient length to allow the valve solenoid, splice, and all connections to be brought above grade for servicing. This additional slack shall be coiled for neatness in the valve box. Each valve shall have a separate wire back to the controller.

B. All wire shall be laid in trenches and shall be carefully back-filled to avoid any damage to the wire insulation or wire conductors themselves. In areas of unsuitable material, the trench shall have a 2 inches layer of sand or stone dust on the bottom before the wires are laid into the trench and back-filled. The wires shall have a minimum of 12 inches of cover. Wire not to be installed that day shall not be laid out.

C. An expansion curl shall be provided within 6 inches of each wire connection to a solenoid and at least every 100 feet of wire length on runs more than 100 feet in length. Expansion curls can be formed by wrapping five (5) turns of wire around a 1-inch diameter or larger pipe and then withdrawing the pipe.

D. Provide a common ground wire of white color. No white color shall be used for power wire. Control wire shall be red, and spare wiring shall be blue in color.

E. Service wiring in connection with Drawings and local codes for 24-volt service. All in-ground wire connections shall be waterproofed with 3M DBY, or approved equal, splice kits. All splices shall be made in valve boxes (wire runs requiring splices between valve locations shall be provided in splice box--valve box shall be used). Splice locations shall be shown on the Record Drawings.

F. Contractor shall provide a complete wiring diagram showing wire routing for the connections between the controller and valves. See section one for the inclusion of wiring diagram in operation and maintenance manuals.

3.09 CONTROLLER INSTALLATION

A. Contractor to install controller on wall in mechanical room, generally where shown on the drawings. Contractor to wire valves and rain sensor into controller and set proper program.

B. Wire controller to 120-volt electrical supply provided to the controller locations by OTHERS.

C. Keys shall be turned over to Engineer.

3.10 RAIN SENSOR INSTALLATION

A. Install rain sensor on exterior building wall, generally where indicated on the drawings. Coordinate final location of rain sensor with Engineer. Rain sensor shall be in direct contact with the weather and not in contact with the irrigation spray.

B. Install rain sensor wiring within ½ inch conduit where exposed. All above ground wires shall be installed in conduits.

3.11 SPRINKLER INSTALLATION

A. Spray and rotary sprinklers shall be installed flush to grade on swing pipe assemblies, minimum length 6 inches, maximum 18 inches.

B. Adjust sprinkler zone pressure with flow control on valve.

C. Sprinkler installation prohibited inside City of Fayetteville right-of-way.

3.12 QUICK COUPLING VALVE INSTALLATION

A. Provide quick coupling valves where indicated on the Drawings.

B. Quick coupling valves to be mounted on 1-inch brass swing joint with stabilizer as per details.

3.13 BACKFLOW PREVENTION INSTALLATION

A. Install 1-1/2-inch reduced pressure back flow prevention assembly in above grade enclosure as specified.

3.14 BACK FLOW ENCLOSURE INSTALLATION

A. Install enclosure on concrete pad as indicated on the detail, generally where indicated on the drawings. Final location of enclosure shall be coordinated with the Engineer as to best screen the enclosure and deter vandalism. Final location shall also be coordinated with utility department to ensure proper placement of water supply line.

B. Concrete pad for back flow enclosure shall be 53 inches long by 24 inches wide by 8 inches deep.

3.15 CHECK/TEST/START-UP/ADJUST

A. Flushing:
   1. After all piping, valves and sprinkler bodies are in place and connected, but prior to installation of sprinkler internals, flush piping under a full head of water

B. Testing:
   1. Leakage test: test all lines for leaks under operating pressure. Repair all leaks and re-test.
   2. Coverage test: perform a coverage test in the presence of the Engineer (notify Engineer at least seven (7) days in advance of scheduled coverage test). Engineer will determine if the water coverage is complete and adequate. Readjust heads and/or head locations as necessary or directed to achieve proper coverage.
   3. All testing shall be at the expense of the Contractor.

3.16 CLEANING AND ADJUSTING

A. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by the operation of the system for testing.

B. Adjust sprinkler heads, valve boxes, and quick coupling valves to grade as required, so that they will not be damaged by mowing operations.

C. Continue sprinkler coverage adjustment as required by settlement, etc., throughout the guarantee period.

D. Each control zone shall be operated for a minimum of 5 minutes and all heads checked for consistency of delivering water. Adjustments shall be made to sprinklers that are not consistent to the point that they match the manufacturer's standards. All sprinklers, valves, timing devices or other mechanical or electrical components, which fail to meet these standards, shall be rejected, replaced and tested until they meet the manufacturer's standards.

3.17 ACCEPTANCE AND OPERATION BY OWNER

A. Upon completion of the work and acceptance by the Owner, the Contractor shall be responsible for the training of the Owner's Representative(s) in the operation of the system (provide minimum 48 hours written notice in advance of test). The Contractor shall furnish, in addition to the Record Drawings and operational manuals, copies of all available specification sheets and catalog sheets to the Owner's personnel responsible for the operation of the irrigation system. The Contractor shall guarantee all parts and labor for a minimum period of one (1) year from date of acceptance.

3.18 CLEAN UP

A. Upon completion of all installation work, Contractor shall remove all leftover materials and equipment from the site in a safe and legal manner.

3.19 WINTERIZATION

A. Winterization: The irrigation system is designed to be completely drained to protect pipe from bursting prior to freezing temperatures. To adequately drain the system the following procedure must be followed:
   1. Air blow-out
      a. Set automatic controller stations to 2-1/2 minutes timing.
      b. Attach hose from portable air compressor to 1-inch air inlet installed on main line at back flow preventer.
      c. Operate compressor at 100 cubic feet per second at 60-80 psi.
   2. Manual drain valves: Open manual drain valves located at low points on the main line to drain main completely after air blow-out has been completed.
   3. Backflow Preventer: Rotate backflow unit at unions and open petcocks and drain. Reverse operation and tighten unions to resume irrigation.

END OF SECTION 02810

SECTION 02831

FENCING
(CHAIN LINK)

PART 1 GENERAL

1.01 SCOPE

A. Provide chain link fencing where indicated on the Drawings and specified herein.

B. Work shall include, but not be limited to, the following major items and necessary accessories for a complete and operational system:
   1. Clearing as necessary for installation of fence.
   2. Fence post, frame, and concrete foundation.
   3. Chain link fabric and barbed wire.
   4. Gates.

1.02 SYSTEM DESCRIPTION

A. Fencing Location
   1. Fence Height: As shown on drawings
   2. Provide posts, bottom intermediate and top rails as indicated. Provide corner and brace assemblies.
   3. Provide fabric gauges as indicated and install fabric on outside of fence and anchor to framework such that fabric remains in tension after pulling force is released.

1.03 SUBMITTALS

A. Submit the following in accordance with Section, Submittal Procedures:
   1. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following. Equipment to be furnished for the Project shall be clearly indicated including all options to be provided.
      a. Individual components of the fencing system.
   2. Shop Drawings: Submit Project specific shop drawings for the following:
      a. Layout drawing showing spacing of posts and location of gate, corner, end, and pull posts.
   3. Manufacturer's Installation Procedures.

PART 2 PRODUCTS

2.01 FABRIC

A. Selvage: Fabric shall be twisted and barbed at both selvages. Both selvages of meshes less than 2 inches shall be knuckled. Bottom tension wire shall be 7 gauge and shall terminate at posts.

B. Galvanized Steel Chain-Link Fence Fabric: Fabricated in one-piece widths for fencing 12 feet and less in height to comply with Chain Link Fence Manufactures Institute (CLFMI) “Product Manual” and with requirements indicated below:
   1. Mesh and Wire Size: 2-inch mesh, 0.148-inch diameter (9 gage).
   2. Coating: ASTM A 392-74, Class 2, galvanized.

2.02 FRAMING

A. Round member sizes are given in actual outside diameter (OD) to the nearest thousandth of inches. Round fence posts are often referred to in ASTM standard specifications by Nominal pipe sizes (NPS) or the equivalent trade sized inches. The following indicates these equivalents all measured in inches:

Actual OD Size (in)	NPS Size	Trade
1.660	1 1/4	1 5/8
1.900	1 1/2	2
2.375	2	2 1/2
2.875	2 1/2	3
4.000	3 1/2	4

B. Type I Round Posts: Standard weight (schedule 40) galvanized-steel pipe conforming to ASTM F 1083, according to heavy industrial requirements of ASTM F 669. Group IA, with minimum yield strength of 25,000 psi, not less than 1.8 oz. of zinc per square foot. Type coating inside and outside according to ASTM F 1234, as determined by ASTM A 90, and weights per foot as follows:

Actual OD Size (in)	Weight (lb/ft)	NPS Size
1.660	2.27	1-1/4
1.900	2.72	1-1/2
2.375	3.65	2
2.875	5.79	2 1/2
4.000	9.11	3 1/2

C. Top Rail: Manufacturer's longest lengths (21 feet) with expansion-type coupling, approximately 6 inches long for joining. Provide rail ends of other means for attaching top rail securely to each gate, corner, pull, and end post.
   1. Round Steel: 1.660-inch OD Type.

D. Steel posts for all fabric heights:
   1. Round Line or Intermediate Posts: 2.375-inch OD Type I steel pipe.
   2. Round End, Corner, and Pull Posts: 2.875-inch OD Type I steel pipe.

E. Swing Gate Posts: Furnish post to support single gate leaf, or one leaf of a double-gate installation, according to ASTM F 900, sized as follows.
   1. Steel posts for fabric height of 8 feet or less and gate leaf width:
      a. Up to and including 4 feet: 2.875-inch OD pipe weighing at least 5.79 lb per foot.
      b. Over 4 to 10 feet: 4.000-inch OD pipe weighing at least 9.11 lb per ft.

2.03 FITTINGS AND ACCESSORIES

A. Material: Comply with ASTM F 626. Galvanized iron or steel to suit manufacturer's standards.
   1. Steel and Iron: Unless specified otherwise, hot-dip galvanize steel or cast-iron fence fittings and accessories with at least 1.2 oz. Zinc per sq. ft. as determined by ASTM A 90.

B. Post and Line Caps: Provide weather-tight closure cap for each post. Provide line post caps with loop to receive top rail.

C. Post Brace Assembly: Manufacturer's standard adjustable brace. Use material specified below for brace, and truss to line posts with 3/8-inch-diameter rod and adjustable tightener. Provide manufacturer's standard galvanized-steel, cast iron or cast-aluminum cap for each end.
   1. Round Steel: 1.6600-inch OD Type I steel pipe.

D. Bottom and Center Rail: (Where indicated on drawings). Same material as top rail unless indicated otherwise. Provide manufacturer's standard galvanized-steel, cast-iron or cast-aluminum cap for each end.

E. Tension or Stretcher Bars: Hot-dip galvanized steel with a minimum length 2 inches less than the full height of fabric, a minimum cross section of 3/16 inch by 3/4, and a minimum of 1.2 oz of zinc coating per sq. ft. Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric is integrally woven into the post.

F. Tension and Brace Bands: 3/4 –inch-wide minimum hot-dip galvanized steel with a minimum of 1.2 oz. of Zinc coating per sq. ft.
   1. Tension Bands: 0.074-inch thick (14 gauge) minimum.
   2. Brace Bands: 0.105 inch thick (12 gauge) minimum

G. Tension Wire: 0.177-inch-diameter metallic-coated steel marcelled tension wire conforming to ASTM A 824 with finish to match fabric.
   1. Coating Type II zinc in the following class as determined by ASTM A 90.
      a. Class 2, with a minimum coating weight of 1.20 oz. per sq. ft. of uncoated wire surface.

H. Tie Wire: (9-gauge) aluminum wire alloy 1350-H19 or equal.

2.04 BARBED WIRE

A. Provide three lines of 4 point pattern barbed wire. Barbed wire shall be double strand 12-1/2 gauge twisted wire with 14 gauge, 4 point round aluminum barbs spaced on approximately 5 inch centers conforming to the requirements of ASTM A121. Extension arms to accommodate barbed wire shall withstand a 250-pound pulldown load from end of arm and have a 3-inch apron around post. The top most barbed wire shall be approximately 18 inches above the fabric and approximately 18 inches out from fence line. Barbed wire shall be securely fastened in slots by heavy wire pins. Arms having projections to bend down over barbed wire will not be acceptable.

2.05 CONCRETE

A. Concrete: Provide concrete consisting of Portland cement per ASTM C150, aggregates per ASTM C 33, and potable water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 3000 psi. Use at least four sacks of cement per cu. yd., 1-inch maximum size aggregate, 3-inch maximum slump.

B. Package Concrete Mix: Mix dry-packaged normal-weight concrete conforming to ASTM C 387 with clean water to obtain a 2-inch to 3-inch slump.

2.06 GATES

A. General: Fabricate perimeter frames of gates from same material and finish as fence framework. Assemble gate frames by welding. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members a maximum of 8 feet apart unless otherwise indicated.
   1. Fabric: Same as for fence unless otherwise indicated. Secure fabric at vertical edges with tension bars and bands and to top and bottom of frame with tie wires.

2. Bracing: Install an adjustable truss rod diagonally on gates six foot wide and greater to prevent sagging.

B. Swing Gates: Comply with ASTM F 900.
   1. Framework: Fabricate using 1.660-inch minimum OD Type I steel pipe or 1-inch-square galvanized steel tubing weighing 1.84 lb per sq. ft.
   2. Gate Hardware: Provide galvanized hardware and accessories for each gate according to the following:
      a. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180 degree gate opening. Provide 1-1/2 pair of hinges for each leaf over 6-foot nominal height.
      b. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as an integral part of latch.
      c. Keeper: Provide a keeper for vehicle gates that automatically engages gate leaf and holds it in the open position until manually released.
      d. Gate stops: Provide gate stops for double gates consisting of mushroom-type flush plate with anchors, set in concrete, and designed to engage a center drop rod or plunger bar. Include a locking device and padlock eyes as an integral part of the latch, permitting both gate leaves to be locked with a single padlock.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install fence to comply with ASTM F 567. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

B. Excavation: Drill or hand-excavate (using post-hole digger) holes for posts to diameter and spacings indicated, in firm, undisturbed or compacted soil.
   1. If not indicated on Drawings, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than four times the largest cross section of post.
   2. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.

C. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space a maximum of 10 feet o.c., unless otherwise indicated.
   1. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and hold in position during placement and finishing operations.
      a. Pour concrete footings to a level 2” below finished grade and cover with fresh earth from excavation.

D. Top Rails: Run rail continuously through line post caps, bending to radius for curved runs and at other posts terminating into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.

E. Center Rails: Install center rails in one piece between posts and flush with post on fabric side, using rail ends and special offset fittings where indicated.

F. Brace Assemblies: Install braces at end and gateposts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric. Install so posts are plumb when diagonal rod is under proper tension.

G. Bottom Tension Wire: Install tension wire within 6 inches of bottom of fabric before stretching fabric and tie to each post with not less than same gage and type of wire. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter (11-gage) hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c.

H. Fabric: Pull fabric taut and tie to post, rails, and tension wires.

I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and Gateposts with tension bands spaced not over 15 inches o.c.

J. Tie Wires: Use wire of proper length to secure fabric firmly to posts and rails. Bend ends of wire to minimize hazard to persons or clothing.
   1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to rails and braces 24 inches o.c.

K. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

L. Netting Ties: Fasten safety netting to tension cable and fence top rail with cable ties at 12" o.c.

M. Barbed Wire: Install three parallel wires on each extension arm on security side of fence, unless otherwise indicated. Pull wires taut.

N. Gates: Install gates plumb, level and secure for full opening without interference. Install ground set items in concrete for anchorage as recommended by the manufacturer.

END OF SECTION 02831

SECTION 02931

SOD

PART 1 GENERAL

Restoration of existing lawn areas disturbed by construction activities shall be by installation of new sod where indicated on plans or otherwise directed to install sod by the Engineer. Restoration and sod shall be performed as soon as practical, but the time period between initial disturbance, the utility installation and sod placement shall not exceed 60 days. Sod is defined as blocks, squares, strips of turf grass and adhering soil used for vegetative planting. Sodding and preparation of the sod bed shall be performed by an experienced landscape subcontractor specializing in this type of operation unless otherwise approved by the Engineer in writing. The Contractor shall adhere to the standards set forth by the American Association of Nurseryman and the Associated Landscape Contractors of America. All personnel shall be appropriately trained with regard to the degree of involvement so to assure the owner of the highest level of workmanship. Sod species suitable in this area are Hybrid Bermuda, Centipede and Zoysia; however the sod placed for each individual's lawn shall be the same species of sod as existing. Sodding may be performed at any time of the year except frozen sod shall not be placed nor shall sod be placed on frozen ground. The Contractor shall adapt his operations to variations in weather or soil conditions as necessary for the successful establishment and growth of a vigorous, disease free and weed free sod lawn.

1.01 MATERIAL

A. Materials, equipment and products incorporated in the work shall be approved by the Engineer. The Contractor shall submit a list of the proposed materials with samples, if required. Package materials should be delivered in unopened original containers showing weight, analysis and name of manufacturer. Protect material from deterioration.

B. Sod shall contain 95 percent permanent grass; not more than 5 percent weeds and undesirable grasses, good texture and free from obnoxious grasses, roots, stones and foreign materials. Sod shall be uniformly 1 1/2 to 2 inches thick with a well-developed fibrous root mat system in topsoil with clean cut edges. The sod shall be sufficiently dense and cut to the minimum required thickness such that if one corner suspends the sod, the sod will not tear apart. The sod shall be recently mowed to a height of not more than 3 inches prior to harvest. The sod shall be supplied and maintained in a healthy condition as evidenced by the grass being a normal green color in appearance, dense, and free from insects, pests, disease or injury. Sod shall be delivered to the job site within 24 hours after being cut and shall be installed within 24 hours after delivery. Any sod which is torn, broken or too dry will be rejected.

1.02 SOIL BED PREPARATION

A. Before landscape construction is to begin, the site shall be cleaned and disposed of brush, rubbish, stones, gravel and other foreign material within the area to be landscaped. Exposed ground surfaces disturbed during construction activities shall be graded to the original contours (allowing for the thickness of the sod) or as in the case of an altered contour such as a fill slope, graded as directed by the Engineer to finish grade, or typical cross section. The sod bed shall be excavated to such a depth that after sod placement the top of the sod shall be flush with surrounding grade or contours. Rake areas to be sodded smooth, free from unsightly variations, bumps, ridges or depressions. Do not start work until conditions are satisfactory and do not work during inclement or impending inclement weather.

B. The surface area to receive sod shall contain a minimum of 4 inches of good, fertile, friable, organic natural topsoil loam as a base for laying the sod. Topsoil shall be free of clumps, brush, sticks, weeds, stones, roots, trash or other objectionable material. Contractor shall

ensure all topsoil to be free of plants or plant parts of Quackgrass, Johnson grass, nut sedge, poison ivy or other noxious weeds. Soil preparation shall not be performed in frozen or extremely wet conditions. The finished topsoil bed shall be uniform in grade, with a yard like appearance. All changes in grade shall have smooth, rounded peaks and valleys.

C. The soil shall be scarified or otherwise loosened to a depth of not less than 5 inches and all clods shall be broken. The top 4 inches shall be worked into an acceptable smooth, friable and uniformly fine texture sod bed by use of soil pulverizes, drags, harrows or by other methods approved by the Engineer. Commercial grade fertilizer (8% Nitrogen, 8% Phosphate, 8% Potash) shall be applied at a rate of 20 pounds per 100 square feet, Super-Phosphate at 12 pounds per 1000 square feet and lime (Dolomite limestone containing not less than 85% total carbonates) shall be applied at a rate of 25 pounds per 1000 square feet or at a rate recommended for the type of sod being placed. Apply soil amendments within 24 hours after raking topsoil base surface and not more than 48 hours prior to laying sod. Mix thoroughly a minimum depth into the upper 4 inches of topsoil and lightly water to aid in dissipation. Sod placement shall not begin until the soil preparation is inspected and approved by the Engineer. During application of soil amendment fertilizer etc., adequate precautions shall be taken to prevent damage to existing features such as traffic, structures, landscape, trees, vegetation, utilities or any other appurtenances. The Contractor shall be required to repair or clean any damages.

1.03 PLACING SOD

A. The Contractor and his landscape subcontractor shall coordinate the placing of the sod to begin within 24 hours after the topsoil base preparation is completed and accepted by the Engineer. Sod shall be brought to the site as near to the time of placing as possible. Store sod in the shade, and keep watered particularly in extreme hot and dry condition to insure vitality and to prevent the dropping off of soil during handling. During wet weather, the sod shall be allowed to dry sufficiently to prevent tearing. Handling shall be done in a manner which will prevent tearing, breaking, drying or other damage. Carefully place sod in rows with the longer side perpendicular to slopes and the ends staggered in each successive row in a brick-like pattern. Butt the ends and sides together tightly and do not overlap or stretch the sod. Do not leave any voids or gaps.

B. Insure sod that abuts valve box covers, manhole covers and/or utility poles, walks, etc. is 1/4" below the edge of the structure to allow for positive drainage. Soil shall not dam up water adjacent to walks, etc. or exhibit ponding. Unavoidable gaps shall be closed with small pieces of torn or broken sod if kept moist and approved by the Engineer. After the sod is laid, irrigate thoroughly to allow water to penetrate a minimum 6 inches into the soil below the sod. Sod shall not be placed when the atmospheric temperature is below 32° F.

C. Tamp and roll completed sod installation with a manual roller or approved equipment to eliminate minor irregularities and to form close contact with the soil bed immediately after placing and watering. The type of rolling and tamping equipment to be used shall be submitted to the Engineer for approval prior to construction. On steep slopes 3:1 (horizontal and vertical) or greater, in drainage ditches or any areas where sod slipping may occur, anchor sod with approved wooden stakes (1/2"x 3/4" x 12") or staples spaced not over 2 feet apart in any direction and/or in sufficient number to prevent slippage or displacement. The anchors shall be driven flush with the surface of the sod. The wide flat side of the stake shall be driven parallel to the slope. Staking shall be done concurrently with sod placement and prior to tamping. Sod shall be laid with the long horizontal edge of the strips parallel to the contour starting at the bottom of the slope. The edge of the sod shall be turned slightly in the ground at the top of a slope and a layer of earth placed over it and compacted so as to

conduct the surface water over and onto the top of the sod. Upon completion of the above-described work, the surface of the sodded areas shall coincide with the finished grade and not exceed 1/4" plus or minus variation to adjoining grade or proposed contour. Extreme care shall be taken to prevent the installed sod from being torn or displaced. Where sod is placed adjacent to travel way Contractor shall protect sod from vehicular or other shoulder traffic by roping off temporarily or providing other suitable means of protection until sod has set.

1.04 MAINTENANCE

A. The Contractor shall, at no additional cost to the Owner, make whatever arrangements necessary to insure an adequate supply of water to meet the needs of this Contract. The Contractor shall supply water of suitable quality and purity to sustain and encourage vigorous plant growth, and supply all equipment for proper de1ivery and application to planted areas. Water obtained from PWC fire hydrant shall be metered and properly protected with an approved backflow prevention device. All costs for bulk water use where applicable shall be borne by the Contractor. PWC must inspect and approve any connections to their water system to include the proposed water application and storage equipment. The Contractor shall not use private resident's water. The Contractor is solely responsible to provide watering of the sod. The Engineer shall approve the method of application of water. Limit watering to early morning or late afternoon to enable the soil to absorb the maximum amount of water with limited runoff.

B. Maintenance shall begin immediately after sodding operation. Contractor shall provide a written schedule to the Engineer of proposed maintenance methods and scheduled maintenance. The Contractor shall maintain all sodded areas until sod is firmly established and as outlined below. Maintenance will include watering, fertilizer, pest control, soil amendments, disease control, erosion repair, mowing, protecting turf area from traffic (i.e. temporary fences, barriers, signs, etc.) and replacement of any dead or damaged sod.
   1. Watering
      a. Water lawn areas once a day with a minimum 1/2-inch water for the first 3 weeks after area sodded.
      b. After the 3-week period, water twice a week with a 3/4-inch of water each time unless a comparable amount of rainfall has occurred.
      c. Make weekly inspections to determine moisture content of soil and supplement the above watering schedule as needed.
      d. Excessive runoff, puddling, and wilting shall be prevented.
   2. Fertilizer and Pest Control
      a. Evenly spread fertilizer composite at a rate of 40 pounds per 5000 square feet or as recommended by the manufacturer. Fertilizer shall not be applied until 2 weeks after initial placement of the sod or prior to the advent of winter
      b. Treat areas of weed and insect infestation as recommended by the treatment manufacturer.
   3. Mowing
      a. The Contractor shall do mowing operations, (in yards not being mowed by residents) until provisional acceptance.
      b. Mowing shall be done only when the grass is dry with a rotary type mower having a blade height set not lower than l 1/2 inches nor higher than 3 inches.
      c. Mowing operations shall be conducted at intervals, which insure grass height does not exceed 4 inches between mowing.
      d. The Contractor shall complete at least one mowing operation before the work will be considered for provisional acceptance.
      e. The Contractor shall protect and not allow access of vehicular traffic into any newly sodded areas and shall repair any damaged turf to original grade.

Maintenance shall continue for a period of one (1) year after placement or until provisional acceptance by the Engineer. A written record shall be furnished to the Engineer of the maintenance work performed. At least two weeks shall elapse after chemical control is applied before a request of inspection.

1.05 ACCEPTANCE

A. Fifteen (15) days prior to the end of the one (1) year maintenance period, the Contractor shall make written request to the Engineer for an inspection and provisional acceptance of the sod. Failure to notify the Engineer will not relieve the Contractor of the maintenance provisions required and the Contractor will continue to be responsible for the maintenance of the sod.

B. Replacement of dead sod shall be performed within 7 days after notification by the Engineer and the maintenance period for these areas or individual lawns shall be extended for the 90-day maintenance period. Failure to replace dead sod within the specified 7 day period will result in the Owner having the work performed and deducting the cost from the Contract, however, the Contractor shall be responsible for the maintenance and if necessary replacement of sod.

C. Final acceptance will be given upon satisfactory contract performance exhibited at final inspection and acceptance. Sodded areas are to be fully rooted prior to acceptance. The Engineer shall be the sole judge as to whether or not the lawns are acceptable. Should any deficiencies be disclosed at final inspection, the Contractor shall make the necessary corrections in a timely manner and request re-inspection.

D. After the completion of the project, the Contractor will provide a warranty letter for one (1) year.

1.06 GUARANTEE

A. The Contractor shall guarantee a dense, vigorous stand of turf free of weeds, disease, pests or any dead areas more than one half of a square foot in size for a period of one (1) year from initial placement or replacement whichever is greater. Total dead area shall not exceed 1% of total square footage for each individual resident's lawn.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 02931

SECTION 02950

TREES, PLANTS, AND GROUND COVER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation of soil.

B. Topsoil bedding.

C. Relocation of trees, plants and ground cover.

D. Mulch and fertilizer.

E. Maintenance.

F. Tree Pruning.

1.02 REFERENCES

A. ANSI Z60.1 - Nursery Stock.

B. NAA (National Arborist Association) - Pruning Standards for Shade Trees.

1.03 DEFINITIONS

A. Weeds: Any plant life not specified or scheduled.

B. Plants: Living trees, plants, and ground cover specified in this Section [, and described in ANSI Z60.1].

1.04 SUBMITTALS - PROJECT CLOSEOUT

A. Maintenance Data: Include cutting and trimming method; types, application frequency, and recommended coverage of fertilizer.

B. Submit list of plant life sources.

1.05 QUALITY ASSURANCE

A. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years' experience.

B. Installer Qualifications: Company registered and specializing in installing and planting the plants with 3 years' experience.

C. Tree Pruner Qualifications: Company specializing in pruning trees with proof of Arborist Certification.

D. Tree Pruning: NAA - Pruning Standards for Shade Trees.

E. Maintenance Services: Performed by installer.

1.06 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Plant Materials: Certified by state department of agriculture. Described by ANSI Z60.1, free of disease or hazardous insects.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

B. Protect and maintain plant life until planted.

C. Deliver plant life materials immediately prior to placement. Keep plants moist.

1.08 COORDINATION

A. Install plant life after and coordinate with installation of underground irrigation system piping and watering heads specified in Section 02810.

1.09 WARRANTY

A. Provide one year warranty.

B. Warranty: Includes coverage for one continuous growing season; replace dead or unhealthy plants.

C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

1.10 MAINTENANCE SERVICE

A. Maintain plant life for 24 months after Date of Substantial Completion.

B. Maintain plant life immediately after placement until plants are well established and exhibit a vigorous growing condition. Continue maintenance until termination of warranty period.

C. Maintenance to include:
1. Cultivation and weeding plant beds and tree pits.
2. Applying herbicides for weed control in accordance with manufacturer's instructions. Remedy damage resulting from use of herbicides.
3. Remedy damage from use of insecticides.
4. Irrigating sufficient to saturate root system.
5. Pruning, including removal of dead or broken branches, and treatment of pruned areas or other wounds.
6. Disease control.
7. Maintaining wrapping, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.
8. Replacement of mulch.

PART 2 PRODUCTS

2.01 TREES, PLANTS, AND GROUND COVER

A. Trees, plants and ground cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

2.02 SOIL MATERIALS

A. Topsoil: Fertile, agricultural soil, capable of sustaining vigorous plant growth; free of subsoil, clay or impurities, plants, weeds and roots

2.03 SOIL AMENDMENT MATERIALS

A. Fertilizer: Nitrogen 5 percent, phosphoric acid 10 percent, soluble potash 5 percent.

B. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.

C. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.

2.04 MULCH MATERIALS

A. Mulching Material: Hardwood mulch.

2.05 ACCESSORIES

A. Wrapping Materials: Burlap.

B. Stakes: Softwood lumber, pointed end. Mild steel angle, galvanized, pointed end.

C. Cable, Wire, Eye Bolts [and Turnbuckles]: Non-corrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.

D. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared subsoil is ready to receive work

B. Saturate soil with water to test drainage.

C. Verify that required underground utilities are available, in proper location, and ready for use.

3.02 PREPARATION OF SUBSOIL

A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

C. Scarify subsoil to a depth of 3 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

D. Dig pits and beds 6 inches larger than plant root system.

3.03 PLACING TOPSOIL

A. Spread topsoil to a minimum depth of 4 inches over area to be planted. Rake smooth.

B. Place topsoil during dry weather and on dry unfrozen sub-grade.

C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.

D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches.

3.04 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after initial raking of topsoil.

C. Mix thoroughly into upper 2 inches of topsoil.

D. Lightly water to aid the dissipation of fertilizer.

3.05 PLANTING

A. Place plants for best appearance for review and final orientation by Architect/Engineer.

B. Set plants vertical.

C. Remove non-biodegradable root containers.

D. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth as indicated on drawings under each plant. Loosen burlap, ropes, and wires, from the root ball.

E. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch lifts. Maintain plant life in vertical position.

F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.06 PLANT RELOCATION AND RE-PLANTING

A. Relocate plants as directed by Engineer.

B. Re-plant plants in pits or beds, partly filled with prepared topsoil mixture, at a minimum depth as indicated on drawings under each plant. Loosen burlap, ropes, and wires, from the root ball.

C. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant materials in vertical position.

D. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.07 FIELD QUALITY CONTROL

A. Field inspection and testing.

B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.08 MAINTENANCE

A. Neatly trim plants where necessary.

B. Immediately remove clippings after trimming.

C. Water to prevent soil from drying out.

D. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.

E. Apply pesticides in accordance with manufacturer’s instructions.

END OF SECTION 02950

SECTION 04000

MASONRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 DESCRIPTION OF WORK

A. Mortar

B. Brick masonry

C. Cast Stone

D. Unit pavers

1.03 QUALITY ASSURANCE

A. All produces and execution shall conform to applicable standards and specifications published by the following:

1. The American Society for Testing and Materials (ASTM)
2. American National Standards Institute (ANSI)
3. National Concrete Masonry Institute (NCMA)
4. Structural Clay Products Institute (SPCI)
5. Underwriters Laboratories, Inc. (UL)

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and other data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements. Include instructions for handling, storage installations and protections.

1.05 JOB CONDITIONS

A. Protection of Work: During erection, cover top of walls with heavy waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

1.06 COLD WEATHER PROTECTION

A. Remove any ice or snow formed on masonry bed by carefully applying heat until tip surface is dry to the touch.

B. Remove all masonry determined to be frozen or damaged by freezing conditions.

C. Perform the following construction procedures while the work is progressing:

1. When air temperature is from 40 degrees F (4 degrees C) to 32 Degrees F (0 degrees C), heat sand or mixing water to produce mortar temperatures between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C)
2. Do not lay masonry when the temperature of the surrounding air is 32 degrees F (0 degrees C) and falling.

D. Perform the following protections for completed masonry and masonry not being worked on:

1. When the mean daily air temperature is from 40 degrees F (4 degrees C) to 32 degrees F (0 degrees C), protect masonry from rain or snow for at least 24 hours by covering with weather resistive membrane.

2. When mean daily air temperature is from 32 degrees F (0 degrees C) to 25 degrees F (-4 degrees C), completely cover masonry with weather-resistive membrane for at least 24 hours.

3. When mean daily air temperature is from 25 degrees F (-4 degrees C) to 20 degrees C) completely cover masonry with insulating blankets or similar protection for at least 24 hours.

4. When mean daily temperature is 20 degrees F (-7 degrees C) and below, maintain masonry temperature above 32 degrees F (0 degrees C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps, or other acceptable methods.

PART 2 PRODUCTS

2.01 MORTAR MATERIALS

A. Portland Cement: ASTM C150, Type I. Provide natural color or white cement as required to produce the required mortar color.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregates: ASTM C 144, except for joints less that ¼" use aggregate graded with 100% passing the No. 16 sieve.

D. Mortar Color: Supply mortar color with fast-color, mineral pigments to produce color of mortar selected by architect.

E. Water: Clean, free of deleterious materials which would impair strength or bond.

2.02 CAST STONE

A. Ornamental Ball: Ornamental Ball shall be design PC-3/12, 12" diameter without pier cap, S-15 color, SK finish, as manufactured by Dura Art Stone, Conley Georgia or approved equal.

B. Balustrade: Balustrade shall consist of the following components, all of which manufactured by Dura Art Stone of Georgia:

1. Base Rails shall be BR4, *' sections with appropriate end sections. Provide with dowels for anchoring to bridge deck. Fabricated for equal baluster spacing of approximately 8.4".

2. Baluster shall be RB2, round, spaced approximately 8.4" on center. Provide with dowels for anchoring to base rails and gap rails. Provide half balusters each side of intermediate piers and inside of end piers. Balusters shall be 31" high.

3. Piers: Intermediate piers shall be 12" straight, provincial. End piers shall be 7" end, provincial.

4. Cap Rail shall be CR4, 8' sections with appropriate end sections. Fabricate for equal baluster spacing of approximately 8.4".

5. Keystone for arch shall be fabricated according to dimensions on details. Composition, color and finish shall match other cast stonework. Cast dowels into keystone for anchoring into brick arch.

6. System Design: Balustrade system shall be designed by the manufacturer. Submit drawings showing complete elevation, spacing of balusters, piers, and details for installation. Color for all components shall be S-15 (silica white), finish shall be SK (sharked smooth).

2.03 UNIT PAVERS

A. Solid concrete interlocking paving stones; ASTM C936-82 paving stones shall be Holland Stone as manufactured by Metromont Materials, Spartanburg, South Carolina or approved equal. Paving stones shall be 2 3/8" x 4" x8" with hidden spacer and meet the following physical requirements:

1. Compression Strength- At the time of delivery to the work site, the average compressive strength shall not be less than 8,000 psi with no individual unit strength less than 7,200 psi with testing procedures in accordance with ASTM Standard C-140.

2. Absorption- The average absorption shall not be greater than five percent (5%) with no individual unit absorption greater than seven percent (7%).

3. Proven Field Performance – Satisfying field performance is indicated with units similar in composition, and made with the same manufacturing equipment as those to be supplied to the purchaser, do not exhibit objectionable deterioration after at least one (1) year.

4. All units shall be manufactured with a separate surfaced hardened mix to ensure consistent texture and concentration of color on the wearing surface.

B. Visual Inspection

1. All units shall be sound and free of defects that would interfere with the proper placing of the unit of impair the strength of performance of the construction. Minor cracks incidental to the usual methods of manufacture, or minor chipping resulting from customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.

C. Sampling and Testing

1. The purchaser or his authorized representative shall be accorded facilities to inspect and sample the units at the place of manufacture from lots ready for delivery.

2. Sample and test units in accordance with ASTM Methods C-140.

D. Rejection

1. In case the shipment fails to conform to the specified requirements, the manufacturer may sort it, and new test units shall be selected at random by the purchaser from the retained lot and tested at the expense of the manufacturer. In case the second set of test unit fails to confirm to the specified requirements, the entire lot shall be rejected.

E. Expense of Tests

1. The expense of inspection and testing shall be borne by the purchaser unless otherwise agreed.

F. Sand Laying Course

1. The sand laying course shall be a well graded, clean washed sharp sand with 100% passing 3/8" sieve size and a maximum of 3% passing a No. 200 sieve size. This is commonly known as manufactured concrete sand, river sand, granite screenings, or similar. DO NOT USE MASON SAND.

2. Bedding sand to conform to ASTM C-33 – The sand-laying course should be the responsibility of the paving stone installer.

PART 3 EXECUTION

3.01 MORTARED BRICK MASONRY

A. Do not lower the freezing point of mortar by use of admixtures or antifreeze agents.

B. Do not use calcium chloride in mortar by use of admixtures or antifreeze agents.

1. Type M: ¼ part lime per part of Portland cement.

2. Type S: Over ¼ up to ½ part lime per part Portland cement.

C. Thickness: Build masonry construction to the full thickness shown, except, build single-width walls (if any) to the actual thickness of the masonry units, using units of nominal thickness shown or specified.

D. Cut masonry units with motor-driven saw designed to cut masonry with clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible.

E. Do not wet concrete masonry units.

F. Frozen Materials and Work: Do not use frozen materials or materials mixed or coated with ice or frost. For masonry, which is specified to be wetted, comply with BIA recommendations. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.

G. Lay-up walls plumb and true and courses level accurately spaced and coordinated with other work.

H. Stopping and Resuming Work: Rack back ½-masonry unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if specified to be wetted), and removed loose masonry units and mortar prior to laying fresh masonry.

I. Mortar Bedding and Jointing:

1. Use Type M mortar for masonry below grade and in contact with earth, interior and exterior load bearing walls.

2. Use Type S mortar for exterior above grade and in contact with earth, interior and exterior load bearing walls.

3. Measure and batch materials either by volume or weight, such that the required proportions for mortar can be accurately controlled and maintained. Measurement of sand exclusively by shovel will not be permitted.

4. Mix mortars with the maximum amount of water consistent with workability to provide maximum tensile bond strength within the capacity of the mortar.

5. Mix mortar ingredients for a minimum amount of water consistent with workability to provide maximum tensile bond strength within the capacity of the mortar.

6. Mix mortar ingredients of a minimum of 5-minutes in a mechanical batch mixer. Use water clean and free of deleterious materials, which would impair the work. Do not use mortar, which has begun to set, or if more than 2 ½ hours has elapsed since initial mixing. Re-temper mortar during 2 ½ hour period as required to restore workability.

7. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also, bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells, or cavities to be reinforced or to be filled with concrete or grout.

8. Joints: Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not otherwise indicated, lay walls with 3/8" joints. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials.

9. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

10. Formwork for Supporting Reinforced Masonry: Construct formwork to fully support reinforced arch for its entire length. Tolerance for formwork shall be 1/8" true to radius, 1/16" true to level. Leave formwork in place for 14 days after erection.

3.02 CAST STONE

A. Cast stone shall be constructed per manufacturer's recommendations. Drawings and recommendations shall be submitted for review prior to beginning of construction. Joints shall be ½", slightly concave, color to match cast stone. Base rails and bridge shall be drilled and dowelled and grouted securely.

3.03 UNIT PAVERS

A. The paving stone installer/contractor must have related experience in the installation of interlocking concrete paving stones.

B. Base Course Preparation

1. A suitable base must be prepared as detailed in other sections of the project specifications.

2. The base course shall be shaped to grade and cross section with an allowable tolerance of 1.4" (5mm).

3. The compacted base thickness is as follows: Patios, sidewalk, pool decks, and other designated areas for pedestrian walkways shall be at least 4" (100mm) on well drained soils. For other areas such as driveways, receiving wheeled traffic loads, a minimum of 6" (150mm) base thickness is required. A minimum of 8" (200mm) base thickness is required on low volume residential street application. Heavier traffic loads shall require a layer of Geotextile fabric or Geogrids as needed. Reference Tables 1 and 2 of National Concrete Masonry Association's TEK 87-A for minimum physical requirements for Soil Separation Geotextile or Base Reinforcement Geogrids.

C. Construction of the Sand Laying Course

1. The finished base course shall be approved before the placement of the sand-laying course.

2. The uncompacted sand-laying course shall be spread evenly over the area to be paved and then screeded to a level that will produce 1" (25mm) thickness when the paving stones have been placed. Normally, it is good practice to have final elevation of paving stones slightly higher than adjacent curb, gutter, other paving, to allow for any minor settling that may occur within the base. Maximum bedding sand thickness shall not exceed 1 ½".

3. Once screeded and leveled to the desired elevation, this sand laying course shall not be disturbed in any way.

D. Laying of Concrete Paving Stones

1. The paving stones shall be laid in the approved pattern as noted or shown on the drawings. Layering pattern shall be Runner bond.

2. The paving stones shall be laid in such a manner that the desired pattern is maintained and the joints between the stones are as tight as possible. Joints between stones shall not exceed 1/8" (3mm).

3. String lines should be used to hold all pattern lines true.

4. The gaps at the ends of the paver surface be filled with standard edge stone or with stones cut to fit. Cutting shall be accomplished to leave clean edge to the traffic surface using a masonry saw. Whenever possible, no cuts should result with a paver less than 1/3 of original dimension.

5. Paving stones shall be vibrated into the sand-laying course using a vibrator capable of 3,000 to 5,000 pounds of compaction force with the surface clean and joints open. At least two passes with the vibrator should be made across the surface.

6. After vibration, clean masonry type sand containing at least 30% of the 1/8" (3mm) particles shall be spread over the paving stones surface, allowed to dry, and vibrated into joints with additional vibrator passes and brushing so as to completely fill joints. Sweep sand to meet ASTM C-144.

7. Surplus materials shall then be swept from the surface or left on surface during construction time in ensure complete filling of joints during initial use. This sand also may provide surface protection from construction debris.

8. Do not vibrate within three feet of unrestrained edge. All work within three feet of the laying face must be fully compacted edge of the laying face and sand with a waterproof coverage. Sweep off excess sand when the job is complete.

9. Upon completion of work covered in the Section, the Contractor shall cleanup all work areas by removing all debris, surplus material and equipment from the site.

10. Cleaning- all dirt, grime, and fresh oil and grease shall be removed from the concrete paver surface prior to job being complete. Spray or brush cleaner onto paver surface and then rinse away with clean, potable water. Flammable ingredients or acids are not to be used. Use Addiment Dirt and Grim Remover, or Addiment Efflorescence Remover and General Cleaner, or approved equal.

11. Sealers- No sealer shall be applied until after a thorough cleaning of paver surface. Sealer shall be sprayed or rolled onto clean, dry surface, using Addiment Paver Seal - WB, or approved equal.

END OF SECTION 04000

Tryon Drive Drainage Improvements

APPENDIX B

Project Special Provisions

FAYETTEVILLE NC

AMERICA'S CAN DO CITY

31 41 40 Vibration Monitoring and Foundation Protection

33 42 13 Precast Reinforced Concrete Box Culvert

Utility Project Special Provisions

SECTION 31 41 40
VIBRATION MONITORING AND FOUNDATION PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide labor, equipment, and material to perform required vibration monitoring and foundation protection as specified herein and indicated on the Drawings. Work shall include, but not be limited to, the following:
   1. Pre-construction structural inspection of each building requiring foundation protection to evaluate the existing structural condition of each building.
   2. Furnish and install foundation protection measures in compliance with design.
   3. Design of vibration monitoring plan and provide vibration monitoring for the buildings designated on the Drawings.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 00425 Excavation/Backfilling
   2. Section 00435 Trenching
   3. Section 00475 Storm Sewer
   4. Section 00490 Precast Drainage Structures

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Document Management:
   1. Pre-construction Structural Inspection Report (SIR), as described herein.
   2. Geotechnical Engineer recommendations for additional buildings which should be considered for foundation protection based on proposed construction. Alternatively, Geotechnical Engineer statement shall indicate if no additional buildings need foundation protection.
   3. If Contractor proposes alternate means to protect foundations, Contractor shall submit a proposed Foundation Protection Plan (FPP) drawings and/or details showing proposed foundation protection measures, sealed by a North Carolina registered professional engineer (experienced in foundation protection measures). Approval of alternate means to protect foundations is not guaranteed and is at the sole discretion of the Engineer and Owner. Foundation protection measures shall prevent construction related damage to buildings which are in the vicinity of the Work.
   4. Vibration Monitoring Plan (VMP), sealed by a North Carolina registered professional engineer (Geotechnical) showing equipment type, locations, and allowable vibration level. Allowable vibration level shall be determined in the VMP but shall not exceed the level specified herein.
      a. Equipment, locations, and allowable vibration levels shall be selected by the Contractor to prevent damage to buildings in the vicinity of the Work.
   5. Monthly vibration monitoring reports.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PRECONSTRUCTION STRUCTURAL INSPECTION REPORT

A. Prior to beginning construction, the Contractor shall hire a third party testing firm to perform a pre-construction condition assessment to document the conditions of buildings and other sensitive structures adjacent to the construction area. The assessment shall be performed on all adjacent properties designated for foundation protection on the Drawings and any other properties as directed by the Engineer or Owner. The assessment shall include video and photographic documentation of all exteriors including building foundations, and installation of crack monitors on cracks that might occur or expand due to construction vibrations. Provide all documentation described above to the Owner and Engineer prior to beginning the operation.

B. The purpose of the pre-construction condition assessment is to evaluate the existing structural condition of each building. The assessment shall be attended by the Contractor, the Owner, and the property owner/resident if available. Contractor shall notify the property owner two weeks prior to the inspection and request that the property owner or his/her representative be present for the assessment.

C. The Contractor's third party testing firm shall document the findings of the inspection in a report (the Structural Inspection Report or SIR), which shall include the condition of each building inspected and video and photographs taken at the time of inspection.

D. The Contractor shall sign the report and shall obtain signature of the third party testing firm, the Owner, and the property owner to signify that all are in agreement with the findings and conclusions of the existing condition of the building at the time of the assessment.

3.02 CRACK MONITORING DURING CONSTRUCTION

A. During construction, the third party testing firm shall perform (or more frequently if recommended by the third party testing firm or Contractor) readings twice weekly (minimum) of the crack monitors installed prior to construction. Provide readings to the Owner within 48 hours of taking the reading. If crack monitoring readings confirm that crack width is not increasing, Contractor may request reduced frequency of readings, but in no case shall crack monitors be read less than once per week. More frequent readings may be required by Owner or Engineer if construction activities could result in greater earth borne vibrations. Testing firm shall notify the Owner immediately if monitoring indicates that construction contributed to crack widening. The testing firm shall prepare a detailed plan for repairing the structure and the Contractor shall repair the structure at no cost to the Owner. Contractor shall submit a plan for review that proposes alternate construction methods to address the vibration problems and minimize further damage.

3.03 VIBRATION MONITORING DURING CONSTRUCTION

A. All vibration monitoring equipment shall be in place and operational prior to beginning any excavation activity or foundation protection installation.

B. Prior to installation of monitoring equipment the Contractor shall notify adjacent property owners of the proposed excavation activities and purpose of vibration

monitoring equipment installation. The Contractor shall install the vibration monitor(s) along the side of the building closest to the excavation operations at the locations specified in the VMP. In each case, the distance from the excavation trench to the building being monitored should be determined and placed on the permanent print-out of the vibrations which are recorded.

C. The third party testing firm shall monitor vibrations at each location designated for foundation protection on the Drawings. Exact locations of monitoring equipment shall be recommended by the testing firm. The VMP shall include the proposed monitoring locations for Engineer / Owner approval. Adjustments may be made to the locations upon approval. The sensitivity range of the seismograph shall be selected such that the recording is initiated below the maximum allowable particle velocity of 1 in/sec and extends above the highest expected intensity. Specific activities of the vibration source (i.e., excavation) shall be indexed in time to allow correlation with the arrivals on the vibration.

D. The maximum allowable particle velocity is 1 in/sec. The Contractor shall notify the Engineer and Owner immediately if monitors indicate that the vibrations are above the criteria established. Operations causing the vibrations shall be suspended until a revised construction plan has been developed by the testing firm to eliminate the particle velocity exceedance. The exceedance shall be resolved by the Contractor at no additional cost to the Owner.

E. The vibration monitors shall consist of digital seismographs that display the particle velocities and associated frequencies plotted against the criteria established for this project. Each seismograph shall contain geophones with response capability in three mutually perpendicular axes or components; one vertical and two horizontal (radial and transverse). The frequency response of the geophones shall be linear from at least 4 Hz to more than 200 Hz. The sensitivity shall range from less than 0.02 in/sec to more than 5.0 in/sec. Monitors by Instantel is one type of seismograph that is suitable for this project.

F. For manual equipment a trained technician shall review and verify that the threshold values are not exceeded, at least twice daily during vibration monitoring operations. Additionally the equipment shall be set to sound an alarm to notify on site construction personal when the threshold value has been exceeded.

G. Vibration monitors shall be field calibrated by the testing firm before each recording period. The transducer shall be positioned with the longitudinal axis toward the vibration source. Transducers must be adequately coupled with the ground. Operation and calibration of all equipment shall be per manufacturer's recommendations. Vibration records shall be collected in waveform plot or strip chart plot. The peak vector sum of the particle velocity in longitudinal, transverse, and vertical planes shall be shown along with the respective dominant or principle frequencies. The highest recorded particle velocity (i.e., the vector sum of the three orthogonal directions), when indexed to a particle vibration event, shall be reported as the peak particle velocity. The recorded peak particle velocity shall be compared to criteria appropriate for the subject of concern.

H. If at any time during the operation the vibration levels exceed tolerable levels (in inches/second per the approved VMP) the Contractor shall stop work immediately and coordinate with the Engineer and the certified Geotechnical Engineer to develop acceptable methods to reduce vibration levels below the designated tolerable level.

I. The Engineer and Owner shall be notified immediately of any complaint received by the Contractor. The Contractor shall immediately review those construction activities inducing the vibration and prepare a report documenting all relevant data such as the time and date of the complaint, a description of the construction activities and operations, data from the monitoring instruments for the subject time/date, complaint information (including photographs, if possible) of the alleged damage. The Contractor shall submit for review a detailed plan for repair and revised construction plan to address the vibration problems to minimize further damage and complaints. The Contractor shall perform necessary repairs at no additional cost to the Owner.

J. The testing firm shall provide monthly vibration monitoring reports containing the results of the crack monitors and vibration monitors during those activities that generate earth borne vibrations, including but not limited excavation operations. The report shall document that the firm has provided the work described herein and shall be prepared by a professional experienced in analyzing and evaluating the results of the vibration monitoring.

3.04 FOUNDATION PROTECTION INSTALLATION

A. Foundation protection measures shall be installed and/or constructed by a qualified contractor. The foundation protection contractor shall have a minimum of ten (10) years of experience in the installation of the foundation protection measures. The foundation protection construction contractor shall coordinate the work with individual property owners and work will only be permitted Monday through Friday between the hours of 9:00 a.m. and 4:00 p.m. (EST). Weekend work will not be permitted unless approved by the Owner and the property owner(s).

B. Foundation protection measures shall be installed in accordance with the approved Drawings.

C. The depth of each foundation protection measure shall be recorded. The contractor shall record the indicated bearing and final depth for each installed foundation protection measure and provide sketches showing the address, location of and spacing between foundation protection measures for each building. A legible hard copy of the installation log shall be submitted to the Owner upon completion of work at each building.

D. Foundation protection measures shall be installed and completed prior to trench excavation for pipe removal or pipe installation. Trench excavation shall not be permitted within twenty (20) feet of a building shown to require foundation protection unless the foundation protection measures have been installed, completed, and accepted.

END OF SECTION

SECTION 33 42 13
PRECAST REINFORCED CONCRETE BOX CULVERT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work covered by this section consists of providing precast reinforced concrete culvert or arch culvert (culvert), precast reinforced concrete culvert bend (bend), or precast reinforced concrete culvert transition (transition) in accordance with the Drawings and Specifications. The Work shall also include the construction of such joints and connections to other culverts, pipes, drainage structures, endwalls, and steps as may be necessary to complete the work shown on the Drawings.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 00425 Excavation/Backfilling
   2. Section 00435 Trenching
   3. Section 00475 Storm Sewer
   4. Section 00485 Flowable Fill
   5. Section 00490 Precast Drainage Structures

1.03 REFERENCES

A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
   1. North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures (Measurement and Payment provisions do not apply)
   2. ASTM C1577 - Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD.
   3. In case of conflict, this specification section shall govern.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Document Management:
   1. Affidavit of Compliance: Affidavit shall attest that supplied products conform to the referenced standard and this specification and that tests set forth in each applicable referenced publication have been performed and that test requirements have been met.
   2. The designs of the precast culverts, bends, and/or transitions are the responsibility of the Contractor and are subject to review, comments, and approval. Include all details in the drawings, including the size and spacing of the required reinforcement necessary to build the precast culverts, bends, and/or transitions and the laying schedule. A North Carolina Registered Professional Engineer shall seal the drawings and design calculations. The shop drawings must show the proposed openings (top and sides) and reinforcing for pipe connections, joint material, joint sealer wrap including manufacturer installation instructions, handling devices or holes, structure openings, direction of flow arrow, minimum flow area, joint straps, weep holes

(if applicable) , sills/baffles (if applicable), and precast holes for steps (if applicable).

3. The Contractor shall submit the manufacturer's certification for the culvert, bend, and/or transition sections and those products to be used in the installation. The Contractor shall also submit the manufacturer's certification for the sills/baffles if required per Drawings.
4. All box culvert submittals shall incorporate a minimum of three weeks review time for the Engineer. Contractor shall not place any orders or cast any concrete until Engineer approval is granted.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver culvert, bend, and/or transition in the field as near as practicable to the place where it is to be installed. Where necessary to move the culvert, bend, and/or transition within the site, it shall be done in such a manner as not to injure the component and shall follow manufacturer recommendations.

B. Handling devices or holes are permitted in each culvert, bend, and/or transition section for the purpose of handling and laying. Remove all handling devices flush with concrete surfaces as directed. Fill holes in a neat and workmanlike manner with an approved non-metallic non-shrink grout, concrete, or hole plug.

PART 2 PRODUCTS

2.01 GENERAL

A. Installation of the culvert, bend, and/or transition shall conform to Section 414, Box Culvert Excavation of the NCDOT Standard Specifications and this Section and other applicable Sections in the Technical Specifications. Technical Specifications shall take precedence in the event of a conflict.

2.02 DESIGN AND MANUFACTURE

A. Culvert, bend, and/or transition sections shall conform to ASTM C-1577 Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers or ASTM C-1786 Standard Specification for Segmental Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers in the latest edition of the AASHTO LRFD Bridge Design Specifications (HL-93 loading). Provide a precast culvert that meets the requirements of NCDOT Standard Specifications Section 1077 and any other applicable parts of the NCDOT Standard Specifications.

B. The concrete mixture shall meet the requirements for Single Cell Box Sections shown in Table 1077-1 in Section 1077 Precast Concrete Units of the NCDOT Standard Specifications. Movement of the precast culvert, bend, and/or transition sections should be minimized during the initial curing period. Any damage caused by moving or handling during the initial curing phase will be grounds for rejection of that precast section. Air entrain the concrete in accordance with Section 1077 5(A) Portland Cement Concrete of the NCDOT Standard Specifications. For dry cast manufacturing, air entrainment is not required.

C. Each culvert, bend, and/or transition section shall be checked at the plant for fitment and numbered which shall correspond to the laying schedule.

D. All openings shown on the Drawings in the culvert, bend, and/or transition shall be formed during the manufacturing process.

E. Precast reinforced concrete box culverts shall meet the minimum flow area listed on the Drawings for each culvert. If flow area is not specifically listed on the drawings, it shall be calculated by multiplying the culvert span and height dimensions shown on the drawings to calculate the waterway flow area (i.e. 12'x4' box culvert shall have a 48 square foot waterway flow area). Culvert minimum waterway area shown on the Drawings shall be verified with the manufacturer for the culvert sizes due to manufacturing differences.

2.03 JOINTS

A. Produce the precast reinforced concrete culvert, bend, and/or transition section with tongue and groove ends. Design and form these ends of the culvert, bend, and/or transition section so, when the sections are laid together, they make a continuous line of culvert sections with a smooth interior free of appreciable irregularities in the flowline. The internal joint formed at the tongue and groove ends of the precast units shall be sealed with either bitumen/butyl sealant or closed-cell neoprene material conforming to ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants or C1677 Standard Specification for Joints for Concrete Box, Using Rubber Gaskets. The internal joint material shall be installed in accordance with the manufacturer's recommendations.

2.04 JOINT SEALER WRAP

A. Seal the external joint with an outside sealer wrap conforming to ASTM C877 Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections that is at least 12 inches wide and covers the joint on both the sides and the top of the culvert, bend, and/or transition sections. Use ConWrap CS-212 from Concrete Sealants, Inc., EZ Wrap from Press-Seal Gasket Corporation, Seal Wrap from Mar-Mac Manufacturing Co., Inc., Cadilloc External Pipe Joint from Cadilloc, or an approved equal for the outside sealer wrap. If the outside sealer wrap is not applied in a continuous strip along the entire joint, a 12 inch minimum lap of the outside sealer wrap is permitted. Before placing the outside sealer wrap, clean and prime the area receiving the outside sealer wrap in accordance with the sealer wrap manufacturer recommendations.

B. Cover the external joint with a 3-foot strip of filter fabric centered on the joint, with minimum 18" overlap. Filter fabric shall conform to type 4 requirements in Section 1056 of the NCDOT Standard Specifications.

2.05 JOINT CONNECTION STRAPS

A. Box culvert sections shall be joined together using PL3/8x4x2' hot dip galvanized straps, centered on box culvert section joints (minimum of two (2) per joint). A minimum of 4 epoxy bolts with washers shall fasten the straps to the interior of the box culvert sections with a minimum of 6" embedment length.

PART 3 EXECUTION

3.01 INSTALLATION

A. Contractor shall contact the Owner and Engineer for inspection and acceptance of the precast units prior to installation. A minimum of 48 hours' notice shall be given to the Owner and Engineer for inspection.

B. Ensure that equipment of the correct lifting capacity is available to install precast concrete culverts, bends, and/or transitions. Site conditions must be checked well in advance of shipping to ensure proper equipment location and to avoid any lifting restrictions. The lift anchors or holes provided in each section are only means to lift the elements unless otherwise approved by manufacturer.

C. In no case shall equipment operating in excess of the design load be permitted over the precast concrete culvert, bend, or transition units unless otherwise approved by manufacturer.

D. No construction equipment shall cross the bare precast concrete culvert, bend, or transition units. The Contractor shall refer to the manufacturer's specifications for additional restrictions.

E. No backfill shall be placed over or against any elements until they have been approved by the Engineer. Complete backfill in accordance with Section 00425, Excavation/Backfilling and applicable compaction requirements shown on the Drawings and NCDOT specifications.

F. Bedding for precast culverts, bends, and transitions shall meet the requirements of Section 414 of the NCDOT Standard Specifications, ASTM C1675, and as specified on the Drawings. Excavate to the depth shown on the Drawings, minimum 12 inches below the bottom of barrel and footings. Place backfill in the excavation as shown on the Drawings, including NCDOT #57 stone, NCDOT Type 2 geotextile full wrap around #57 stone foundation material. Place 6" leveling course (as defined in ASTM C1675) on top of #57 stone foundation layer. Bedding shall extend minimum 12 inches outside of the culvert or footings. The geotextile wrap shall be placed perpendicular to the culvert barrel and wrap around the #57 stone layer with a minimum lap of 2 feet to be provided.

G. Precast concrete units shall be placed at the beginning of the outlet end of the culvert with the groove end being laid upgrade. Tongue sections shall be laid into the groove sections. Positive means shall be provided to pull each section firmly into the previously placed section so that the joints are tightly homed. Use a "come-along", box pullers or other approved methods to create a positive means of joining box culvert, bend, or transition sections. Construction equipment shall not have direct contact with the culvert, bend, and/or transition sections. The load of the culvert, bend, and/or transition sections shall be suspended by a lifting device during joining procedure.

H. Place multiple, parallel lines of a culvert such that the separation between the lines of culvert has a minimum width of 3 inches. Fill the separation between multiple lines of culvert with non-excavatable flowable fill. Use flowable fill that meets the requirements listed in Section 00485, Flowable Fill.

3.02 CONCRETE BAFFLES/SILLS

A. If Concrete Baffles or Sills are proposed, they are to be included in the manufacturer's design and installed per manufacturer's specifications.

3.03 INVERT FILL MATERIAL

A. The culvert shall be filled with native soil if shown on the Drawings. Native material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow channel or culvert barrel. Rip rap may be used to supplement the native material. If rip rap is used, native material shall be placed on top to fill voids and provide a flat surface for animal passage. Native material is subject to approval by the Engineer and may be subject to permit conditions. If native material is not available, the Engineer shall approve an alternate source of material.

B. The material shall be compacted as little as possible but firm enough to walk on without leaving footprints, with voids filled such that water flows over, not under or through.

3.04 INSPECTION AND ACCEPTANCE

A. The Contractor shall provide an inspection report by a structural engineer stating that the concrete box culvert has been installed in accordance with the plans and specifications and that the installed culvert is free from cracking, damage, or other defects which would compromise the structural integrity or water-tightness of the installed culverts.

B. The inspection report shall include photos and video of the interior of the installed culvert, especially of any defects identified during the inspection.

C. Any defects in material or workmanship or damage identified by the inspection report shall be repaired by the Contractor using a method approved by the Owner at no additional cost to the Owner.

D. After repair of pipes, Contractor shall provide follow up inspection report at no additional cost to the Owner. Engineer shall review report make determinations regarding acceptability of the repaired pipes. The Engineer shall provide report and determinations to the City for review and approval.

E. Contractor shall not receive final payment until Owner acceptance of the installed box culvert.

END OF SECTION

UTILITY CONSTRUCTION PROJECT SPECIAL PROVISIONS

PART 1 - GENERAL

1. MISCELLANEOUS UTILITY CONSTRUCTION

All proposed utility construction shall be in conformance with the applicable requirements of the Fayetteville PWC Master Specifications, Fayetteville PWC Utility Details on the Drawings, and the project Contract Documents. If a discrepancy should arise between these specifications, the more stringent shall govern.

The existing water and sewer utilities proposed to be relocated or replaced are owned by PWC (hereafter "Owner"). The Contractor shall provide access for the Owners' representatives to all phases of construction. The Owner shall be notified two weeks prior to commencement of any work and one week prior to service interruption. Only authorized personnel of the Owners shall operate valves in the existing public water distribution or sewer collection systems.

PART 2 – UTILITY PAY ITEMS

General

Measurement and payment for utility construction shall conform to the pay items listed herein. Any work necessary to construct the utilities and appurtenances shown on the Drawings that is not specified as a pay item is considered incidental to the project and no direct payment shall be made.

B-07: X" (Material) Water Line

Description

Install water line of the specified material and diameter as shown on the Drawings, and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment

X" Water Line shall be measured along a horizontal plane and paid per linear foot of water line installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, bedding, thrust restraint, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install water line and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-08: Ductile Iron Water Line Fittings

Description

Install water line fittings as shown on the Drawings and in accordance with PWC Master

Specifications Section 02660.

Measurement and Payment
Ductile Iron Water Line Fittings shall be measured in paid per pound of water line fittings installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, thrust restraint, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install ductile iron water line fittings and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-09 and B-10: X" Gate Valve

Description
Install gate valves of the specified size as shown on the Drawings and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment
X" Gate Valve shall be measured in paid per each gate valve installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install gate valves and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-11: X" Tapping Sleeve & Valve

Description
Install tapping sleeve & valves of the specified size as shown on the Drawings and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment
X" Tapping Sleeve & Valve shall be measured in paid per each tapping sleeve & valve installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install tapping sleeve & valves and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-12: Water Main Kill-Out

Description
Install water main kill-outs of the specified size as shown on the Drawings and in accordance

with PWC Master Specifications Section 02660.

Measurement and Payment
Water Main Kill-Out shall be measured in paid per each water main kill-out installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

All work shall be in accordance with PWC standard detail W.22. Work shall include all costs to cut the existing water main, plug the end of the abandoned pipe with brick and mortar, steel plate/ductile iron cap (or other plug as approved by PWC), ductile iron pipe stiff knee, mechanical joint sleeve with megalug restraining gland (DIP) and mechanical joint cap, transition fitting, cap blocks, concrete encasement, excavation, shoring, disposal of removed water main, bedding material, installation of the stiff knee at the specified line and grade, bedding, backfill, compaction, all required compaction testing, and all labor, materials, equipment, and incidentals necessary to complete the work for each kill-out shall be considered incidental, and no specific payments will be made.

B-13: Fire Hydrant

Description
Install fire hydrants as shown on the Drawings and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment
Fire Hydrant shall be measured in paid per each fire hydrant installed and placed in satisfactory service and accepted by the Owner.

Ductile Iron fittings, valves, and water pipe for fire hydrant legs required for fire hydrant installation shall be measured and paid separately under the applicable pay items. All other work required to furnish and install fire hydrants, testing, and placing into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-14: Hydrant Leg

Description
Install hydrant legs to connect fire hydrants to the potable water main as shown on the Drawings and in accordance with PWC Master Specifications Section 02660 with 6-inch restrained joint PC350 ductile iron pipe.

Measurement and Payment
Hydrant Leg shall be measured in and paid per linear foot of hydrant leg installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

All other work required to connect fire hydrants to the potable water main and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-15, B-16 and B-17: X" Steel Encasement Pipe

Description
Install steel encasement pipes of the specified size as shown on the Drawings and in accordance with PWC Master Specifications Section 02301.

Measurement and Payment
Steel Encasement Pipe shall be measured in and paid per linear foot of steel encasement pipe installed and placed in satisfactory service and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, bedding, thrust restraint, backfill, roadway subgrade and unpaved surface restoration, and all other work required to install encasement pipes and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-18: Renew Water Meter

Description
Provide new complete water meter assembly, including meter box and all other components within the meter box, as shown on the Drawings and as directed by the Owner or Engineer.

Connect water meter to service lateral from main and to service line entering private property.

Water meters shall meet applicable requirements of PWC Master Specifications Section 02660 and applicable PWC details.

Measurement and Payment
Renew Water Meter shall be measured and paid per each meter satisfactorily provided, connected, tested, disinfected, placed into fully operational service as shown on the Drawings or as directed by the Owner or Engineer, and accepted by the Owner.

Water service line required for connection of water meters to main shall be measured and paid separately under the applicable pay item.

Connections which utilize an existing corporation stop at the potable water main (only if allowed by the Owner) will not be measured or paid.

All other work required to reconnect water meters and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-19: Water Service Line

Description
Install water service line to connect water meters to the potable water main as shown on the

Drawings and as directed by the Owner or Engineer.

Water service line shall meet applicable requirements of PWC Master Specifications Section 02660 and applicable PWC details. Trenchless methods shall be used for all water service line under roadways, curbs, sidewalks, and other paved areas if not being disturbed for other project construction.

Item includes abandoning of existing service line from existing water meter to existing main, including replacing the existing corporation stop with a tapered brass plug.

Measurement and Payment
Water Service Line shall be measured and paid per linear foot of new water service line installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Water service line required for connection, reconnection, or relocation of water meters shall be measured and paid under this pay item.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to relocate water meters place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-20, B-21, and B-22: X" (Material) Sanitary Sewer

Description
Install sanitary sewer line of the specified material and diameter as shown on the Drawings and in accordance with PWC Master Specifications Section 02730.

Measurement and Payment
X" (Material) Sanitary Sewer shall be measured along a horizontal plane and paid per linear foot of sanitary sewer line installed, tested, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, reconnection of all existing sewer service laterals, bedding, backfill, roadway subgrade and unpaved surface restoration, and all other work required to install sanitary sewer line and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-23: Renew Sanitary Sewer Cleanout

Description
Install sanitary sewer cleanouts as shown on the Drawings and in accordance with PWC Master Specifications Section 02730 and applicable PWC details.

Measurement and Payment

*Renew Sanitary Sewer Cleanout (*or *SSCO)* shall be measured and paid per each sanitary sewer cleanout installed, tested, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, removal and disposal of existing cleanout, protection of and coordination with any conflicting utilities, trenchless installation as applicable, fittings, reconnection of all existing sewer service laterals, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install sanitary sewer cleanout and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-24: Sewer Service Line

Description
Install sewer service line (or "laterals") to connect sanitary sewer cleanouts to the sanitary sewer main as shown on the Drawings and in accordance with PWC Master Specifications Section 02730 and applicable PWC details.

Measurement and Payment
Sewer Service Line shall be measured and paid per linear foot of sewer service line installed, tested, placed in satisfactory service and accepted by the Owner.

Trenching and excavation, removal and disposal of existing lateral service, protection of and coordination with any conflicting utilities, trenchless installation as applicable, fittings, reconnection of all existing sewer services, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install sanitary sewer line and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-25 and B-27: X' DIA Sanitary Sewer Manhole

Description
Install precast concrete sanitary sewer manholes of the specified diameter as shown on the Drawings and in accordance with PWC Master Specifications Section 02730.

Measurement and Payment
X' DIA Sanitary Sewer Manhole (or *SSMH)* of depth 0-feet to 6-feet, measured from finished rim elevation to lowest invert, regardless of type (doghouse or standard), shall be measured and paid per each manhole satisfactorily installed, tested, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, connection to proposed or existing piping, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install sanitary sewer manholes and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-26 and B-28: X' DIA Manhole Wall

Description
Install precast concrete riser sections of the specified diameter and in accordance with the Drawings and PWC Master Specifications Section 02730 for proposed manholes whose total height, as measured from finished rim elevation to lowest invert, exceeds 6-feet.

Measurement and Payment
Manholes of depth 0-feet to 6-feet, measured from finished rim elevation to lowest invert, regardless of type (doghouse or standard) shall be measured and paid per each under the applicable pay item in the bid proposal. When the depth exceeds 6-feet, the additional depth shall be measured vertically to the nearest tenth of a foot under *X' DIA Manhole Wall* and paid per linear foot for satisfactorily installed precast concrete manholes.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install manhole walls and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-29: Remove Fire Hydrant

Description
Remove fire hydrants as shown on the Drawings.

Remove fire hydrants by disconnecting the fire hydrant leg from the water main and installing a ductile iron mechanical joint plug directly into the hydrant tee. If the hydrant tee is not accessible, and the hydrant valve is within 4-feet of the water main, close the valve, install a ductile iron mechanical joint plug in the outlet side of the valve, and remove the valve box.

For fire hydrants to be removed that are connected to water mains specified on the Drawings to be abandoned, a ductile iron plug is not required at the hydrant tee.

The remaining hydrant leg shall be removed along with the fire hydrant. Fire hydrants removed shall be preserved and provided to the Owner or disposed of by the Contractor at the Owner's discretion. Materials removed shall become the property of the Contractor and shall be properly disposed of in accordance with all federal, state, and local regulations.

Measurement and Payment
Remove Fire Hydrant shall be measured and paid per each fire hydrant satisfactorily removed.

Trenching and excavation, protection of and coordination with any conflicting utilities, backfill, roadway subgrade and unpaved surface restoration, and all other work required to remove fire hydrants shall be considered incidental to the project and no specific payment will be made.

B-30: Remove Manhole

Description
Remove manholes as shown on the Drawings and in accordance with PWC Master Specifications Section 02730.

Remove utility manholes by removing the entirety of the manhole base, riser(s), cone, ring, and cover.

Measurement and Payment
Remove Manhole shall be measured and paid per each manhole satisfactorily removed.

Trenching and excavation, protection of and coordination with any conflicting utilities, backfill, roadway subgrade and unpaved surface restoration, and all other work required to remove manholes shall be considered incidental to the project and no specific payment will be made.

B-31 and B-32: Abandon X" Utility Pipe

Description
Remove or abandon existing utility pipes as shown on the Drawings.

All utility piping to be abandoned within the project limits that is in conflict with proposed work shall be removed entirely. Utility piping to be abandoned shall be removed if within 2-feet of finished grade. All other utility piping to be abandoned shall be emptied of all contents and filled to at least 90% full with flowable fill or removed entirely.

Cap or plug existing pressure pipes at the locations shown on the Drawings and in accordance with PWC Master Specifications Section 02660. Contractor shall provide adequate thrust restraint for caps or plugs installed on pressure pipes for abandonment.

Materials removed shall become the property of the Contractor and shall be properly disposed of in accordance with all federal, state, and local regulations.

Measurement and Payment
Abandon X" Utility Pipe shall be measured and paid per linear foot of pipe satisfactory abandoned or removed.

B-33: Cored Connection to Existing Manhole

Description
Connect proposed sanitary sewer piping into existing manholes as shown on the Drawings.

Core drill into the existing manhole with a hole diameter sufficient to accommodate a rubber booted connection in accordance with and the PWC Master Specifications Section 02730 for the proposed connecting sanitary sewer. Seal penetration with rubber boot and non-shrink hydraulic cement. Restore manhole interior lining, if present, in accordance with the liner manufacturer's requirements.

Measurement and Payment
Cored Connection to Existing Manhole shall be measured and paid per each satisfactory corrected connection of proposed piping to existing manholes.

Connections of proposed piping to existing manholes where the proposed invert matches the existing invert are considered incidental to the sewer line and no specific measurement nor payment will be made.

Connections of proposed manholes to existing piping are considered incidental to the manhole and no specific measurement nor payment will be made.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, and all other work required to install cored connections to existing manholes, and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

B-34: Sanitary Sewer Bypass Pumping

Description
Perform sanitary sewer bypass pumping as necessary to facilitate installation of the proposed sanitary sewer replacements and relocations as shown on the Drawings, as specified in the Utility Bypass Pumping Notes, and in accordance with PWC Master Specifications Section 02732. Minimize bypass pumping to the extent practicable and acceptable to the Owner.

Measurement and Payment
Sanitary Sewer Bypass Pumping shall be measured in paid as a lump sum for sanitary sewer bypass.

Bypass plan (sealed by NC Licensed Professional Engineer), implementation, monitoring, maintenance, removal, and all other work required for a fully operational sanitary sewer bypass, acceptable to the Owner, shall be considered incidental to the project and no specific payment will be made.

END OF SECTION

Tryon Drive Drainage Improvements

APPENDIX C

Fayetteville Public Works Commission
Standard Specifications

FAYETTEVILLE NC
AMERICA'S CAN DO CITY

MASTER SPECIFICATIONS

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DIVISION 2 SITE WORK

02211 GRADING FOR ROADS AND DRAINAGE

GENERAL

This section covers grading for the roadways and drives including all excavations, formation of embankments, preparation of subgrade for pavements and finishing and dressing of graded earth areas, shoulders, and ditches.

MATERIALS

Topsoil, material obtained from excavation suitable for topsoils, is defined as natural, friable soil, characteristics of representative soils in the vicinity that produce heavy growth of crops, grass, or other vegetation. Topsoil shall be free from roots, stones, and other materials that hinder grading, planting, and maintenance operations, and free from objectionable weed seeds.

Satisfactory soil materials are defined as those in accordance with AASHTO Soil Classification Groups, A-1, A-2-4, A-2-5 and A-3 (or in accordance with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, SP, SC.) as determined by the Engineer. Satisfactory material shall be free from roots, organic matter, trash, debris, frozen material or stones larger than three (3) inches in any dimension.

Unsatisfactory soil materials are defined as those in accordance with AASHTO Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, A-7 (or in accordance with ASTM D2487 soil classification groups GC, ML, MH, CL, CH, OL, OH, and PT) as determined by the Engineer.

Materials determined by the Engineer as too wet or too soft to provide a stable subgrade, foundation, or fill will be classified as unsatisfactory regardless of soil classification. The Engineer may require the Contractor to condition the wet and/or soft soils to provide a stable subgrade, foundation, or fill. The Contractor shall recondition the materials at no additional cost to the Owner.

CONSERVATION OF TOPSOIL

Areas designated for operations that contain a blanket of soil, which is more satisfactory for the growth of grass than the embankment material to be placed, shall be stripped to a depth of approximately four (4) to six (6) inches and placed in convenient stockpiles as directed in the field, for later use as a topsoil blanket on the new graded areas specified herein, or as designated. The stripping of material for use as topsoil shall be carefully determined and only the quantity required shall be stripped and stockpiled. Material ordered stockpiled shall be placed in a satisfactory manner to afford drainage. When grading operations permit, instead of stockpiling, the topsoil shall be hauled and spread directly on the areas to receive topsoil.

Topsoil shall be placed on all shoulders, slopes, ditches, and other earth areas graded under this contract, excluding borrow areas, unless otherwise specified on the plans. Topsoil shall be uniformly placed on these areas to a compacted depth of not less than three (3) inches or more than four (4) inches. The material shall be free from clods of soil, matted roots greater than ½ inch in diameter, and any other objectionable material which might hinder subsequent grass and mowing operations. The material shall be placed, leveled, and lightly compacted with at least one pass of a cultipacker, or other approved equipment weighing 100 to 160 pounds per linear foot of roller, to required cross sections, but shall be left one-tenth of a foot below the finished earth grade as specified in the paragraph FINISHED EXCAVATION.

BORROW EXCAVATION (Select Backfill)

Where satisfactory materials are not available in sufficient quantities from the required excavation, approved materials shall be obtained from borrow areas. Borrow excavation material shall be supplied by the Contractor from borrow areas located off-site. The work covered by this section shall consist of the excavation of approved material from borrow sources and the hauling and utilization of such material as required on the plans or directed by the Engineer. The borrow material shall be approved by the Engineer and shall not contain roots, root mats, stumps, highly plastic clay or other unsatisfactory materials. The material shall be a soil material which meets requirements of AASHTO Ml 45 for soil classification A-i-a, A-i-b, A-2-A, A-3 acceptable for select backfill. All borrow material shall be in accordance with the NCDOT Standard Specification for Roads and Structures, most recent edition. Borrow excavation shall be in accordance with the NCDOT Standard Specification for Roads and Structures, most recent edition. Excess material removed within the work limits, suitable for borrow excavation, during “Unclassified Excavation” operations shall not be considered or paid for as borrow excavation.

UNDERCUT EXCAVATION

When the Owner determines that the natural soil materials in areas where fill is to be placed, or in the finished graded subgrade roadway cross section, or in areas supporting structures or pipes, are determined to have a poor supporting value, the Engineer may require the Contractor to remove the materials and backfill with approved properly compacted material to the finished graded section. The Contractor shall conduct undercut operations in such a way that the Engineer can take the necessary measurements before any backfill is placed. Any material removed and backfilled without the approval of the Engineer, and/or all necessary measurements taken, and/or to a depth, length or width exceeding the dimensions shall not be considered undercut excavation and will not be paid for such. All undercut excavation shall be in accordance with the NCDOT Standard Specification for Roads and Structures, most recent edition. Undercut excavations suitable for backfill on toes of slopes and other approved areas will not be paid for as borrow excavation.

FINISHED EXCAVATION

All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified. Ditches shall be finished to permit adequate drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials. Surfaces shall be finished not more than 0.15 foot above or below the established grade and approved cross section. In areas where the bulking of soil as a result of grassing operations will tend to retard surface drainage along the edge of pavements, the finished grades shall be left 0.1 foot below grade prior to grassing.

Newly graded areas shall be protected from traffic and from erosion, and any settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades re-established to the required elevations and slopes. Embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic of other operations and shall be protected and maintained by the Contractor in a satisfactory condition until subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade shall not be permitted. No base course or pavement shall be laid until the subgrade has been checked and approved, and in no case shall base, surfacing, or pavement be placed on a muddy, spongy, or frozen subgrade. All work shall be conducted in accordance with the environmental protection requirements of the contract.

DIVISION 2
SITE WORK

02222 EXCAVATION AND BACKFILLING FOR UTILITY SYSTEMS

GENERAL

Work described in this section consists of the excavation, backfill, compaction, and finish grading required to install the utility systems. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defect in material or workmanship shall be cause for the replacement and correction of such defect as directed by the Public Works Commission.

RELATED SECTIONS

A. 02305 – Pipe Bursting
B. 02660 – Water Distribution
C. 02730 – Sanitary Sewer Systems
D. 02732 – Sewage Force Mains
E. Chapter 24 of the City of Fayetteville Ordinance (most recent version)

MATERIALS

Suitable soil materials are defined as those in accordance with AASHTO Soil Classification Groups A-1, A-2-4, A-2-5 and A-3 (or in accordance with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, SP, SC) as determined by the Public Works Commission. Suitable material shall be free from roots, organic matter, trash, debris, frozen material or stones larger than three (3) inches in any dimension.

Unsuitable soil materials are defined as those in accordance with AASHTO Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, A-7 (or in accordance with ASTM D2487 soil classification groups GC, ML, MH, CL, CH, OL, OH, and PT) as determined by the Public Works Commission. Unsuitable material as defined above shall be replaced with select material as determined by the Public Works Commission.

Suitable materials determined by the Public Works Commission as too wet or too soft to provide a stable subgrade, foundation, or fill will be deemed as unsuitable regardless of soil classification. Materials deemed unsuitable shall be conditioned or replaced, as directed by the Public Works Commission. The Contractor shall recondition and stockpile the materials at no additional cost to the Public Works Commission.

EXCAVATION

All excavation shall be to the lines and grades indicated. The work shall consist of the excavation, placement, and compaction of suitable material as outlined in this Specification and proper disposal of all unsuitable materials. During excavation, suitable material for backfilling shall be stockpiled. The stockpiles shall be protected from contamination by unsuitable excavated material or other material. If

any material becomes unsuitable, such material, if directed, shall be removed and replaced with suitable on-site or imported material from approved sources at no additional cost to the Public Works Commission.
Where the line parallels a creek and/or ditch the excavated material shall be stockpiled opposite the creek, with the trench separating the two. Adequate drainage shall be provided for the stockpiles and surrounding areas by means of ditches, dikes, or other approved methods. Grading shall be done to prevent surface water from entering the excavation. Any water within the trench shall be removed.

Suitable excavated material shall be stockpiled or placed in the excavation's backfill. Excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. Unauthorized over excavation shall be backfilled with select bedding material at no additional cost to the Public Works Commission. The Contractor, at their expense, shall properly dispose of all excess excavated material unless directed to place it in another area of the project by the Public Works Commission. The Contractor's obligation to remove and dispose of excess materials shall in no manner convey to him any rights of property in any material taken from any excavation.

It shall be the Contractor's responsibility to investigate the site and existing conditions. No compensation will be allowed due to excavation and/or grading being different than anticipated.

TRENCH EXCAVATION

The trench width shall be in accordance with the PWC standard details. All work shall be in accordance with the applicable OSHA regulations.

The subgrade beneath the centerline of the pipe shall provide uniform support for each section of the pipe. Stones three (3) inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed.

Where unsuitable material is encountered at the elevation established for installation of pipe or structures, additional undercut excavation shall be done as directed by the Public Works Commission. The additional undercut excavated area shall be backfilled with stone bedding material. Unauthorized undercut excavation shall be backfilled with stone bedding material and compacted as directed by the Public Works Commission. The Contractor shall conduct undercut operations in such a way that the Public Works Commission can take the necessary measurements before any backfill is placed. Any material removed and backfilled without the approval of the Public Works Commission, and/or all necessary measurements taken, and/or to a depth, length or width exceeding the dimensions shall not be considered undercut excavation and will not be paid for such.

Where unsuitable material is encountered at the elevation established for installation of roads, parking lots, or other paved areas, additional undercut excavation shall be done as directed by the responsible agency (i.e., City of Fayetteville, Town of Hope Mills, NCDOT, etc.). The additional undercut excavated area shall be backfilled with stone bedding material. Unauthorized undercut excavation shall be backfilled with stone bedding material and compacted as directed by the responsible agency. The Contractor shall conduct undercut operations in such a way that the responsible agency can take the

necessary measurements before any backfill is placed. Any material removed and backfilled without the approval of the responsible agency, and/or all necessary measurements taken, and/or to a depth, length or width exceeding the dimensions shall not be considered undercut excavation. All undercut excavation shall be in accordance with the NCDOT Standard Specification for Roads and Structures (most recent edition), or the responsible agency's specifications.

Excavation for manholes, meter vaults, or similar structures shall leave a minimum of 12-inches clear space around the structure. Removal of unsuitable material shall be as specified above. Preparation of the subgrade shall be in accordance with the applicable detail and as directed by the Public Works Commission.

PIPE LAYING

All pipe shall be installed in accordance with PWC Specification Section 02660 – Water Distribution, Specification Section 02730 – Sanitary Sewer Systems, and/or PWC Specification Section 02732 – Sewage Force Mains.

TRENCH SAFETY

All excavations shall comply with all Federal, State, and local rules and regulations. The Contractor shall have a trenching and shoring "competent" person on the job at all times when there is an open excavation. Under no circumstance shall an employee of the Public Works Commission be considered the "competent" person for the operation.

TRENCH STABILIZATION (SHORING)

The Contractor shall furnish, install, and maintain all necessary shoring to ensure a safe excavation. The method of shoring and excavation shall be in strict accordance with OSHA Regulations. The Contractor shall be responsible for installation, maintenance, and removal of all trench stabilization measures. The Contractor shall be responsible for any damage to adjacent structures resulting from the installation, maintenance, removal, or absence of trench stabilization measures.

DEWATERING

Excavations shall be kept dry at all times. Any required dewatering shall be the Contractor's responsibility. The Contractor shall be responsible for any damage to the adjacent property resulting from the installation, maintenance, discharge, and removal of the dewatering system. All discharge from the dewatering system shall be in accordance with the applicable erosion control rules and regulations.

BACKFILL

Backfill shall consist of suitable material free from debris, stone, etc. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. The backfill operation shall be conducted to prevent damage and/or movement of the pipe.

Backfill material in trenches shall be placed in layers not exceeding six (6) inches loose thickness to a point at least 12-inches above the pipe compacted to 90 percent maximum density. The remainder of the trench shall be backfilled in layers not exceeding six (6) inches in loose thickness compacted as specified in subparagraph COMPACTION. Each layer shall be thoroughly compacted by an approved mechanical tamping device.

Backfill material around structures shall be placed in a manner that the structure will not be damaged. No backfill shall be placed around manholes, thrust blocks, or similar structures until the concrete has been allowed to cure for three (3) days. The backfill material shall be compacted as specified in subparagraph COMPACTION.

No backfilling will be allowed when weather conditions prevent compliance with these Specifications.

BORROW EXCAVATION (Select Backfill)

Borrow excavation material shall be supplied by the Contractor when sufficient quantities of suitable materials are not available within the project limits. The borrow material shall be approved by the Public Works Commission and shall not contain roots, root mats, stumps, highly plastic clay or other unsatisfactory materials. All borrow material shall be in accordance with the NCDOT Standard Specification for Roads and Structures, most recent edition.

COMPACTION

Backfill shall be compacted in accordance with the following table as a percentage of the maximum density at optimum moisture content as determined by the Standard Proctor Test, ASTM D-698.

Area	Percent ASTM D-698 Maximum Dry Density
Around and 1' above top of pipe	95
Remaining trench (within 4' of subgrade)	95
Pavement subgrade and shoulders	
Last 1' of fill (below subgrade)	100
Last 3' of fill to 12" below subgrade	98
Base material	100
Adjacent to structures (Areas not paved)	95
Under structures	98
Utility Outfalls (Cross Country)	95

Compaction testing may be performed at the option of the PWC Project Coordinator, or as required by the responsible agency (i.e., City of Fayetteville, NCDOT, etc.). Compaction testing shall be done in

accordance with the responsible agency's requirements. Deficiencies shall be corrected by the Contractor without additional cost to PWC.

FINISHED EXCAVATION

All areas covered by the project shall be uniformly graded to the established elevations and approved cross sections. Ditches shall be graded to permit proper drainage. Newly graded areas shall be protected from traffic and/or from erosion, and any settlement or washing prior to acceptance shall be repaired and the required grades re-established. Ditches and drains along the subgrade shall be maintained to drain at all times. The finished subgrade shall be protected and maintained by the Contractor. The storage or stockpiling of materials on the finished subgrade shall not be permitted. No base course or pavement shall be laid until the subgrade has been checked and approved. All work shall be conducted in accordance with the environmental protection requirements of the Contract.

DIVISION 2
SITE WORK

02272 EROSION CONTROL - GENERAL PROVISIONS

GENERAL

The Contractor shall be responsible for conducting his site grading and drainage operations in such manner as to prevent or lessen excessive soil erosion of the construction site work areas. He shall at all times provide satisfactory means to prevent or minimize the movement and washing of large quantities of soil. The Contractor is expected to review his site grading and drainage operations periodically to determine the areas most susceptible to erosion by excessive rainfall and periodically maintain all installed measures for the project duration. The Contractor shall correct any deficiencies or problem areas as directed by the Owner or the North Carolina Department of Environment and Natural Resources (NCDENR) inspector within 48 hours.

EXECUTION

The Contractor's attention is directed to the fact that unless exposed earth areas are properly cared for during construction, they may result in substantial sedimentation damage downstream from the construction area. He shall at all times provide satisfactory means to prevent or minimize the movement and washing of quantities of soil onto pavements or into adjacent ditches, swales, inlets, and drainage pipes, to avoid the possibility of these structures becoming clogged with soil. Should this happen as a result of erosion at the site of this construction, the Contractor will be required to immediately provide means for removal of the soil and/or debris from the structures to restore the proper functioning of these structures. The Contractor shall assume all responsibilities to the affected property owners for correction of all damages. The Contractor is expected to review his site grading and drainage operations periodically with the Owner with the view in mind of determining the areas most susceptible to erosion by excessive rainfall and shall take necessary temporary measures in sufficient time to minimize the washing away of the site soils that would likely occur before the areas are finished graded, topsoiled and planted. The temporary measures to be provided by the Contractor at the critical areas may consist of, but not limited to, any one or a combination of the following, or by other approved means selected by the Contractor:

Silt Fence
Gravel Construction Entrance/Exit
Inlet Protection

If any earthwork is to be suspended for any reason whatsoever for longer than 15 days, the disturbed areas shall be seeded with temporary vegetative cover or otherwise protected against excessive erosion during the suspended period. Suspension of work in any area of operation does not relieve the Contractor of the responsibility for the erosion control and temporary measures will not be considered cause for a change in the price bid.

MAINTENANCE

The Contractor shall inspect and maintain each erosion control measure until the project is stabilized and accepted. After each significant rainfall, the Contractor shall remove and dispose of silt accumulation from each individual measure. The following maintenance may be required for each specific erosion and sediment control measure:

Silt Fence: Fabric shall be removed and replaced whenever deteriorated to such an extent the effectiveness is reduced. The toe of the fabric shall be buried a minimum of 6 inches.

Gravel Construction Entrance/Exit: Periodic top dressing with two inches (2") of graded stone. Remove all objectionable materials spilled, washed or tracked onto public roadways.

Sediment Trap: Remove sediment and restore trap to original dimensions when accumulated silt volume equals ½ the design depth. Replace the contaminated gravel facing.

Gravel Inlet Protection: Remove sediment as necessary to provide adequate volume. Replace contaminated gravel facing if required.

Rip-Rap: Make repairs to dislodged stone and/or supplement as required if erosion occurs during heavy rainfalls.

REMOVAL

After the area has been stabilized and the project accepted, the Contractor shall remove all temporary erosion and sediment control measures. Silt fences shall be removed, sediment traps/pits and/or basins filled with suitable soil, compacted and seeded. The materials removed shall remain the property of the Contractor and shall be disposed of off-site, or may be reused in other locations if approved by the Owner.

DIVISION 2
SITE WORK

02273 TEMPORARY SILT FENCE

GENERAL

The work covered by this section consists of furnishing, installing, maintaining and removing a water permeable filter type silt fence for the purpose of removing suspended particles from the water passing through it.

The quantity of temporary silt fence to be installed will be affected by the actual conditions which occur during the construction of the project. The quantity of temporary silt fence may be increased, decreased, or eliminated entirely at the direction of the Owner. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

MATERIALS

Either wood posts or steel posts may be used. Wood posts shall be a minimum of 6 feet long, at least 3 inches in diameter, and straight enough to provide a fence without noticeable misalignment. Steel posts shall be 5 feet long, 1 3/4 inches wide and have projections for fastening the wire to the fence.

Wire fence fabric shall be at least 32 inches high, and shall have at least 6 horizontal wires. Vertical wires shall be spaced 12 inches apart. The top and bottom wires shall be at least 10 gage. All other wires shall be at least 12½ gage.

Burlap shall be at least 36 inches wide and shall weigh at least 6.7 ounces per square yard. Other materials may be used in lieu of burlap, provided those materials have been approved by the North Carolina Department of Environment and Natural Resources (NCDENR).

Wire staples shall be No. 9 staple and shall be at least 1½ inches long.

INSTALLATION

The Contractor shall install temporary silt fence as shown on the plans and details. The silt fence shall be constructed at the locations shown on the plans and at other locations directed by the Owner.

Posts shall be installed so that no more than 3 feet of the post shall protrude above the ground and at least18 inches are driven into the ground. Filter fabric shall be attached to the wire fence fabric by wire or other acceptable means. The fabric shall be continual in length. The fabric shall extend into a 6"x 6" trench along the uphill side of the fence. The trench shall be backfilled and compacted. Place 6 inches of No. 57 stone along the toe of the fence to secure the fabric in place. The single stripe located approximately 6 inches form the silt fence outer edge should not be visible if the fabric and fencing are installed properly.

DIVISION 2
SITE WORK

02274 GRAVEL CONSTRUCTION ENTRANCE/EXIT

GENERAL

The work covered by this section consists of furnishing, installing, maintaining and removing temporary gravel construction entrance/exits. The entrance/exit shall be located at points where vehicles enter and exit the project and as indicated on the plans to limit sediment "tracked" off the site.

Where there are differences or conflict between this specification and those requirements outlined in an approved Erosion Control Plan, the specifications in the erosion control plan shall take precedence

MATERIALS

The stone shall be two inch (2") to three inch (3") washed stone.

INSTALLATION

The Contractor shall install the gravel construction entrance as shown on the plans and details. The construction entrance shall be constructed at the locations shown on the plans and at other locations directed by the Engineer.

The area to receive the stone shall be cleared of all vegetation, roots and other objectionable materials. The subgrade shall be graded and properly compacted. Areas yielding shall be covered with engineering fabric or undercut as directed by the Engineer. The stone shall be placed, graded and compacted to a minimum depth of eight inches (8") and as shown on the plans. The minimum construction entrance dimensions shall be 50 feet in length and 12 feet in width. The construction entrance/exit shall be maintained and the stone supplemented throughout the life of the project and shall be removed upon stabilization and disposed of off-site at the Contractor's expense.

DIVISION 2
SITE WORK

02275 BLOCK AND GRAVEL INLET PROTECTION

GENERAL

The Contractor shall install block and gravel inlet protection when storm drain inlets are to be made operational before permanent stabilization of the disturbed drainage area. The inlet protection applies to areas of heavy runoff and provides for overflow capacity to prevent excessive ponding; however, shallow temporary flooding should be anticipated.

INSTALLATION

The Contractor shall install the block and gravel inlet protection as shown on the detail drawing and at the locations indicated. As an option, the concrete blocks may be omitted and the entire structure made of gravel and stone. A structure made entirely of stone is commonly called a "gravel doughnut". In this case, keep the stone slope toward the inlet at 3:1 or flatter. Stone shall be washed stone with minimum 3 inch size on the basin side for stability and 1 inch or smaller (No. 57) on the flow side.

DIVISION 2
SITE WORK

02301 BORING AND JACKING

GENERAL

Installation shall be by dry boring and jacking of a smooth wall steel pipe that is true to line and grade under roadways or where indicated on the plans, all in accordance with these specifications and recommendations of the pipe manufacturer. The Contractor shall notify the Public Works Commission's Project Coordinator a minimum of seven (7) days prior to any contemplated work. All required permits and approvals shall be secured prior to commencing work.

MATERIALS

Materials to be used shall be appropriate for the installation method chosen by the contractor. All materials shall be submitted to the Public Works Commission for approval, prior to the Contractor commencing operations.

Dry Boring & Jacking

The casing pipe shall be spiral welded or smooth wall steel pipe in accordance with ASTM A53, Grade B having minimum yield strength of 35,000 psi. The carrier pipe installed for water or force main applications, within the casing pipe shall be CL 50 ductile iron restrained joint pipe. Use of pressure class ductile iron pipe for water mains is acceptable, in accordance with Specification Section 02660. Mechanical joint restraint systems (i.e., Mega-Lugs, grip-rings, field-lok gaskets, etc.) are not an acceptable means of restraint within the casing pipe for water mains or force mains.

The material for the gravity sanitary sewer carrier pipe shall be CL 50 ductile iron restrained joint pipe. All carrier pipes in sewer service shall have the appropriate lining and coating. Use of restraining gaskets (i.e., field-lok gaskets) is an acceptable means of restraint for gravity sewer mains. Use of mega-lugs (or equivalent) is not approved for restraint within casings.

The casing pipe minimum size and minimum wall thickness shall be in accordance with the following chart unless indicated otherwise on the drawings.

CARRIER PIPE (dia, in inches)	MIN CASING SIZE (inches)	WALL THICKNESS (inches)	RAILROAD WALL THICKNESS (inches)
4	10	0.188	0.188
6	12	0.250	0.281
8	16	0.250	0.281
12	24	0.250	0.375
16	30	0.312	0.469

18	30	0.312	0.469
24	36	0.375	0.532
30	42	0.500	0.625
36	48	0.500	0.688

The Contractor may substitute larger size casing pipe (particularly for sewer mains where grade and alignment are critical) with the proper wall thickness. A manual steering head or other approved guidance system is recommended for casing pipe 30 inches and larger and/or bores exceeding 100 feet in length.

INSTALLATION

Installation using the selected method shall be true to line and grade, where indicated on the plans, all in accordance with these specifications and recommendations of the pipe manufacturer. The Contractor shall notify all affected parties a minimum of seven (7) days prior to any contemplated work.

It is recommended that the Contractor perform each bore before beginning the sewer line construction. The boring shall be performed from the “upstream” to “downstream” direction maintaining the critical downstream invert elevation. Should the bore termination not be on grade, a revised plan shall be submitted to PWC Water Resources Engineering for approval. No additional payment shall be made for any required corrective actions. The boring operations shall be conducted at all times in such a manner so as not to create a hazard to nor impede the flow of traffic.

The Contractor will be responsible for any repair costs if any settlement or damage to the roadway or railroad bed resulting from the boring operation occurs within one year after completion of the work. The Contractor shall maintain proper insurance as required by the permitting agency.

The Contractor shall submit all requested information as required by the permitting agency.

Dry Boring & Jacking

The alignment and grade of the jacking shall be carefully established prior to beginning the operation. A licensed professional land surveyor shall provide staking to establish the correct alignment and grade. The licensed surveyor (or a licensed professional engineer) shall provide cut sheets to the Public Works Commission and the contractor.

Lubricants such as bentonite may be applied to the outside of the pipe to reduce frictional resistance during jacking. The boring auger shall not be a greater diameter than the outside diameter of the encasement and removal of the excavated material ahead of the pipe will be held to a minimum to prevent the formation of voids.

Voids occurring outside the encasement pipe shall be filled with 1:3 Portland cement grout and the ends of the encasement pipe closed with masonry after the carrier pipe placement. The voids shall be filled with 1:3 Portland cement grout at sufficient pressure to prevent settlement of the roadway or railroad. The method of grouting shall be as approved by the permitting agency.

If the installed casing is deemed to be unusable by the Public Works Commission and/or the permitting agency, the casing shall be abandoned by bricking each end and filling the casing with grout, or as directed by the permitting agency.

The Contractor shall locate all existing utilities in the proposed location of the jack and bore. Design of the casing shall be in accordance with PWC standards, and subject to PWC approval. The casing should have a minimum separation of 12-inches from existing utilities.

In the event two parallel casings are being installed, the minimum separation between the outside edges of each casing shall be five (5) feet, or as directed by the permitting agency. In the event of a conflict between this specification and the permitting agency's requirements, the more stringent shall apply.

The use of "back-taps" is not encouraged. The design engineer shall take all necessary steps to determine the location of existing utilities and evaluate the necessity of a back-tap. Should it be necessary to install a back-tap, the top of casing shall be a minimum of 12-inches below the bottom of the pipe to be tapped. All pipe and fittings from the tap location to the carrier pipe shall be restrained joint. Use of mechanical joint restraint systems (i.e., mega-lugs, grip-rings, etc) are allowed in such instances. The Public Works Commission shall review and approve all proposed back-tap locations.

DIVISION 2
SITE WORK

02350 STEEL "H" PILES

GENERAL

The work covered by this section consists of furnishing and driving steel H piles as indicated on the plans and as directed by the Engineer, in conformity with these specifications and to the bearing and penetration required.

MATERIALS

Steel H piles shall be of the sizes and weights shown on the drawings and shall conform to the requirements of ASTM A-36. The Contractor shall submit a manufacturer's certification to the Engineer that the H piles are in accordance with the project specifications.

INSTALLATION

Steel piles shall be handled and stored by methods that will not injure the pile. The piles shall be stored above the ground on platforms, blocks, or other supports. The piles shall be kept free from dirt, grease, and other foreign matter and shall be protected in so far as practical from corrosion.

The Contractor shall furnish sufficient lengths to develop load requirements as stated on the plans. Full butt-welded splices shall be used. H piles shall be driven to a minimum penetration of 10 feet by an approved hammer developing not less than 7500 ft.-lbs. of energy per blow. The load capacity of each pile shall be determined by the following formula:

$$Ra = \frac{2E}{S + 0.3}$$

where:

Ra	=	Safe load (lbs.)
E	=	Energy per blow (ft.-lbs.)
S	=	Final penetration per blow (inches) (average of last 6 blows)

Deviation of the location of the top of the pile from that shown on the plans shall not exceed 2 inches. A suitable driving cap shall be provided to prevent undue damage to the top of the pile. Piles shall be cut off at the required elevations along a plane normal to the axis of the pile. Methods used in cutting off piles shall meet the approval of the Engineer.

SHOP PAINTING

All steel piling shall be sandblasted in the shop to a minimum of SSPC-SP6-63. All sandblasted surfaces shall receive one (1) coat of Epoxy Primer the same day that piles are blasted. The primer shall be applied at the rate of 385 sq. ft. per gallon, which will provide 1.5 mils dry film thickness. Application method of the primer can be made by brush, roller brush, and conventional or airless spray.

FIELD PAINTING

After the piles have been driven, exposed primed surfaces shall be cleaned of dust and other foreign materials prior to applying two (2) coats of Coal Tar Epoxy at the rate of 90-115 square feet per gallon, which will provide a dry thickness of 8-10 mils coat. The minimum dry film thickness for the two coats shall be 16 mils. Application may be by brush, roller, conventional air spray or airless spray.

The re-coat time for the Coal Tar Epoxy can be as little as three (3) hours, but must not exceed 24 hours. Drying time of the coating is greatly affected by the temperature and humidity. If the first coat has exceeded the allotted time, it will be necessary to treat the coating prior to application of the second coat. The Coal Tar Epoxy shall not be applied in the rain or when the temperature is lower than 50 degrees F. Damaged surface areas due to handling and field welding must be wire brushed to original surface preparation and then coated with two (2) coats of Coal Tar Epoxy with minimum dry film thickness of 16 mils as specified above.

DIVISION 2
SITE WORK

02500 – TRAFFIC CONTROL

GENERAL

The purpose of these specifications is to outline the Contractor's requirements for furnishing, erecting, maintaining, relocating, and removing traffic control devices for the maintenance of traffic during the Contractor's construction operations. The Contractor shall furnish all labor, materials, accessories, equipment and tools for performing all required traffic control operations.

REFERENCES

All work shall be in accordance with:

A. The North Carolina Department of Transportation Standards and Specifications for Roads and Structures (most recent edition)
B. The North Carolina Department of Transportation Roadway Standard Drawings (most recent edition)
C. The Manual on Uniform Traffic Control Devices (MUTCD) – most recent edition
D. The North Carolina Supplement to the MUTCD
E. Section 01000 – Special Conditions, of these Contract Documents

REQUIREMENTS

TRAFFIC CONTROL PLAN

The Contractor shall submit a traffic control and phasing plan for the overall project to be reviewed and approved by the PWC Project Engineer, prior to starting construction. The Contractor shall obtain an approved copy of the traffic control plan for the overall project area prior to any excavation within roadways. The plan must indicate how traffic will be managed, signage to be used, and potential traffic patterns resulting from plan implementation. The plan shall be submitted to the PWC Project Engineer in accordance with Section 01000 "Special Conditions" and Section 01300 "Submittals" of these Contract Documents. Failure of the Contractor to submit the required traffic control plan sufficiently in advance shall not entitle the Contractor to any extension of Contract Time.

TRAFFIC CONTROL DEVICES

The Contractor working in public rights-of-way on streets open to vehicular traffic, shall be required to provide, erect, and maintain all necessary traffic control devices throughout the project area to include any connecting streets affected by construction activities. The Contractor shall provide a sufficient number of personnel, and take all precautions for the protection of the work and safety of the public. All traffic control devices in place shall be in accordance with the approved traffic control plan. All traffic control devices and device installation shall be placed and maintained in strict accordance with the resources listed above.

The Contractor shall be liable for any damages resulting from using unapproved and/or inadequate work zone traffic control. The Fayetteville Public Works Commission reserves the

right to stop any work for non-compliance. The Contractor shall have no claim for delay due to stoppage of work as a result of non-compliance.

TRAFFIC CONTROL PLAN AND ROAD CLOSURE NOTIFICATION

1. TRAFFIC CONTROL PLAN – The Contractor shall notify the PWC Project Engineer, in writing, by 5:00 p.m. Wednesday, indicating which roadways will be affected by the work the following week. The Contractor shall notify NCDOT of work to be done per the terms of the approved encroachment agreement. The PWC Project Engineer shall receive copies of all correspondence via fax or email (PWC fax 910-829-0203; email addresses will be provided at the pre-construction meeting).

   Traffic cannot be altered without notification and approval from the appropriate agency as outlined in the above paragraph. Failure to do so will result in the Contractor not being able to work within the street the next week.

   No work on the individual streets shall start until all the traffic control devices required for the particular work activity have been installed in accordance with the approved traffic control plan.

2. ROAD CLOSURE NOTIFICATION - When deemed to be in the best interest of the public, the Fayetteville Public Works Commission and the Contractor, a street may be closed for a duration mutually agreed upon. The Contractor shall submit a request in writing to the PWC Project Engineer for approval to have a street closed. The PWC Project Engineer will forward the request to the appropriate agency (i.e., City, Hope Mills, NCDOT) for approval of the closure. The PWC Project Engineer will include their recommendation regarding approval or disapproval of the request. The PWC Project Engineer will respond in writing with any recommendation for approval or disapproval of the request.

   The request shall be submitted a minimum of five (5) business days prior to the desired closure date. The request shall include the street name and the limits of the closure based on the points of intersection. The request shall also state the proposed duration the street is to be closed and shall include a traffic control plan showing the detour route, traffic control devices, etc. The traffic control plan submitted shall be in accordance with the requirements listed in this Specification.

   Once the street closure has been approved, in writing, by the PWC Project Engineer, the Contractor accepts full responsibility for the closure, to include the installation, maintenance, and removal of all traffic control devices and all implied liability.

TRAFFIC CONTROL LOOPS

The Town of Hope Mills, City of Fayetteville, and NCDOT maintain traffic detection loops at various intersections throughout the project limits. Due to the location of the proposed utility improvements, it may be necessary for these detection loops to be damaged. The Contractor shall coordinate with the appropriate agency a minimum of three (3) days prior to excavating, in order for the agency to locate these loops, or make any necessary revisions to the traffic signal facilities.

The agency will hire a third-party contractor to repair the damaged traffic detection loops. The invoice for this work shall be submitted to the Contractor for payment. The cost for this shall be incidental to the Contract.

STEEL PLATING ROADWAYS

Steel plating shall not be used without the prior written approval of the Project Engineer. The Contractor shall submit their proposed plan to utilize steel plates a minimum of five (5) working days prior to the proposed activity. Plating shall only be considered if the trench depths are 14 feet or greater. Should plating be approved the Contractor shall adhere to the following:

1. The trench shall be adequately shored to support bridging and traffic loads.
2. The trench box shall be sealed so there are no open voids.
3. Steel plates shall rest on trench box.
4. Steel plates shall extend beyond the outer edges of the trench box on all four sides.
5. There must be a minimum of two (2) feet of compacted backfill above steel plates.
6. Compacted backfill shall match existing street grade.
7. Provide documentation that the plates are capable of supporting potential loads.

Steel plating shall not exceed two (2) consecutive calendar days in any given week. However, provided that work is progressing in that particular section of sewer the Contractor may be allowed to utilize plating for a longer duration as approved in writing by the Project Engineer.

STEEL PLATING ROADWAYS (NCDOT STREETS)

Steel plating shall not be used without the prior written approval of the Fayetteville Public Works Commission Project Engineer. The Contractor shall submit their proposed plan to utilize steel plates a minimum of five (5) business days prior to the proposed activity. Should plating be approved, the Contractor shall adhere to the following:

1. The plates shall be secured against any movement from traffic. Options include "countersinking" the plates to be flush with the existing pavement, or bolting the plates to the pavement.
2. The plates shall overlap the excavation a minimum of two (2) feet on all sides.
3. The plates shall be sufficient to withstand the expected traffic loads.
4. Provide documentation that the plates are capable of supporting potential loads.

Steel plating shall not exceed two (2) consecutive calendar days in any given week. However, provided that work is progressing in that particular section of the project, the Contractor may be allowed to utilize plating for a longer duration as approved in writing by the Fayetteville Public Works Commission Project Engineer.

MATERIALS

A. The Contractor shall utilize interim pavement marking paint as specified in the North Carolina Department of Transportation Standards and Specifications for Roads and Structures (most recent edition)

B. Traffic cones may be utilized when approved by the Fayetteville Public Works Commission Project Engineer. If approved, traffic cones shall either be double stacked or weighted to prevent movement by traffic.

C. All traffic control devices furnished by the Contractor shall remain the property of the Contractor, unless otherwise specified in these Contract Documents.

INSTALLATION

The furnishing, erecting, maintaining, relocating, and removal of traffic control devices shall be in accordance with the MUTCD (most recent edition), the requirements outlined in the approved traffic control plan, and these Contract Documents.

All traffic control devices shall be in place prior to the Contractor beginning work, removed during intervals when work is not on-going, and removed at the end of each business day (unless otherwise approved, as outlined in this specification).

The Contractor shall not obstruct or impede any traffic on adjacent streets, during the installation or removal of the traffic control devices, or during construction.

The Contractor shall not close a lane to through traffic after normal working hours and during periods of construction inactivity, unless otherwise approved in writing by the Fayetteville Public Works Commission Project Engineer.

The Fayetteville Public Works Commission Project Engineer may restrict the Contractor from placing lane closures during certain hours, holidays, or as deemed necessary for the convenience of the public. All lane closure types, hours of installation, and durations shall be as approved in writing by the Fayetteville Public Works Commission Project Engineer.

The use of police and/or trained flaggers to control traffic through the work site shall be provided by the Contractor as required. The Contractor shall be responsible for obtaining trained personnel to direct traffic and contacting local authorities for use of police for traffic control where applicable.

INTERIM PAVEMENT MARKINGS

The Contractor shall be required to place interim pavement markings (centerlines, lane lines, edgelines, railroad, and school symbols) daily on any street with existing pavement markings that have been obliterated.

THERMOPLASTIC PAVEMENT MARKINGS

The Contractor shall be required to place thermoplastic pavement marking centerlines, lane lines, and edge lines within three (3) calendar days after the completion of the resurfacing operation.

The Contractor shall be required to place all thermoplastic pavement marking symbols (arrows, crosswalks, stop lines, school symbols, railroad symbols, raised pavement markers, etc.) within seven (7) calendar days of the completion of the project.

NCDOT STREETS

All traffic control measures for work within NCDOT road rights-of-way shall be in accordance with the approved NCDOT encroachment agreement, and as specified herein. Where there is a conflict between the requirements of this specification and the approved encroachment, the requirements of the approved encroachment shall govern.

END OF SECTION

DIVISION 2
SITE WORK

02505 ADJUSTMENT OF EXISTING STRUCTURES

GENERAL

The work covered by this specification consists of the raising or lowering of existing manholes and valve boxes encountered within the limits of the project to match the adjacent finished work.

RELATED SECTIONS

A. 02222 – Excavation and Backfilling for Utility Systems
B. 02660 – Water Distribution
C. 02730 – Sanitary Sewer Systems

Where conflicts occur between the specifications, the more stringent requirement shall apply.

MATERIALS

All materials shall be in strict accordance with the requirements of the Public Works Commission and as set forth in this standard.

Adjustable riser rings are not approved for use within the Public Works Commission water and/or sewer system. All manhole adjustments shall be done utilizing a concrete grade ring. If a concrete grade ring cannot be utilized, the manhole shall be broken down and rebuilt to the proper grade, in accordance with PWC standards.

INSTALLATION

Adjustment of structures shall not be performed until after placement of base course and/or any leveling course, and prior to placement of final course. All adjustments of structures shall be accomplished a minimum of 72 hours prior to placing the final surface course. All defective, damaged, or worn castings shall be replaced with new castings provided by the Public Works Commission at no cost to the Contractor. The Contractor shall be responsible for exchanging castings at the Public Works Commission's facility.

The Contractor shall take all necessary precautions to prevent debris from entering the sanitary sewer system. Any debris that falls into the manhole or valve box during adjustment shall be removed immediately.

Manholes

For all manholes that need adjustment, the Contractor shall remove all concrete grade rings to the top of the cone section. All loose material shall be removed and properly disposed of. The Contractor shall utilize new concrete grade rings to ensure that the new manhole ring and cover will be at final grade. If no concrete grade rings are required to adjust the structure to final grade, the Contractor shall set the ring and cover in a bed of clean fresh mortar.

If the manhole needs to be lowered, and there are no existing concrete grade rings, then the Contractor shall tear down the existing manhole and rebuild it, utilizing new riser and cone sections, in order to ensure that the installed ring and cover will be at final grade. The Contractor shall remove all necessary sections of the existing manhole in order to make the adjustment.

If the manhole needs to be raised, and there are 12-inches of concrete grade rings already in place, the Contractor shall tear down the existing manhole and re-build it. The Contractor shall utilize new riser and cone sections, as required, to ensure that the installed ring and cover will be at final grade. The Contractor shall remove all necessary sections of the existing manhole in order to make the adjustment.

Valve Boxes

In order to adjust valve boxes, the top section of the valve box shall be raised or lowered as required to meet the final grade. If the height of the final grade exceeds the length of the existing top section, the Contractor shall remove the existing valve box and install a new one at final grade.

All adjustments shall be protected for at least 72 hours before the placement of any surfacing material, in order to allow the concrete to properly set. The Contractor shall be responsible for protecting the raised structure from damage due to traffic. After the 72 hours, a temporary asphalt transition shall be placed around the raised structure, to allow vehicular traffic to pass over. The asphalt transition shall extend a minimum of 18 inches from the structure in every direction. The Contractor shall be responsible for maintaining this asphalt transition until such time the final surface course is placed. Immediately prior to paving, the asphalt transition shall be removed. In the event paving is stopped for the day prior to completing the work, the Contractor shall re-install the temporary asphalt transition. The finish surface tolerance shall not vary more than ¼" (0.25 inch) in any direction. Every effort shall be made to ensure that the surface course and castings provide as smooth a ride as possible.

DIVISION 2
SITE WORK

02573 PERMANENT PAVEMENT PATCH

GENERAL

Permanent pavement patching shall be completed as indicated on the Contract Plans and in accordance with these Contract Documents. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defect in material or workmanship shall be cause for replacement and correction of such defect as directed by the Public Works Commission. All materials and workmanship shall be in complete accordance with the standards and specifications of the Public Works Commission and subject to Public Works Commission inspection and approval. The materials and installation shall conform to the North Carolina Department of Transportation (NCDOT) Standards, (latest revision), the NCDOT HMA/QMS Manual (latest revision), and as specified herein.

REMOVAL

The Contractor shall cut the existing pavement to straight uniform widths parallel and perpendicular to the roadway. Jagged saw cuts will not be acceptable. The pavement shall be removed its entire depth. The Contractor shall properly dispose of all removed pavement. If the Contractor elects to mill the asphalt, the millings cannot exceed two (2) inches in size, and shall be swept into the trench and re-compacted. The removal limits shall extend a minimum of six (6) inches into solid undisturbed base course prior to patching or as directed by the Public Works Commission.

Pavement removal shall not exceed 3,000 feet total for the entire project at one time. It shall be the Contractor's responsibility to maintain the trench (swept, wetted, compacted, etc.) until paved.

PAVEMENT

Replacing the pavement shall consist of the following:

Tack Coat

All existing pavement edges shall be tacked in accordance with the North Carolina Department of Transportation Standard Specifications for Roads and Structures (latest revision).

Asphalt Surface Course

The asphalt surface course shall be Type S9.5, placed in accordance with the PWC Standard Detail M.2. All asphalt surface course shall be in accordance with the NCDOT HMA/QMS Manual (latest revision) and the North Carolina Department of Transportation Standard Specifications for Roads and Structures (latest revision).

The pavement repair shall be constructed to the line, grade, crown and cross section of the existing street. The asphalt plant mix shall be compacted to density in accordance with the HMA/QMS Manual (latest revision). The Contractor shall provide a smooth transition from the existing pavement to the top of the backfill, so as to have no vertical drop (in any direction). The transitions shall only be removed the day of patch paving.

The permanent pavement patch shall be made within 30 days of installation of the line. If settlement should occur within one (1) year warranty period, the Contractor shall be required to remove asphalt, re-compact base and sub-base, and re-patch any areas of settlement at no expense to PWC. All repairs shall be in accordance with these Contract Documents.

Base Course

The base course shall be aggregate base course (ABC) installed to a minimum eight (8) inches thickness (compacted) and extending a minimum of six (6) inches beyond the edge of the trench as indicated on the PWC Standard Detail M.2. The base course shall be compacted to 100% maximum dry density at optimum moisture content as determined by the AASHTO T-99 as modified by NCDOT.

The Contractor, with permission of the Public Works Commission, may use asphalt concrete intermediate course, placed in a minimum four (4) inch layer extending a minimum of six (6) inches beyond the edge of the trench as indicated on the Permanent Patch Detail. The Asphalt Concrete Intermediate Course shall be in accordance with the North Carolina Department of Transportation Standard Specifications (latest revision), and the NCDOT HMA/QMS Manual (latest revision).

Prior to patch paving, the Contractor shall remove the upper ten (10) inches of backfill, if ABC is to be used or upper six (6) inches if Asphalt Concrete Intermediate Course is to be used, in the trench. All asphalt edges along the trench shall be cut straight, uniform width, parallel and perpendicular to the road with no jagged edges. The outer six (6) inches (minimum) of the trench adjacent to the newly removed asphalt shall be on undisturbed soil.

The pavement repair shall be constructed to the line, grade, crown and cross section of the existing street. The asphalt plant mix shall be compacted to density in accordance with the HMA/QMS Manual.

Maintenance shall be performed at least weekly, after a rainfall, or at the direction of the Public Works Commission. Maintenance shall include sweeping the adjoining pavement, blading, wetting and compacting the stone to insure smooth drivable surface.

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DIVISION 2
SITE WORK

02660 WATER DISTRIBUTION

GENERAL

Water lines and all appurtenant items shall be constructed of materials specified and/or as indicated on the approved drawings. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defects in material or workmanship shall be cause for the replacement and correction of such defect as directed by the Fayetteville Public Works Commission (PWC) at no expense to the Fayetteville Public Works Commission.

RELATED SECTIONS

A. 02211 – Grading, Utilities
B. 02222 – Excavation and Backfilling for Utility Systems
C. 02301 – Boring And Jacking (Roadways And Railroads)

MATERIALS

MANUALLY OPERATED GATE VALVES

All manually operated gate valves four (4) inches and larger shall be ductile iron or cast iron body resilient wedge type rated for 250 psig working pressure gate valves and shall conform to American Water Works Association (AWWA) C-509/C-515 and NSF 61. All valves must open counter-clockwise equipped with a two (2) inch square operating nut. The operating nut shall have an arrow cut in the metal, indicating the direction of opening. All valves shall have a non-rising stem. All valves up to and including thirty-six (36) inch diameter shall have triple "O" ring stem seals. The design and machining of valves shall be such as to permit the replacement of the upper two (2) "O" rings without undue leakage while the valve is wide open and in service. The wedge shall be ductile iron encapsulated in nitrile rubber (for four (4) inch through 12 inch) and SBR rubber for 14-inch through 24-inch sizes.. All internal and external surfaces of the valve body and bonnet shall have a fusion bonded epoxy coating complying with ANSI/AWWA C550 applied electrostatically prior to assembly, conforming to AWWA C-550-90. All valves up to and including 36-inch diameter shall have a safe working pressure of 250 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve. All valves shall be tested for leakage and distortion in strict accordance with the latest revision of AWWA Specification C-500.

Gate valves installed in meter vaults shall have a wheel in lieu of a square operating nut and shall also have a non-rising stem. The wheel shall have an arrow cut in the metal indicating the direction of opening. Flanges shall not be buried. An approved pit shall be provided for all flange connections.

Resilient seated tapping valves shall be furnished with the tapping flange having a raised face or lip designed to engage the corresponding recess in the tapping sleeve flange in accordance with MSS-SP60.

Tapping valves without the raised face on the tapping flange are not permitted since they do not assure the proper alignment required to prevent damage by a misaligned shell cutter. The interior of the waterway in the body shall be a full opening and capable of passing a full sized shell cutter equal to the nominal diameter of the valve.

All valves shall be manufactured in strict accordance with the latest specifications of the American Water Works Association (AWWA). Valves shall be manufactured by: Mueller Company, Clow Corporation, or American Darling Company. Certification shall be furnished to the Fayetteville Public Works Commission by the manufacturer that all valves are in accordance with PWC standards. Where specified on the plans and approved by the Fayetteville Public Works Commission, resilient wedge gate valves may be furnished with spur gearing for valves installed in a vertical position and bevel gearing for valves installed in a horizontal position. All gate valves shall be installed in accordance with PWC standard details.

BALL VALVES

For all valves smaller than four (4) inches, ball valves shall be used. Ball valves shall be installed in accordance with PWC standard details.

Ball valves shall be all bronze construction, with tee head operator and having a removable disc. Ball valves shall have threaded connections, in accordance with PWC standard details. Ball valves shall be manufactured and tested in accordance with AWWA/ANSI C800. The valve shall be equipped with packing nut, gland, and packing material. Ball valves shall be of an approved type made from approved materials conforming to ASTM Specifications and shall also meet the approval of the Public Works Commission. The turn required to travel from fully closed to fully open on the ball valve shall be 90 degrees.

VALVE BOXES

Valve boxes shall be "slip-type" made of close-grained, gray cast iron metal painted with a protective asphaltic coating. Construction shall be in three pieces as follows: The lower of base pieces, which shall be flanged at the bottom, the upper part which shall be flanged on the lower end, and of such size as to telescope over the lower part, the upper end being constructed in the form of a socket to receive the cap or cover; and the cover or cap shall have cast on the upper surface, in raised letters, the word "WATER". All valve boxes shall be equal in quality and workmanship to those manufactured by Sigma Corporation (VB-462), Tyler Union (6855 Series), Star Pipe Products (VB-0004), or an approved equal. The valve box shall be installed in accordance with PWC standard details. The valve box shall have a 3/8-inch hole drilled in the upper part four (4) to six (6) inches from the top of the box to accommodate a ¼-inch x 1-1/2-inch galvanized bolt for securing tracer wire.

Valve box protector rings shall be installed to protect valve boxes located outside pavement. The ring shall be constructed and installed in accordance with PWC standard details.

FIRE HYDRANTS

All fire hydrants shall be dry barrel, traffic type and conform to the latest revision of AWWA Specification C-502 except as listed below or as otherwise directed by the Public Works Commission. All working parts shall be bronzed. The size of the fire hydrants (designated by the nominal diameter of the valve opening) shall not be less than four and one-half (4 ½) inches. All hydrants shall be able to deliver a minimum of 1,000 gallons per minute with a friction loss of not more than five (5) pounds per square inch (psi) total head loss through the hydrant. Hydrants shall be of compression type (opening shall be of such design that when the barrel is broken off the hydrant valve will remain closed and reasonably tight against leakage). All hydrants shall be mechanical joint to accommodate the spigot end of six (6) inch Pressure Class 150, AWWA Standard, ductile iron pipe. The installation of the fire hydrant shall be in accordance with PWC standard details. Bosses (6") may be substituted for tees in pipe sizes exceeding 24 inches in diameter, with prior approval from PWC. The boss shall be welded to the bottom of the main to provide effective flushing of the system.

All hydrants shall be furnished with two (2) two and one-half (2 ½) inch nozzles and one (1) four and one-half (4 ½) inch pumper nozzle. Outlets shall have American National Standard fire hose coupling thread, in accordance with the City of Fayetteville standard, and shall be provided with nozzle caps securely chained to the body of the hydrant. The base of the hydrant shall have two (2) cast lugs suitable for use in strapping the hydrant to the connecting pipe. The operating nut shall be pentagonal in shape, finished with a slight taper to one and one-half (1 ½) inches from point to flat to conform to the standard wrench used by the Fayetteville Public Works Commission. All hydrants shall open left or counter-clockwise. Hydrants shall be suitable for working pressure of 150 psi and a test pressure of twice the working pressure. Fire hydrants shall be specific models manufactured by Mueller Company (Model Centurian 200), Clow Corporation (Medallion), American Darling (Model Mark 73-1) or approved equal. The interior of the hydrant shoe shall be coated with a four (4) mil thickness FDA approved epoxy coating.

COMBINATION AIR VALVES ASSEMBLY

Combination air valves shall be of the single housing style that combines the operation features of both an air/vacuum and air release valve. The combination air valve shall have a two (2) inch inlet and one (1) inch outlet connections and an orifice diameter to be determined by the Design Engineer for each project for a maximum working pressure of 300 psi. The assembly shall be equipped with a two (2) inch cut-off valve as shown on the PWC standard detail. The combination air valve body shall be constructed of 316 stainless steel or reinforced nylon with the only exception being the Buna-N Rubber seat and gasket. Valves shall be as manufactured by Crispin (Model UX20), ARI (D-020), or approved equal. Combination air valves shall be installed in accordance with PWC standards.

WATER DISTRIBUTION PIPE

DUCTILE IRON PIPE

The raw material from all ductile iron pipe and fittings shall have an average minimum content consisting of 90% recycled iron and steel. Ductile iron pipe and fittings shall be manufactured in the United States of

America in accordance with ANSI/AWWA A21.51/C151. The manufacturer of the ductile iron pipe shall be a member of the Ductile Iron Pipe Research Association (DIPRA).

All ductile iron pipe shall be designated as "Pressure Class", unless otherwise specified. The pipe furnished shall have a minimum thickness calculated in accordance with ANSI A 21.50 (AWWA C-150), with a factor of safety of two (2); a working pressure of 150 psi to 350 psi, plus 100 psi water hammer allowance; and AASHTO H-20 live truck load with 2.5 feet of cover. In no case shall "Pressure Class" pipe's nominal thickness be less than the following:

SIZE	PRESSURE CLASS	NOMINAL THICKNESS (In.)
4"	350	0.25
6"	350	0.25
8"	350	0.25
10"	350	0.26
12"	350	0.28
16"	250	0.30
24"	250	0.37

PUSH-ON JOINTS

Push-on joints shall be as specified and installed in accordance with AWWA C-600 and shall conform to AWWA Standard C-111. Push on joints, rubber gaskets and lubricant shall conform to ANSI A21.11. Pressure rating shall not be less than 200 psi unless otherwise specified. All ductile iron pipe shall be lined with standard thickness cement mortar lining and asphaltic seal coat in accordance with ANSI A21.4 (AWWA C-104). The pipe shall have an outside asphaltic coating as specified in AWWA Standard C-151.

RESTRAINED JOINTS

Factory Restrained Joints

Factory restrained joint pipe shall be utilized for all pipe greater than 12-inches in diameter, unless otherwise approved by the Fayetteville Public Works Commission. Factory restrained joint pipe shall be furnished for the locations shown on the approved drawings. The pipe, joints, and gaskets shall be in accordance with ANSI/AWWA Standards as specified for ductile iron pipe. Factory restrained joints shall be rated for a working pressure of 350 psi for sizes up to 12-inches and 250 psi for larger sizes.

All factory restrained joint pipe shall have the restraints internal to the pipe (i.e., "boltless"). All restrained joint ductile iron pipe and fittings larger than 12-inches shall be as manufactured by U.S. Pipe's TR-Flex, Griffin Pipe Products SNAP-LOK, American Cast Iron Pipe Company's Flex-Ring Joint, or approved equal. The method of restraining the valves to the factory restrained ductile iron pipe shall be reviewed and approved by PWC on a case by case basis. The valves shall have the same working pressure as the pipe.

Flanged Joints

Flanges shall be specifically designed for each application. The flange pipe shall be in accordance with ANSI/AWWA C-115/A21.15. Threads for threaded flange pipe shall be in accordance with ANSI B2.1, shop fabricated as outlined by AWWA 115 with serrated faces furnished on the pipe, completely factory installed. Welding of flanges to the body of the pipe will not be acceptable.

Ductile iron fittings and flanges shall be in accordance with ANSI/AWWA C-110/A21.10 with a minimum working pressure of 250 psi. Gaskets shall be full faced SBR rubber per ANSI/AWWA C-111/A21.11 with a minimum 1/8 inch thickness. Linings and coatings shall be as previously outlined for all ductile iron pipe and fittings.

Mechanical Joints

Mechanical joints shall be as specified and installed in accordance with AWWA C-600 and shall conform to AWWA Standard C-111. Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for four (4) inch pipe through 12-inch pipe. Mechanical joints, rubber gaskets and lubricant shall conform to ANSI A21.11. Pressure rating shall not be less than 200 psi unless otherwise specified.

Special accessories such as mechanical joint retainer glands or mega-lugs are acceptable on pipe 12-inches and less in diameter, upon approval from the Fayetteville Public Works Commission. Mega-lug and/or grip-ring restraint mechanisms will not be an acceptable method of restraint for pipe, fitting and/or valves on sizes larger than 12-inches in diameter. For mains larger than 12-inches and at locations specified by the Fayetteville Public Works Commission, factory restrained joints shall be utilized, in accordance with these Specifications.

Field Lok Gaskets

Special accessories such as US Pipe's Field-LOK gasket, Ford’s Uni-Ring, or Romac’s Grip-Ring are acceptable on pipe 12-inches and less in diameter, upon approval from the Fayetteville Public Works Commission. Mega-lug and/or grip-ring restraint mechanisms will not be an acceptable method of restraint for pipe, fitting and/or valves on sizes larger than 12-inches in diameter. For mains larger than 12-inches and at locations specified by the Fayetteville Public Works Commission, factory restrained joints shall be utilized, in accordance with these Specifications.

FITTINGS

Mechanical Joint

All fittings shall be ductile iron and shall be manufactured in accordance with AWWA Standard C-110 (ANSI A21.11). Compact fittings shall be mechanically restrained, ductile iron in accordance with ANSI A 21.53 (AWWA C-153) for four (4) inch through 12 inch sizes only. Where thrust blocking is utilized, fittings shall be full body ductile iron in accordance with ANSI A 21.53 (AWWA C110).

All ductile iron fittings shall be lined with standard thickness cement mortar lining and asphaltic seal coat in accordance with ANSI A21.4 (AWWA C-104). All fittings shall have an outside asphaltic coating as specified in AWWA Standard C-151 and C-110, respectively.

Factory Restrained

Factory restrained joint fittings shall be utilized for all pipe greater than 12-inches in diameter, unless otherwise approved by the Fayetteville Public Works Commission. Factory restrained joint fittings shall be furnished for the locations shown on the approved drawings. The fittings, joints, and gaskets shall be in accordance with ANSI/AWWA Standards as previously specified for ductile iron pipe. Factory restrained joints shall be rated for a working pressure of 350 psi for sizes up to 12-inches and 250 psi for larger sizes. All factory restrained joint fittings shall have the restraints internal to the fitting (i.e., "boltless"). All fittings shall be compatible with the factory restraint system. All restrained joint ductile iron fittings larger than 12-inches shall be as manufactured by U.S. Pipe's TR-Flex, Griffin Pipe Products SNAP-LOK, American Cast Iron Pipe Company's Flex-Ring Joint, or approved equal.

Bosses

Tangential welded on outlets (i.e., bosses) shall only be utilized on pipe 24-inches and larger, as approved by PWC. All bosses shall be factory welded; field fabrication is not allowed. The pipe shall be in accordance with these specifications. Bosses shall be of the size and location indicated on the approved drawings.

AERIAL CROSSINGS

For aerial crossings, the ductile iron pipe shall be thickness class, as specified on the plans and standard details. All thickness class pipe shall be in accordance with ANSI A21.51 and AWWA C-151, with a minimum working pressure of 200 psi.

For aerial crossings which are four (4) inches to 12 inches in diameter, Class 53 manufactured factory restrained joint or Class 53 flanged ductile iron pipe shall be used in accordance with the PWC standard details. No other means of restraint are allowed for aerial crossings. For aerial crossings larger than 12 inches, or as noted specifically on the plans, Class 53 flanged ductile iron pipe shall be used in accordance with the PWC standard details.

All aerial crossings shall be designed and installed in accordance with PWC standard details.

PIPE IN CASINGS

All ductile iron pipe (regardless of diameter) within casings shall be factory restrained, in accordance with these specifications and the applicable PWC standard details. The use of any other restraints (i.e., mega-lugs, grip-rings, etc.) shall not be utilized on pipe within casings.

All restrained joint ductile pipe in casings shall be in accordance with the PWC standard details.

TRENCHLESS APPLICATIONS

All ductile iron pipe (regardless of diameter) utilized for trenchless installations (i.e., horizontal directional drilling, pipe-bursting, etc.) shall be factory restrained, in accordance with these specifications and the applicable specification section for the trenchless technology. The use of any other restraints (i.e., mega-lugs, grip-rings, etc.) shall not be utilized.

PVC PIPE

Two (2) inch water main pipe shall be manufactured using Grade 1 PVC compound material as defined in ASTM D-1784 and shall be SDR21, pressure class 200 in accordance with ASTM D 2241. Fittings for two (2) PVC pipe shall be solvent weld Schedule 80 PVC. Brass FIP x pack joint for PVC fittings shall be used to transition from PVC to brass. The pipe shall be plainly marked with the manufacturer's name, size, material (PVC) type and grade or compound, NSF seal, date of manufacture, pressure rating and reference to appropriate product standards.

All PVC pipe (4-inches through 12-inches diameter) shall be manufactured using virgin compounds as defined in ASTM D-1784, with a 4,000 psi HDB rating and designated as PVC 1120 to be in strict accordance with AWWA C-900. The pipe shall be Class 150 and conform to the thickness requirements of DR18. The pipe shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM D-1599 and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM D-1598. The pipe joints shall be of the integral bell type with rubber gaskets and shall conform to the requirements of ASTM D-3139 or ASTM F-477.

PVC fittings are not acceptable for water mains four (4) inches or greater. Fittings and specials shall be ductile iron, bell end in accordance with AWWA C-110, 150 psi pressure rating unless otherwise shown or specified. Ductile iron fittings to PVC pipe shall be adequately supported on a firm trench foundation. Ductile iron fittings and specials shall be cement mortar lined (standard thickness) in accordance with ANSI A21.4.

Mechanical restraining systems (i.e. mega-lug, grip-ring) shall not be used on PVC pipe.

TRACING WIRE

For the purpose of locating non-metallic pipes, a continuous "detectable" tracing wire shall be installed. The wire shall be a minimum 12 gauge, single strand, coated copper or copper clad steel wire that is suitable for underground use. Splices shall be accomplished utilizing a corrosion proof wire connector. The connectors shall "lock" the wires in place and contain a dielectric sealant to prevent corrosion. The connector shall be the "Snake Bite" connector manufactured by Copperhead Industries, LLC, or approved equal. The wire shall be buried continuously along the pipe. The wire shall be secured into valve boxes such that a direct/conductive metal detector may be used to trace the pipe location. Bolts shall be used to secure the wire and the attachment location shall be readily available from finished grade without special equipment.

POLYETHYLENE PLASTIC WATER TUBING

Polyethylene (PE) plastic water tubing shall be installed in accordance with PWC standard details. All services installed in new construction shall be one continuous run of pipe with no splices from the corporation stop to the meter. The PE water tubing shall meet the requirements of ASTM D2737, AWWA C901, and NSF Standards 14 and 61. Pipe dimensions shall meet Iron Pipe Size (IPS) standards.

The PE tubing material shall be high density polyethylene conforming to the minimum requirements of cell classification 445574E, as defined and described in ASTM D3350. The resin shall have a material designation code of PE4710 by the Plastic Pipe Institute.

The PE water tubing shall be SIDR 7, with a minimum pressure rating of 250 psi. Fittings for the PE water pipe shall be cast brass compression fittings, made to the PE water pipe dimension. All brass fittings shall have a 300 psi minimum pressure rating.

For the purpose of locating plastic water services during trenching, a continuous tracing wire shall be installed. The wire shall be a minimum 12 gauge, single strand, coated copper or copper clad steel wire that is suitable for underground use. The wire shall be buried along the water service lateral from the main to the meter box. The wire shall extend a minimum of 12 inches into the meter boxes.

COPPER WATER TUBING

Copper water tubing shall be installed in accordance with PWC standards. All services installed shall be one continuous run of pipe with no splices from the corporation stop to the meter.

Copper water tubing shall be Type K, soft copper manufactured in accordance with ASTM B88. The minimum pressure rating for the copper water pipe shall be 655 psi. Fittings for the copper water pipe shall be brass compression fittings, made to the copper water pipe dimensions. All brass fittings shall have a 300 psi minimum pressure rating.

TAPPING SLEEVES

Tapping sleeves shall be ductile iron mechanical joint or stainless steel and have a minimum working pressure of 150 psi for all tapping of mains up to and including 24-inch diameter with a branch less than or equal to 12-inches diameter. Branch diameter greater than 12-inches on a 16-inch diameter pipe and larger shall require full body ductile iron mechanical joint tapping sleeve.

Ductile iron mechanical joint tapping sleeves shall be as manufactured by Clow, M&H, Mueller, American, or an approved equal and shall be furnished with complete joint accessories. The mechanical joint sleeve shall be compatible with type and class of pipe being tapped. The outlet flange shall be class 125 per ANSI B16.1 compatible with approved tapping valves.

Stainless steel tapping sleeves shall be as manufactured by Romac, Smith-Blair, or approved equal, and shall be furnished with all accessories. The sleeve, lugs, bolts and nuts shall be 18-8 type 304 stainless steel, as provided by the manufacturer. The outlet flange shall be ductile iron or stainless steel. The gasket shall be a grid pattern design and shall provide full circumferential sealing around pipe to be

tapped. The sleeve shall include a 3/4 NPT test plug. All welds shall be passivated. The outlet flange shall be class D per AWWA C-207-ANSI 150 lb. drilling compatible with approved tapping sleeves.

The tapping sleeve and valve shall be in accordance with PWC standard details.

All tapping sleeves shall be hydrostatically pressure tested prior to the tap being accomplished. **Use of air to complete the pressure test is not acceptable.** The tapping sleeve shall be tested to 150 psi. The PWC Project Coordinator shall witness and approve the testing.

WATER SERVICE SADDLES

All water service saddles for use on two (2) inch PVC shall be one (1) inch brass saddles as manufactured by Ford, McDonald, or Mueller.

Water service saddles for one (1) and two (2) inch taps on four (4), six (6), eight (8), 12-inch and larger size PVC and asbestos-cement (AC) and also four (4) inch and larger size iron pipe shall be ductile iron with stainless steel strap(s), bolts, nuts and washers. Ford Models FS 101, FS 202; Romac Models 101S, 202S; or Smith-Blair Model 315.317 shall be used. Stainless steel straps must be pre-formed at the factory to the specified outside diameters of the pipe.

Water service saddles with a two (2) inch outlet shall be double strap.

Water service saddles for pipe sizes 12-inch through 24-inch shall be double strap.

Water service saddles for pipe sizes exceeding 24-inches shall be as specified by the PWC Water Resources Engineering Department.

INSTALLATION

GENERAL

Pipe installation shall be in strict accordance with Specification Section 02222 – Excavation and Backfilling for Utility Systems and as outlined herein.

PIPE INSTALLATION

Pipe installation shall be in accordance with the manufacturer's instructions. All pipes and fittings shall be handled to prevent damage to the protective coatings and linings.

All dust, dirt, oil, tar, or other foreign matter shall be cleaned from the jointing surfaces, and shall be lubricated with lubricant recommended by the manufacturer.

All pipe shall be installed in accordance with the approved drawings and cut sheets, unless otherwise directed by PWC.

All dead ends on new mains shall have a two (2) inch blow-off assembly as indicated on the approved drawings. The blow-off assembly shall be in accordance with PWC standard details.

For pipe sizes up to 12-inches, mechanical equipment should not be utilized to assemble the pipe. For pipe sizes over 12-inches, mechanical equipment may be utilized, in accordance with the pipe manufacturer's instructions. Any damage resulting from the use of mechanical equipment shall be replaced as directed by PWC.

Adjustments in grade by exerting force on the barrel of the pipe with excavating equipment shall not be allowed. The Contractor shall verify line and grade after assembling each joint.

When pipe installation is not in progress, the open ends of the pipe shall be closed by a water tight plug or other means approved by the PWC Project Coordinator. If water is present, the plug shall remain in place until the water is lowered to a level that allows for proper installation. No pipe shall be laid in water or where in the PWC Project Engineer's and/or PWC Project Coordinator's opinion trench conditions are unsuitable. Every precaution shall be taken to prevent material from entering the pipe while it is being installed.

ALIGNMENT AND GRADE

The Contractor shall be responsible for installing the pipe and appurtenances to proper line and grade.

All ductile iron pipe and fittings shall be installed in accordance with ANSI/AWWA C-110/A21.10. All C-900 pipe shall be installed in accordance with ASTM D-2774. The amount of deflection in the PVC or ductile iron pipe shall not exceed the applicable AWWA standards and the manufacturer's recommendations. If the required deflection exceeds the specified limitations or as determined by the Public Works Commission, mechanical joint bends shall be utilized.

Pipe passing through walls of NCDOT bridges, retaining walls, and other concrete structures shall be factory restrained joint ductile iron and be installed in casings/sleeves in accordance with NCDOT specifications. Annular space between walls and sleeves shall be filled with an approved cement mortar that meets NCDOT specifications. The annular space between the sleeve and the pipe shall be filled with an approved mastic.

Pipe passing through the walls of meter vaults, valve pits, and storm drainage structures shall be restrained joint ductile iron, as specified by PWC. Pipe shall be installed in a casing/sleeve if determined to be necessary. Annular space between walls and sleeves shall be filled with an approved cement mortar. Annular space between pipe and sleeves shall be filled with an approved mastic. Proposed conflict boxes with storm and water shall be reviewed by the PWC Water Resources Engineer and approved on a case by case basis.

All ductile iron pipe (regardless of diameter) within casings shall be factory restrained, in accordance with these specifications and the applicable PWC standard details. The use of mechanical restraints (i.e., mega-lugs, grip-rings, etc.) shall not be utilized on pipe within casings.

When pipe is field cut, the cut end shall be smooth and at right angles to the axis of the pipe. All sharp edges shall be removed. All field cut pipe shall be beveled. The beveled end of PVC pipe shall be removed, when installing into mechanical joint ductile iron fittings.

When connecting unlike (class, material, etc.) pipe, an approved PWC fitting shall be used. All pipe shall be installed in accordance with AWWA C-600 or C-605 as applicable, for buried lines and the manufacturer's recommendations. For mechanical joint pipe and fittings, all nuts shall be torqued to the manufacturer's recommendations.

Concrete thrust blocking shall be utilized on all PVC water mains. The concrete thrust blocking shall be in accordance with PWC standard details. When thrust blocking is to be utilized, backfilling shall not occur until the concrete has time to set. No hydrostatic pressure testing shall occur until the concrete thrust blocking has cured for a minimum of five (5) calendar days.

FIRE HYDRANTS

Fire hydrants shall be installed as shown on the approved drawings. Each fire hydrant shall be connected to the main with a six (6) inch branch line and shall have a minimum of 42-inches of cover. Fittings between the valve and fire hydrant may be utilized, with prior approval from PWC. The valve shall be located at the main unless otherwise approved by PWC. Hydrants shall be set plumb with pumper nozzle facing the roadway. The hydrant branch shall not be backfilled until inspected and approved by the PWC Project Coordinator. Fire hydrants shall be installed in accordance with PWC standard details.

HYDROSTATIC TESTS

All mains and laterals shall be subjected to a hydrostatic pressure test. Each valved section maybe tested individually.

The Contractor shall furnish all labor and material, including test pumps, taps, and corporations, necessary to complete the work. Any taps which are not to be utilized shall be killed out at the main. If any taps are to be used for irrigation laterals they shall be installed in accordance with PWC standard details. A PWC Project Coordinator shall be present and observe all valve operation by the Contractor. Under no circumstances shall a Contractor operate any PWC-owned valves unless it is an emergency.

The duration of the pressure test shall be at least one hour or longer, as directed by the PWC Project Coordinator. The hydrostatic pressure shall be 200 psi. The pipe to be tested shall be slowly filled with water and the specified test pressure shall be applied. Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow offs are not located to properly expel the air, taps shall be made as approved by PWC.

Damaged or defective materials discovered as a result of the pressure test shall be removed and replaced with new material, and the test shall be repeated until the test results are satisfactory to the Public Works Commission.

All replacement, repair or retesting shall be accomplished by the Contractor at no additional cost to the Public Works Commission. All repairs shall be reviewed and approved by PWC prior to backfill. The use of couplings, fittings, sleeves, etc. shall be reviewed and approved by PWC prior to use. The main must successfully pass the hydrostatic test prior to sterilization.

STERILIZATION

Sterilization shall be in accordance with the requirements of NCDEQ, the North Carolina Rules Governing Public Water Supply, AWWA C651, and AWWA C655 (most recent editions). The Contractor shall furnish all chlorinating equipment, sterilization solution, materials, excavation, barricades, backfilling, and any taps and corporations necessary to complete the work. The Contractor shall fully cooperate with the PWC Project Coordinator, furnish any needed assistance, and schedule the testing.

Prior to performing the hydrostatic test, water mains, laterals, and appurtenances shall be flushed to remove air, sediment, contaminants, and/or foreign matter. After completion of a successful hydrostatic test, the water system shall be disinfected by the thorough dispersion of a chlorine solution. The chlorine level shall be between 50 parts per million (ppm) and 100 ppm throughout the water system. In no case shall the chlorine level exceed 300 ppm. If the chlorine level is over 300 ppm, the system shall be completely flushed and re-chlorinated. **In no case shall chlorine be introduced into the water system in a dry solid state.**

The chlorine solution shall remain in contact with the interior surfaces of the water system for a minimum period of 24 hours and shall result in not less than 10 ppm of chlorine throughout the system. Then the water system shall be flushed with water from the existing PWC water system until the chlorine solution is dispelled. The Contractor shall take all necessary measures to prevent downstream erosion caused by flushing the lines. All erosion/damages shall be repaired at no additional expense to the Public Works Commission. All environmental regulations governing the release and/or disposal of chlorinated testing water shall be met by the Contractor. AWWA C655 defines “highly chlorinated” water as water having more than four (4) ppm. Any water with a chlorine level greater than four (4) ppm shall be de-chlorinated by the Contractor prior to being released to the environment.

If any disruption to the disinfection process occurs, or if any repair procedure is necessary then the disinfection process shall start over.

After disinfection, the water supply shall not be accepted or placed into service until bacteriological tests results or representative water samples analyzed in the Public Works Commission’s laboratory are found to be satisfactory. The disinfection shall be repeated until tests indicate the absence of pollution for at least two (2) full days. The PWC Project Coordinator shall be responsible for taking the sample(s) and transporting them to the PWC laboratory.

If the initial sample taken after disinfection and flushing does not indicate that the water main is sterilized, the Contractor shall, in conjunction with the PWC Project Coordinator, flush the lines. Once flushing is complete, another sample will be taken to the Public Works Commission’s laboratory for analysis. Should this second sample also fail to indicate that the main is sterilized; the Contractor shall repeat the disinfection process. This process shall be repeated until the samples are satisfactory. The Contractor

shall fully cooperate with the PWC Project Coordinator, furnish any needed assistance, and schedule the testing.

DIVISION 2
SITE WORK

02730 SANITARY SEWER SYSTEMS

GENERAL

Sanitary sewer lines and all appurtenant items shall be constructed of materials specified or indicated on the drawings. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defect in material or workmanship shall be cause for the replacement and correction of such defect as directed by the Public Works Commission.

RELATED SECTIONS

A. 02211 – Grading, Utilities
B. 02222 – Excavation and Backfilling for Utility Systems
C. 02732 – Sewage Force Mains

MATERIALS

SEWER MAINS

Prior to shipment each joint of pipe shall be stamped by an independent testing laboratory, certifying compliance with the specifications stated therein. Pipe sizes indicated shall be understood to be nominal inside diameter of the pipe. All sewer pipe materials shall be either PVC (as specified herein) or ductile iron (as specified herein), unless otherwise approved in writing by the Public Works Commission. Written approval shall be obtained prior to installation.

DUCTILE IRON PIPE

The raw material from all ductile iron pipe and fittings shall have an average minimum content consisting of 90% recycled iron and steel. Ductile iron pipe and fittings shall be manufactured in the United States of America in accordance with ANSI/AWWA A21.51/C151. The manufacturer of the ductile iron pipe shall be a member of the Ductile Iron Pipe Research Association (DIPRA).

All ductile iron pipe and fittings shall be in strict accordance with ANSI A21.51 and AWWA C151, Class 50 or Class 51, as applicable, in every respect. The working pressure shall be a minimum of 200 psi. Pipe shall be furnished in 18 or 20-foot lengths. All pipe joints used in open trench construction shall be furnished with "push-on" joints, unless otherwise indicated on the drawings or specified. All joints and fittings shall be in accordance with ANSI A21.11 and AWWA C111. All ductile iron interior surfaces shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils (Protecto401 or approved equal). The exterior pipe surfaces shall be protected with asphaltic coating as specified in AWWA C151 and C110. Specifications for the ceramic epoxy can be found in Specification Section 09802.

For aerial crossings which are 4 inches through 12 inches in diameter, manufactured restrained joint ductile iron pipe Class 53, or Class 53 flanged ductile iron pipe shall be utilized in accordance with the standard Public Works Commission detail for aerial crossings. Mega-lugs, field-lok, and gripper rings are not an allowable means of restraint for aerial crossings. For aerial crossings larger than 12 inches, or as noted specifically on the plans, flange joint ductile iron pipe, Class 53, shall be utilized in accordance with the standard Public Works Commission details. The location of flanges shall be specifically designed for each application. The flange pipe shall be in accordance with ANSI/AWWA C-115/A21.15. Threads for threaded flange pipe shall be in accordance with ANSI B2.1, shop fabricated as outlined by AWWA 115 with serrated faces furnished on the pipe, completely factory installed. Welding of flanges to the body of the pipe will not be acceptable. Ductile iron fittings and flanges shall be in accordance with ANSI/AWWA C-110/A21.10 with a minimum working pressure of 250 psi. Gaskets shall be full faced SBR rubber per ANSI/AWWA C-111/A21.11 with a minimum 1/8" thickness. Linings and coatings shall be as outlined for ductile iron pipe.

If the Public Works Commission determines that an expansion coupling is required, it shall be installed as indicated on the drawings. The expansion coupling shall not be buried.

For subsurface water crossings (i.e., streams, wetlands), restrained joint ductile iron pipe shall be utilized. No mechanical restraint systems (e.g., mega-lugs, field-lok gaskets, etc.) shall be utilized. The pipe shall be installed in a casing, in accordance with the approved Public Works Commission detail, unless otherwise specifically approved by the Public Works Commission.

PVC PIPE

PVC sewer pipe and fittings 4 inches thru 15 inches shall be in accordance with ASTM D-3034 with a standard dimension ratio (SDR) of 26 for sewer mains and laterals. Larger diameter pipe (18 inches through 27 inches) shall be in accordance with ASTM F-679, with a SDR of 26. Both pipe and fittings shall be made of PVC plastic having a cell classification of 12454 as specified in ASTM D-1784.

Pipe joining shall be push on elastomeric gasket joints only and the joints shall be manufactured and assembled in accordance with ASTM D-3212. Elastomeric seals shall meet the requirements of ASTM F-477. The pipe shall be furnished with integral bells and with gaskets that are permanently installed at the factory and in accordance with ASTM D-3212 and contain a steel reinforcing ring. PVC sewer pipe shall be made by continuous extrusion of prime green unplasticized PVC and contain identification markings as required by the applicable ASTM standard.

SEWER FITTINGS

Ductile Iron Push-on Fittings:

Ductile iron sewer fittings on PVC mains shall be deep bell, gasketed joint, and air test rated. Gasket groves shall be machined in the factory. Material shall be ductile iron, in accordance with ASTM A536, Grade 65-45-12 and ASTM F1336. Wall thickness shall meet the requirements of AWWA C153. Gaskets shall have a minimum cross sectional area of 0.20 square inches, and conform to ASTM F477.

All ductile iron fittings shall have an interior coating of Protecto 401, or approved equal. All ductile iron fittings on PVC pipe shall provide a flow line that provides a smooth transition between the materials. Ductile iron fittings shall be as manufactured by the Harrington Corporation (Harco), or approved equal.

Mechanical Joint Fittings:

Joints shall be installed in accordance with AWWA C-600 and shall conform to AWWA Standard C-111. Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for four inch (4") pipe and larger. Fittings and specials shall be ductile iron and shall be manufactured in accordance with AWWA Standard C-110 (ANSI A21.11). Compact fittings shall be ductile iron in accordance with ANSI A 21.53 (AWWA C-153) for 4" thru 24" sizes only. Note: mechanical joint wyes are not included in the AWWA C-153 specification. Pressure rating shall be not less than 200 psi unless otherwise specified. All ductile iron fittings shall have an interior coating of Protecto 401, or approved equal. Mechanical joint fittings shall be utilized on ductile iron mains and ductile iron laterals. Mechanical joint fittings shall not be utilized on PVC mains, unless otherwise approved by the Public Works Commission.

PVC Fittings:

PVC fittings shall be manufactured in accordance with ASTM D-3034, F-1336, and F-679. Molded fittings shall be utilized in sizes from 4” to 8” (or larger, if available). Fabricated fittings shall only be utilized with prior approval from the Public Works Commission. Fabricated fittings are defined as those fittings that are made from pipe or a combination of pipe and molded components. All PVC fittings shall contain identification markings as required by the applicable ASTM standard. All PVC fittings shall be gasketed joint, except as indicated for interior drop structures. Plastic fittings shall be as manufactured by GPK Products, Inc., Plasti-Trends, the Harrington Corporation (Harco), or approved equal.

Ductile Iron Pipe Size x SDR26 Transition Adapter:

All ductile iron x PVC transition adapters shall be one (1) piece, bell x bell (gasket x gasket). Transition adapters shall range in size from four (4) inches through 12 inches. Transition adapters for pipe larger than 12-inches shall be as specified by the Public Works Commission. All transition adapters shall have a flow way tapered to allow a smooth transition between the ductile iron and PVC. Transition adapters shall be either PVC or ductile iron, in accordance with the following:

PVC – All PVC transition fittings shall be made from DR 18 C900 pipe stock. The C900 pipe stock shall meet the requirements of AWWA C900/C905, and have a minimum cell classification of 12454 as defined in ASTM D1784. The wall thickness shall meet or exceed DR 18. PVC transition fittings shall have SBR gaskets in accordance with ASTM F477. All six (6) inch and eight (8) inch adapters shall be molded. Molded fitting joints shall be 235 psi rated, in accordance with ASTM D3139, and shall have SBR rubber gaskets. Four (4) inch, ten (10) inch and 12 inch transition adapters shall have SBR Rieber style gaskets meeting ASTM F477. Joints shall be 235 psi rated, in accordance with ASTM D3139 for the C900 (ductile iron) bell, and in accordance with ASTM D3212 for the sewer (SRD26) bell. Molded C900 bell depths shall comply with AWWA C907. Fabricated (4-inch, 10-inch and 12-inch) bell depths and molded sewer (SDR26) bell depths shall be in accordance with ASTM F1336. PVC transition adapters shall be manufactured by the Harrington Corporation (Harco), GPK Products, or approved equal.

Ductile iron – Ductile iron transition fittings shall be deep bell, push-on joint, and air test rated. The ductile iron material shall comply with ASTM A536, Grade 65-45-12 or 80-55-06. The bell depth shall be in accordance with ASTM F1336. Gaskets shall be of SBR rubber, in accordance with ASTM F477. Transition gaskets are not allowed. All ductile iron transition fittings shall have an interior coating of Protecto401 or approved equal. Ductile iron transition fittings shall be manufactured by the Harrington Corporation (Harco) or approved equal.

Saddles:

Sewer service saddles may be utilized for sewer lateral installations. All sewer service saddles shall be ductile iron with stainless steel straps, bolts, nuts, and washers. The nuts shall be coated to prevent galling. The saddle body shall be ductile iron, in accordance with ASTM A536, Grade 65-45-12. The gasket material shall be SBR, in accordance with ASTM D2000. Saddles for PVC or DI laterals shall have an alignment flange. Sewer service saddles shall be as manufactured by Geneco, or approved equal. All stainless steel straps shall be pre-formed at the factory, to the specified outside diameters of the pipe.

SEWER LATERALS

Ductile iron laterals – For ductile iron mains, utilize mechanical joint fittings or an approved saddle with an alignment flange (Geneco or approved equal). For PVC mains, utilize an approved saddle with an alignment flange (Geneco or approved equal) or ductile iron fittings as specified above.

PVC laterals – utilize a saddle with an alignment flange (Geneco or approved equal) on PVC or ductile iron mains; utilize a mechanical joint tee with SDR 35 transition gaskets on ductile iron mains; or utilize PVC fittings as specified above on PVC mains.

The following table summarizes the materials to be utilized for sewer main to lateral connections:

	PVC Main	DI Main
DI Lateral	DI fitting or approved saddle	MJ fitting or approved saddle
PVC Lateral	PVC fitting or approved saddle	MJ fitting with transition gasket or approved saddle

Sewer laterals shall be in accordance with these Specifications and PWC standard details S.10, S.11, and S.12.

PRECAST CONCRETE MANHOLES

Pre-cast circular reinforced concrete manhole units shall be in accordance with ASTM C-478. The tongue and groove ends of the manhole sections shall be manufactured for jointing with rubber gaskets (i.e., con-seal). An eccentric cone shall be utilized on all manholes, unless otherwise approved by the Public Works Commission.

Manhole steps shall be placed in all manholes and shall be steel reinforced (½" grade 60) copolymer polypropylene plastic steps in accordance with ASTM C-478 for material and design. The steps shall be spaced 16" on center with serrated treads and wide enough to stand on with both feet.

Manhole frames and covers shall be made of gray cast-iron, and the iron shall possess a tensile strength of not less than 18,000 psi. Cast iron shall conform to ASTM Specification A 48-83 Class 35. The frame and cover shall be manufactured by the same manufacturer. All castings shall be in accordance with Public Works Commission standard details. Any defective castings shall be removed and replaced.

Any special linings and coatings that are specified for a manhole and installed at the production facility, in the field, or during repairs, shall be applied in accordance with the applicable special coatings specification and the manufacturer's specifications for that material.

Camlock ring and covers shall be in accordance with Public Works Commission standard details. Camlock bolt head shall be compatible with PWC standard tool for turning camlock mechanism. Camlock ring and covers shall be installed as indicated on the drawings, in accordance with PWC standard details.

SELECT BEDDING MATERIAL

Select bedding material shall be crushed stone (No. 57 or No. 5), in accordance with Public Works Commission standard details. Bedding material shall be provided for all pipe materials.

INSTALLATION

Pipe installation shall be in strict accordance with Specification Section 02222 – Excavation and Backfilling for Utility Systems and as outlined herein.

PIPE LAYING

Pipe installation shall be in accordance with the manufacturer's instructions. Proper equipment shall be utilized to perform the work in a manner satisfactory to PWC. All pipes and fittings shall be carefully lowered into the trench in such a manner to prevent damage to the protective coatings and linings. Under no circumstances shall pipe materials be dropped or dumped into the trench. Pipe shall be carried into position and not dragged.

All dust, dirt, oil, tar (other than standard coating), or other foreign matter shall be cleaned from the jointing surfaces, and the gasket, bell, and spigot shall be lubricated with lubricant recommended by the manufacturer.

The pipe shall be laid upgrade, beginning at the lower end with the tongue or spigot ends pointing in the direction of the flow to the correct line and grade, unless otherwise approved by PWC. The pipe section to be installed shall be aligned by batter board or laser beam with the last installed pipe section. Mechanical equipment should not be used to assemble the pipe. Pipe shall be assembled in accordance

with the pipe manufacturer's instructions. Any damage resulting from the use of mechanical equipment shall be replaced as directed by PWC.

Adjustments in grade by exerting force on the barrel of the pipe with excavating equipment shall not be allowed. The Contractor shall verify line and grade after assembling each joint.

At any time when pipe laying is not in progress, the open ends of the pipe shall be closed by a water tight plug or other means approved by the PWC Project Coordinator. If water is in the trench, the plug shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or where in the PWC Project Engineer's and/or PWC Project Coordinator's opinion trench conditions are unsuitable. Every precaution shall be taken to prevent material from entering the pipe while it is being installed.

ALIGNMENT AND GRADE

All pipe shall be installed to the required lines and grades. Structures shall be installed at the required locations. The lines and grades of the pipe will generally be indicated by stakes parallel to the line of the pipe. The Contractor shall be responsible for installing the pipe to proper line and grade.

Pipe shall be visually inspected by shining a light between structures and /or by closed circuit television inspection. Any defects discovered, including poor alignment, shall be corrected as directed by the Public Works Commission.

The bottom of the trench shall be excavated to a minimum of four inches (4") below the outside bottom of the pipe being installed to allow adequate placement and compaction of bedding material prior to installation.

Select bedding material shall be placed a minimum of four inches (4") and a maximum of six inches (6") under the pipe for full width of the trench and halfway up the pipe on the sides. Bedding material shall be placed in layers not exceeding six inches (6") loose thickness for compacting by vibratory mechanical tamps under the haunches and concurrently on each side of the pipe for the full width of the trench. The final result shall be "Class B" bedding for rigid pipe. If the existing material under the pipe bedding material is unsuitable, the unsuitable material shall be removed and replaced with select bedding material (No. 57 or No. 5 stone), as authorized and approved by the Public Works Commission Project Coordinator.

The same material pipe shall be utilized from manhole to manhole, unless otherwise approved by PWC. If the section of pipe between manholes is 250 feet or less, no transitions will be allowed (either all PVC or all ductile iron). Should the length between manholes exceed 250 feet, only one transition will be allowed. Use of a C900 x SDR 26 adaptor shall be used to accomplish the transition. A transition is defined as the use of one C900 x SDR26 adaptor. No more than one (1) adaptor shall be utilized in any given manhole to manhole segment.

All manholes shall be constructed to Public Works Commission's standards. Installation shall be in accordance with ASTM C-891 and PWC standards.

Manholes shall be constructed of precast reinforced concrete circular sections installed on a base riser section with integral floor and shall be cored to accommodate the various pipe connections, as indicated on the drawings. Pipe connections to a manhole shall be by gasketed flexible watertight connections (boot for small diameter and A Loc for larger diameter pipe) or as approved by the Public Works Commission. The manhole size shall be in accordance with the following table, unless otherwise specified:

Pipe Size	Manhole Diameter **
24" and less	48" *
27" - 36"	60"
42"	72"

* Where interior drop structures are required, use 60" diameter as required in the Public Works Commission standard details.
** Where multiple connections or acute angles are required, larger diameter manhole may be required as indicated on the plans.

The invert channel shall be constructed of brick and mortar, in accordance with Public Works Commission standard details. **Precast inverts are not allowed**. The invert channel shall be smooth and semicircular in shape conforming to the inside of the connecting sewer section. Changes in direction of flow shall be made with a smooth curve as large as a radius as the size of the manhole will permit without a decrease in flow velocity. Changes in size and grade of the channel shall be made gradually and evenly. The invert channel walls shall be constructed to three quarters (3/4) of the height of the crown of the outlet sewer and in such a manner not to obstruct maintenance, inspection or flow in the sewers. The inverts shall have a minimum slope of one (1) percent across the bottom of the manhole. A shelf shall be provided on each side of any manhole invert channel. Inverts in manholes with standing water will not be acceptable. The shelf shall be sloped not less than 1:12 (min) and no more than 2:12 (max). The bottom of the boot for the new sewer main or lateral shall be set one inch above existing shelf unless otherwise indicated.

When used in a paved street, the ring and cover shall be set in suitable mortar surrounded by a concrete collar in accordance with Public Works Commission standard details. When used in places other than in a paved street, the ring and cover shall be set to the grade shown on the plans or directed by the Public Works Commission. In unpaved areas cam-lock ring and cover shall be used. Camlock ring and cover shall be installed in accordance with Public Works Commission standard details.

The interior manhole riser joints, lift holes and grade adjustment rings shall be sealed with non-shrinking mortar to provide a watertight manhole. Lift holes sealed by the manufacturer with plastic caps do not require mortar seal. The hardened mortar shall be smooth to rub with no sharp edges. Use of grade rings with cam-lock ring and cover are not allowed, unless approved by the PWC Project Coordinator. **Use of grade rings is not allowed for above grade adjustments**.

All exterior manhole riser joints, including the joint at the cone, shall be sealed with an external rubber sleeve. The sleeve shall be made of stretchable, self-shrinking rubber, with a minimum thickness of 30

mils. The back side of each wrap shall be coated with a cross-linked reinforced butyl adhesive. The butyl adhesive shall be a non-hardening sealant, with a minimum thickness of 30 mils. The seal shall be designed to stretch around the manhole joint and then overlap to create a fused bond between the rubber and butyl adhesive. The application shall form a continuous rubber seal for the life of the application. The sealing system shall be as manufactured by Concrete Sealants, Inc. (Con-Seal), Sealing Systems, Inc., or approved equal. The wrap shall be a minimum of six (6) inches in width, and shall be centered on the joint. All manhole joints (including the cone section to the last riser) shall be wrapped and sealed. Care shall be taken to prevent damage to the wrap during backfill operations. The manhole surface shall be prepared in accordance with manufacturer's specifications, prior to installing the joint wrap.

Materials shall not enter the sewer line during construction of the manhole. The manhole shall be kept clean of any and all debris or materials. Any debris or material that entered the manhole shall be immediately removed. This condition shall be maintained until final acceptance of the work.

CONNECTION TO EXISTING MANHOLES OR LIFT STATIONS

All connections to existing manholes and/or lift stations shall be approved by the Public Works Commission. Where new mains are to be connected to existing active sanitary sewers, the active sewers shall remain in service. Unless otherwise indicated, where new lines are connected into existing manholes, all or such portion of the manhole invert as is necessary shall be removed and a new invert shall be constructed to accommodate both new and existing flows. All work shall conform to the requirements specified for new manholes. The existing structure connection shall be cored and a flexible watertight connection (i.e., boot) installed. The boot shall be installed in accordance with Public Works Commission standard details and requirements. The Contractor shall coordinate and cooperate with the Public Works Commission's Project Coordinator.

PIPE TO MANHOLE CONNECTOR (BOOT)

A watertight, flexible pipe-to-manhole connector shall be utilized on all pipe to manhole connections, for both new and existing manholes and pipes, unless otherwise specifically authorized in writing by the Public Works Commission.

The connector assembly shall be the sole element to provide a watertight seal of the pipe to the manhole or other structure. The connector shall consist of a rubber gasket, an internal compression sleeve, and one or more external take-up clamps. The connector shall consist of natural or synthetic rubber and Series 300 non-magnetic stainless steel. No plastic components shall be allowed.

The rubber gasket shall be constructed of synthetic or natural rubber, and shall meet or exceed the requirements of ASTM C-923. The connector shall have a minimum tensile strength of 1,600 psi. The minimum cross-sectional thickness shall be 0.275 inches.

The internal expansion sleeve shall be comprised of Series 300 non-magnetic stainless steel. No welds shall be utilized in its construction.

Installation of the connector shall be performed utilizing a calibrated installation tool furnished by the connector manufacturer. Installation shall require no re-tightening after the initial installation. Installation shall be done in accordance with the manufacturer's instructions.

The external compression take-up clamps shall be Series 300 non-magnetic stainless steel. No welds shall be utilized in its construction. The clamps shall be installed utilizing a torque-setting wrench furnished by the connector manufacturer. Installation shall be done in accordance with the manufacturer's instructions.

The Contractor shall utilize the proper size connector in accordance with the connector manufacturer's recommendations. All dead-end pipe stubs shall be restrained in accordance with ASTM C-923.

The finished connection shall provide a sealing to a minimum of 13 psi, and shall accommodate a minimum pipe deflection of seven (7) degrees without the loss of seal.

The pipe to manhole connector shall be PSX: Direct Drive as manufactured by Press-Seal, or approved equal.

INSIDE DROP MANHOLE STRUCTURE

Inside manhole drop structures shall be constructed and installed in accordance with Public Works Commission standard details.

CLEANING

Prior to final inspection, all sanitary sewer laterals, mains, and manholes newly installed on the collection system shall be flushed and cleaned. During the flushing operation, the downstream manhole shall be closed with a watertight plug to protect the existing sewer main. All water and debris shall be removed and properly disposed of by the Contractor. This condition shall be maintained until the Public Works Commission issues final acceptance for the project.

TESTING

Completed sewers shall be tested in accordance with the provisions outlined below. The Contractor shall furnish all equipment, labor, materials, and pay all costs associated with the tests performed. The Contractor shall schedule all testing with the Public Works Commission's Project Coordinator, a minimum of 48 hours in advance. The Contractor shall cooperate with the Public Works Commission's Project Coordinator and furnish any needed assistance necessary to complete the required testing.

For annexation and/or retrofit projects: No testing shall be conducted prior to successful completion of the compaction testing.

For all other projects: No testing shall be completed until all utilities are installed, prior to preparation of the road subgrade. The Contractor may elect to perform testing to satisfy them that the sewer utility is

installed properly prior to commencing installation of other utilities. However, such testing shall not be construed as acceptance by PWC.

The deflection/mandrel test shall not be performed until a minimum of thirty (30) calendar days after backfill operations are completed and the area graded to final contours. In lieu of waiting thirty (30) calendar days, the Contractor has the option to have an independent testing laboratory verify that compaction has been completed to achieve the maximum density as shown in the detail. The location and elevation of the compaction testing shall be determined reviewed and approved by the Public Works Commission's Project Coordinator. The Contractor shall provide the Public Works Commission with a copy of the density testing results.

Compaction testing shall be done in accordance with Specification Section 02222 – Excavation and Backfilling for Utility Systems.

Vacuum Testing Manholes:

All precast sanitary sewer manholes installed by the Contractor shall be vacuum tested for leakage. This test shall be done in accordance with ASTM C-1244 and in the presence of a Public Works Commission Project Coordinator. The Contractor shall be responsible for providing all the necessary labor, materials, equipment, testing apparatus, and all other incidentals necessary to complete the vacuum test. All testing equipment utilized shall be approved for use in vacuum testing manholes.

Each manhole shall be tested after assembly. All lift holes shall be plugged with an approved non-shrink grout. All lines, including laterals, entering the manhole shall be temporarily plugged. The Contractor should take care to ensure that the pipes and plugs are secure in place to prevent them being drawn into the manhole. The test head shall be placed directly on top of the concrete surface of the manhole following the manufacturer's recommendations, rather than to the cast iron seating ring.

Manholes may be tested either prior to backfill or post backfill at the contractor's option. For pre-backfill testing, a vacuum of 10 inches of Mercury (inches Hg) shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of Mercury (inches Hg). The manhole is acceptable if the time for the vacuum reading to drop from 10 inches of Mercury to 9 inches of Mercury meets or exceeds the values indicated below:

	Diameter of Manhole		
Manhole Depth	**4' Diameter**	**5' Diameter**	**6' Diameter**
10' or less	**25 sec**	**33 sec**	**41 sec**
11' to 15'	**38 sec**	**49 sec**	**62 sec**
16' to 20'	**50 sec**	**65 sec**	**81 sec**
21' to 25'	**62 sec**	**82 sec**	**101 sec**

25’ to 30’	**74 sec**	**98 sec**	**121 sec**

Vacuum testing backfilled manholes is not recommended in the presence of groundwater. Vacuum testing a backfilled manhole that is subjected to hydrostatic pressure may exceed the design limits of the flexible connecters and could lead to failure of the structure, joints, and/or connectors. Where groundwater is present a reduction in the vacuum pressure applied to the manhole will be required. The vacuum shall be reduced by 1 inch of Mercury for every 1 foot of hydrostatic head between 12 feet and 21 feet. A vacuum test should not be performed when the hydrostatic head exceeds 22 feet. See the chart below:

Hydrostatic Head (ft)*	12	13	14	15	16	17	18	19	20	21	22
Vacuum Pressure (in Hg)	10	9	8	7	6	5	4	3	2	1	**

*Hydrostatic head above the critical connector (critical connector is bottom most flexible connector)
**Do not perform vacuum test

If the manhole fails the initial test, the manhole shall be repaired by an approved method until a satisfactory test is obtained. All repair methods shall be approved by the Public Works Commission prior to being utilized. Retesting shall be performed until a satisfactory test is accomplished.

Mandrel Testing:

Deflection tests shall be performed on all PVC pipe installations. PVC pipe's maximum deflection after backfilling shall not exceed five (5) percent. The rigid ball or mandrel used for the deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on the type of pipe manufactured and the applicable ASTM Standard. The PVC pipe shall be measured in compliance with ASTM D2122 “Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings”. The Contractor shall supply all labor, equipment and materials necessary to perform the test in the presence of the Public Works Commission’s Project Coordinator. The test shall be performed without mechanical pulling devices. The mandrel shall be constructed so as to preclude any yield in diameter, and with a pull line on each end to facilitate withdrawal. If the deflection exceeds the allowable, the Contractor shall remove and replace the pipe.

Air Testing:

Air testing shall be performed on all mains and laterals to determine acceptability. The length of sewer subject to an air test shall be the distance between two adjacent manholes. The tests shall be conducted in accordance with the appropriate ASTM standard. The air test shall be coordinated with the Public Works Commission. The Contractor is required to supply all equipment, labor, materials and pay all costs associated with the test performed.

Air Test for PVC Pipe

The low pressure air test on PVC pipe shall be performed with satisfactory results in accordance with ASTM F1417 “Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using

Low-Pressure Air". The pipe, including lateral assemblies, shall be plugged and air added slowly until the internal pressure of the line is raised to 4.0 psi. After the pressure of 4.0 psi is obtained, regulate the air-supply so that the pressure is maintained between 3.5 and 4.0 psi for at least two (2) minutes, depending on air/ground temperature conditions. The pressure will drop slightly until equilibrium is obtained; however, a minimum of 3.5 psi is required. Once the 3.5 psi is maintained, the test will begin. If the pressure drops 1.0 psi within the time indicated below, the test fails.

Pipe Dia (in)	Minimum time (minutes)	Length for Min Time (ft)	Time for Longer Length (sec)
4	3:46	597	0.380L
6	5:40	398	0.854L
8	7:34	298	1.520L
10	9:26	239	2.374L
12	11:20	199	3.418L
15	14:10	159	5.342L
18	17:00	133	7.692L
21	19:50	114	10.470L
24	22:40	99	13.674L
27	25:30	88	17.306L
30	28:20	80	21.366L
33	31:10	72	25.852L
36	34:00	66	30.768L

The Contractor shall observe all safety precautions to include allowing no one in the manholes during testing, securing all plugs and providing additional plug bracing. The Contractor shall be required to furnish, install and remove after testing at no additional cost, a temporary glue cap/plug to be airtight for all cleanout stacks to accomplish air testing. The air pressure shall never exceed 8 psi. All gauges shall be accessible outside of the manholes.

HYDROSTATIC TESTS

After the ductile iron sewer pipe has been laid within the "protected" area and backfilled to finished grade, the pipe shall be subjected to a hydrostatic pressure test. All laterals within the "protected" area shall be ductile iron. All sewers subject to hydrostatic testing shall include (1) sewers entering or crossing streams, (2) sewers located less than 100 feet from any public or private water supply source including any WS-I waters or Class I or Class II impounded reservoirs, (3) where the minimum 18 inch vertical and 10 feet horizontal separation cannot be maintained between sewers and water mains (see NC DENR Regulations), or (4) as specified and/or indicated on the drawings. The Contractor will furnish all labor and material, including test pumps, plugs, and all other incidentals for making hydrostatic tests. Hydrostatic pressure testing shall be conducted on the completed main, including the laterals.

The duration of the pressure test shall be at least one hour or longer, as directed by the Public Works Commission. The hydrostatic pressure shall be 150 psi. Each section of pipe shall be slowly filled with water and the specified test pressure based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the

pipe in a manner satisfactory to the Public Works Commission. Before applying the specified test pressure, all air shall be expelled from the pipe.

All joints showing visible leaks shall be made tight. Cracked or defective pipe, joints, laterals, and fittings discovered in consequence of the pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. The requirement for the joints to remain exposed for the hydrostatic test may be waived by the Public Works Commission in certain situations. The test shall be repeated until satisfactory to the Public Works Commission.

The results of the pressure tests shall be satisfactory as specified. All replacement, repair, or retesting shall be accomplished by the Contractor. All repairs shall be reviewed and approved by the Public Works Commission prior to backfill. The use of couplings, sleeves, etc. shall be reviewed and approved by the Public Works Commission prior to use.

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DIVISION 2
SITE WORK

02732 SEWAGE FORCE MAINS

GENERAL

Sewage force mains and all appurtenant items shall be constructed of materials as specified or indicated on the drawings. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defect in material or workmanship shall be cause for replacement and correction of such defect as directed by the Public Works Commission and at no expense to the Public Works Commission. All materials and workmanship shall be in complete accordance with the standards and specifications of the Public Works Commission and subject to Public Works Commission inspection and approval.

RELATED SECTIONS

A. Section 02222 – Excavation and Backfilling for Utility Systems
B. Section 02660 – Water Distribution
C. Section 02730 – Sanitary Sewer System
D. Section 02736 – High Density Polyethylene Pipe
E. Section 02753 – Submersible Lift Stations
F. Section 02754 – Self-Priming Lift Stations
G. Section 09801 – Special Coatings – Anti-Microbial Admixture
H. Section 09802 - Special Coatings – Ceramic Epoxy

MATERIALS

PVC PIPE

In order to prevent the sanitary sewer force main from being mistaken for a water main, **all force main PVC pipe shall be green in color.**

Two (2) inch PVC pipe shall be manufactured using Grade 1 PVC compound material as defined in ASTM D-1784 and shall be SDR21, pressure class 200 in accordance with ASTM D 2241 or SDR-17 with a pressure rating of 250 psi, in accordance with ASTM D-2241. Fittings for two (2) inch PVC shall be solvent welded Schedule 80 PVC. The pipe shall be plainly marked with the manufacturer's name, size, material (PVC) type and grade or compound, NSF seal, pressure rating and reference to appropriate product standards.

All PVC pipe four (4) inches through 12 inches and couplings shall be manufactured using virgin compounds as defined in ASTM D-1784, with a 4000 psi HDB rating and designated as PVC 1120 to be in strict accordance with AWWA C-900. The pipe shall be Class 150 and conform to the thickness requirements of DR18. The pipe and fittings shall be manufactured to withstand 755 psi quick burst

pressure tested in accordance with ASTM D-1599 and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM D-1598. Couplings shall be compression, twin gasket type in accordance with ASTM D-3139 for push-on joints and ASTM F-477 for elastomeric seals (gaskets). PVC fittings are not acceptable for mains other than two (2) inch. The pipe joints shall be of the integral bell type with rubber gaskets shall conform to the requirements of ASTM D-3139 or ASTM F-477. Fittings and specials for mains four (4) inches and larger shall be ductile iron, bell end in accordance with AWWA C-110, 200-psi pressure rating unless otherwise shown or specified, except that profile of bell may have specials of the same material as the pipe with elastomeric-gaskets, all in conformance with the requirements of AWWA C-900. Ductile iron fittings to PVC pipe shall be adequately supported on a firm trench foundation. Fittings shall be for bell and spigot pipe or plain end pipe, or as applicable.

Mechanical restraining systems shall not be used on PVC pipe.

DUCTILE IRON PIPE

The raw material from all ductile iron pipe and fittings shall have an average minimum content consisting of 90% recycled iron and steel. Ductile iron pipe and fittings shall be manufactured in the United States of America in accordance with ANSI/AWWA A21.51/C151. The manufacturer of the ductile iron pipe shall be a member of the Ductile Iron Pipe Research Association (DIPRA).

All ductile iron pipe and fittings (six (6) inches and above) shall be in strict accordance with ANSI/AWWA C-150/A21.50 and ANSI/AWWA C-151/A21.51, Class 50 in every respect. Four (4) inch ductile iron pipe shall be Class 51. Joints shall be mechanical joint or push on joint as specified and installed in accordance with AWWA C-600 and shall conform to AWWA Standard C-111. Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for four (4) inch pipe through 12-inch pipe. Push on joints, rubber gaskets and lubricant shall conform to ANSI A21.11. Fittings and specials shall be ductile iron and shall be manufactured in accordance with AWWA Standard C-110 (ANSI A21.11).

Compact fittings shall be mechanically restrained, ductile iron in accordance with ANSI A 21.53 (AWWA C-153) for four (4) inch through 12-inch sizes only. Where thrust blocking is utilized, fittings shall be full body ductile iron in accordance with ANSI A 21.53 (AWWA C110). Pressure rating shall be not less than 200 psi unless otherwise specified. All ductile iron interior surfaces shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils (Protecto401 or approved equal). The exterior pipe surfaces shall be protected with asphaltic coating as specified in AWWA C151 and C110. Specifications for the ceramic epoxy can be found in Specification Section 09802.

All pipe joints within an encasement shall be furnished with manufactured restrained joints, and as specified in the standard Public Works Commission detail for encasements.

For aerial crossings which are four (4) inches through 12 inches in diameter, manufactured restrained joint ductile iron pipe Class 53, or Class 53 flanged ductile iron pipe shall be utilized in accordance with the standard Public Works Commission detail for aerial crossings. Mega-lugs, field-lok, and gripper rings are not an allowable means of restraint for aerial crossings. For aerial crossings larger than 12 inches, or

as noted specifically on the plans, flange joint ductile iron pipe, Class 53, shall be utilized in accordance with the standard Public Works Commission details. The location of flanges shall be specifically designed for each application. The flange pipe shall be in accordance with ANSI/AWWA C-115/A21.15. Threads for threaded flange pipe shall be in accordance with ANSI B2.1, shop fabricated as outlined by AWWA 115 with serrated faces furnished on the pipe, completely factory installed. Welding of flanges to the body of the pipe will not be acceptable. Ductile iron fittings and flanges shall be in accordance with ANSI/AWWA C-110/A21.10 with a minimum working pressure of 250 psi. Gaskets shall be full faced SBR rubber per ANSI/AWWA C-111/A21.11 with a minimum 1/8" thickness. Linings and coatings shall be as outlined for ductile iron pipe.

If the Public Works Commission determines that an expansion coupling is required, it shall be installed as indicated on the drawings. The expansion coupling shall not be buried.

For subsurface water crossings (i.e., streams, wetlands), restrained joint ductile iron pipe shall be utilized. No mechanical restraint systems (e.g., mega-lugs, field-lok gaskets, etc.) shall be utilized. The pipe shall be installed in a casing, in accordance with the approved Public Works Commission detail, unless otherwise specifically approved by the Public Works Commission.

Transition between ductile iron pipe and HDPE shall be accomplished utilizing mechanical restraints as approved by PWC.

HDPE PIPE

All high density polyethylene (HDPE) pipe and fittings shall be in accordance with PWC Standard Specification Section 02736, most recent edition.

COMBINATION AIR RELIEF AND VACUUM VALVE ASSEMBLIES

All sewer force mains shall have automatic air release valves installed as indicated on the plans, and in accordance with Public Works Commission requirements. The automatic air release valve shall be a combination air release valve. Combination air release valves shall be heavy duty "universal" style, single body units, incorporating the functions of an air and vacuum valve within a single housing.

The tap size shall be a minimum of two (2) inches, however if a larger tap is needed it shall be sized accordingly. The valve body, cover flange, and all internal parts shall be 316 stainless steel. The air release orifice shall be as specified by the Design Engineer. The air release valve shall have a maximum working pressure of 200 psi.

All air and vacuum combination release valves shall be Crispin Model UX20, ARI D-020, H-Tec Model 986, or approved equal. All air release valves shall be installed in accordance with the manufacturer's recommendations.

Air relief and vacuum valve manholes shall be 60 inch diameter precast concrete units conforming to ASTM C-478. The combination air relief vacuum valve manhole shall be cast with an anti-microbial

admixture, in accordance with manufacturer's instructions. The manholes and valves shall be installed in accordance with the standard PWC detail. The force main shall consist of one full joint of PVC C-900 (DR18) pipe centered at the air relief valve and a minimum of four (4) feet deep.

Combination air relief and vacuum valves shall be installed using stainless steel double strap service saddles, a two (2) inch ball valve, and a two (2) inch x one (1) inch brass tee with a quick connect attachment as shown in the PWC standard detail.

Service saddles for two (2) inch taps on four (4) inch and larger size iron pipe shall be ductile iron with stainless steel double straps, bolts, nuts and washers

Ball valves shall be all bronze construction, with a handle operator. Ball valves shall be manufactured and tested in accordance with AWWA/ANSI C800. The valve shall be equipped with packing nut, gland, and packing material. Ball valves shall be of an approved type made from approved materials conforming to ASTM specifications and shall also meet the approval of PWC. The turn required to travel from fully closed to fully open on a ball valve shall be 90 degrees.

AIR RELEASE VALVE MANHOLE RING AND COVER

Cast iron manhole frames and covers shall conform to the drawings in all essentials of design with vent holes. The frames and covers shall have a combined weight of not less than 310 pounds and shall conform to ASTM A-48, Class 30 frame and Class 35 cover. Lettering on the cover shall conform to the City of Fayetteville Public Works Commission standards and shall be stamped or cast into all covers so as to be plainly visible. Unless otherwise shown on the drawings, the frames and covers shall be so set that the top of the cover will be flush with finished grade or as directed by PWC.

BY-PASS PUMPING ASSEMBLIES

By-pass pumping assemblies shall be installed in accordance with PWC standard detail S.21. The bypass pumping assembly shall be constructed of ductile iron pipe which meets the requirements of this specification.

INSTALLATION

Pipe installation shall be in strict accordance with Specification Section 02222 – Excavation and Backfilling for Utilities Systems, and as outlined herein.

PIPE LAYING

Pipe installation shall be in accordance with the manufacturer's instructions. Proper equipment shall be utilized to perform the work in a manner satisfactory to PWC. All pipes and fittings shall be carefully lowered into the trench in such a manner to prevent damage to the protective coatings and linings. Under no circumstances shall pipe materials be dropped or dumped into the trench. Pipe shall be carried into position and not dragged.

All dust, dirt, oil, tar (other than standard coating), or other foreign matter shall be cleaned from the jointing surfaces, and the gasket, bell, and spigot shall be lubricated with lubricant recommended by the manufacturer.

Mechanical equipment should not be used to assemble the pipe. Pipe shall be assembled in accordance with the pipe manufacturer's instructions. Any damage resulting from the use of mechanical equipment shall be replaced as directed by PWC.

Adjustments in grade by exerting force on the barrel of the pipe with excavating equipment shall not be allowed. The Contractor shall verify line and grade after assembling each joint.

At any time when pipe laying is not in progress, the open ends of the pipe shall be closed by a water tight plug or other means approved by the PWC Project Coordinator. If water is in the trench, the plug shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or where in the PWC Project Engineer's and/or PWC Project Coordinator's opinion trench conditions are unsuitable. Every precaution shall be taken to prevent material from entering the pipe while it is being installed.

ALIGNMENT AND GRADE

All pipe shall be installed to the required lines and grades. Structures shall be installed at the required locations. The lines and grades of the pipe will generally be indicated by stakes parallel to the line of the pipe. The Contractor shall be responsible for installing the pipe to proper line and grade.

Threaded PVC and cemented joints will not be permitted. The ends of push on joints shall be beveled to facilitate assembly. Pipe shall be marked to indicate when the pipe is fully seated and the gasket lubricated to prevent displacement. Care shall be exercised to insure that the gasket remains in proper position in the bell or coupling while marking the joint.

All pipe installations shall be properly restrained, utilizing either thrust blocks or approved restraint systems. The thrust blocking shall be in accordance with PWC standards, and as designed by the Engineer. The approved restraint system shall be installed in accordance with the manufacturer's instructions.

For the purpose of identification of buried pipes during future trenching or location, a continuous "detectable" identification wire shall be installed as well as green, "Sanitary Sewer Force Main" marking tape. The wire shall be a minimum 12 gauge single strand, coated copper wire or copper clad steel wire that is suitable for underground use. The wire shall be buried continuously along the pipe. The wire shall be "stubbed" into marker posts and air release valve manholes and secured such that a "direct"/conductive metal detector may be used to trace the pipe location.

The marker posts shall be Rhino TriView TracerPeds which are green with a "Sewer Force Main" warning decal (GD-5314K) and have internal terminals. The marker posts shall utilize the TriGrip Anchor system for direct bury installations. The identification wire shall be attached to the marker posts

in accordance with PWC standards. Tracing wire marker posts shall be located no more than 500 feet apart.

When the force main is located in unpaved areas such as easements the marker posts shall be installed along the centerline of the force main. When the force main is located in paved areas the marker posts may be offset from the centerline of the force main in a uniform manner. The wire shall be installed with all non-metallic pipelines.

The "Sanitary Sewer Force Main" marking tape shall be green and labeled to warn of the presence of the sewer main. The tape shall be manufactured for durability and resistance to the elements. The marking tape shall be installed with both PVC and ductile iron force mains.

CONNECTION TO EXISTING MANHOLES

Where new mains are to be connected to existing active sanitary sewers, the active sewers shall remain in service by the Contractor. Unless otherwise indicated, where new lines are connected into existing manholes, all or such portion of the manhole invert as is necessary in the opinion of the PWC Project Coordinator shall be removed and a new invert shall be constructed to accommodate both new and existing effluent pipes and flows. Where force mains enter manholes, pipe and fittings shall be restrained as indicated on the plans with the force main outlet directed toward invert out.

All work shall conform to the applicable requirements specified for new manholes including all necessary concrete works, brick work, cutting, shaping and pipe fitting. Existing manhole walls, inverts, and shelves shall be coated with cement mixed with an anti-microbial additive in accordance with Specification Section 09801. New manholes that contain a force main discharge shall be cast with an anti-microbial admixture, in accordance with Specification Section 09801. The Contractor shall coordinate and cooperate with the Public Works Commission Project Coordinator on all connections. Connections to any manhole shall be made using the core and boot method. If necessary, drop or slide structures shall be installed, in accordance with PWC standards.

HYDROSTATIC TESTS

After the pipe has been laid, the valves installed, the taps made and the system has been partially backfilled as specified, all newly laid pipe shall be subjected to a hydrostatic pressure test. Where any section of a force main is provided with concrete thrust blocking for fittings, the hydrostatic test shall not be made until at least five (5) days after installation of the blocking unless otherwise approved. The Contractor will furnish all labor and material, including test pumps, taps, and corporations, for making hydrostatic tests. Cost for said tests shall be included in the Proposal. A PWC Project Coordinator shall be present for all testing. The Contractor shall coordinate with the PWC Project Coordinator for disposing of the test water from the system.

The duration of the pressure test shall be at least one hour or longer, as directed by the PWC Project Coordinator. The hydrostatic pressure shall be 200 psi. The pipe shall be slowly filled with water and the specified test pressure based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in

a manner satisfactory to the PWC Project Coordinator. Before applying the specified test pressure, all air shall be expelled from the pipe. If blow offs are not available at the high places, taps shall be made to provide blow offs.

The results of the pressure test shall be satisfactory as specified. All replacement, repair or retesting shall be accomplished by the Contractor at no additional cost to PWC. All materials and methods used to make repairs shall be approved by PWC. The PWC Project Coordinator shall be present while all repair work is taking place.

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DIVISION 2
SITE WORK

02750 WASTEWATER FLOW CONTROL (BYPASS PUMPING)

GENERAL

The intent and purpose of these specifications is to provide wastewater flow control, i.e., bypass pumping, of the sanitary sewer flows during the Contractor's operations. The Contractor shall furnish all labor, materials, accessories, equipment and tools for performing all operations required to bypass pump sewage around a manhole or sewer section in which work is to be performed.

The Contractor shall provide all pumps, piping, and other equipment to accomplish this task; perform all construction; obtain all permits; pay all costs; and perform complete restoration of all existing facilities to equal or better condition to the satisfaction of the Fayetteville Public Works Commission. The Contractor shall be responsible for the design, installation, operation, and maintenance of the temporary bypass pumping system. The Contractor shall provide sufficient documentation to the Fayetteville Public Works Commission to demonstrate that he, or his designated subcontractor, have the experience in the design, installation, and maintenance of temporary bypass pumping systems.

RELATED SECTIONS

A. Section 02305 – Pipe Bursting
B. Section 02500 – Traffic Control
C. Section 02730 – Sanitary Sewer System
D. Section 02760 – Television Inspection
E. Section 02766 – Sewer Line Cleaning
F. Section 02780 – Cured-in-Place Lining

REQUIREMENTS

The Contractor shall be responsible for all aspects of the bypass operation, including but not limited to: providing access to install, move, and maintain the pumps in the proper position, traffic control, installation and removal of bypass equipment, pump monitoring, testing of the bypass system, re-fueling, maintenance, notification of property owners (should access to private property be necessary), wastewater and fuel spill containment, and removal and replacement of manhole cones (if necessary). The bypass system (pumps and piping) shall be monitored by Contractor personnel at all times, when the bypass operation is in effect.

The Contractor shall have all materials and equipment on site to immediately respond to any emergencies or other event that could impact the bypass system (i.e., leak in the discharge piping, pump failure, flooding, etc.). The Contractor shall have sufficient support staff and equipment to mobilize to repair and/or service any equipment within one (1) hour of notification, 24 hours a day, seven (7) days a week. In the event of an emergency, the Contractor shall provide an immediate response and fully cooperate with the Fayetteville Public Works Commission.

The Contractor shall install the bypass pumps, equipment, and discharge lines to minimize impacts to the property owners, residents, and environment. The Contractor shall be responsible for determining the best

location for the bypass equipment, to include, but not limited to, the need for any special provisions to ensure access for the customers, preventing the pumps and manholes from flooding, etc. Such special provisions include, but are not limited to: installation of ramps, excavation and burial of the bypass lines, temporary fencing, sandbagging, construction of berms, raising the pumps, etc. The Contractor bears all responsibility for the maintenance and restoration of any trenches, ramps, access, etc. necessary for the temporary bypass pumping operation.

The Contractor shall take appropriate steps to ensure that all pumps, piping and hoses that carry raw sewage are protected from traffic. The Contractor shall identify the proposed methods to protect the temporary bypass pumping system from traffic as part of the detailed temporary bypass pumping plan. Traffic control shall be performed in accordance with these Contract Documents.

The bypass pumping system shall be monitored by Contractor personnel at all times (24 hours a day, 7 days a week), when the bypass operation is in effect. The Contractor's personnel shall be on-site at all times (24 hours a day, 7 days a week), and stationed at the primary bypass pumps. Depending on the location and system set-up, it may be necessary for the Contractor to station personnel at each of the various bypass pump locations. Unless otherwise approved by the Fayetteville Public Works Commission, one (1) person cannot monitor multiple bypass pump locations. All bypass pumps, regardless of their location (primary or on secondary lines), shall be equipped with an automatic dialer (or other similar device). The Contractor personnel shall immediately respond to any issue regarding the temporary bypass pumping system. All temporary bypass piping shall be periodically monitored (patrolled from pumps to discharge), but no less frequently than once every 12 hours. The bypass pumping equipment shall be automated and capable of functioning without the assistance of an operator.

SUBMITTALS

All submittals shall be provided in accordance with these Contract Documents, and the requirements outlined herein. The Contractor shall submit a detailed bypass pumping plan to the Fayetteville Public Works Commission for approval, prior to initiating the bypass operation. The Contractor shall submit this information far enough in advance to allow sufficient time to complete the necessary coordination, including but not limited to obtaining permits (i.e., encroachments), getting permission from property owners to cross and/or utilize their property, and gaining any necessary regulatory approvals. Failure to submit a complete and comprehensive bypass pumping plan in a timely manner shall not be cause for any extension of the Contract Time.

The detailed temporary bypass pumping plan shall include the following information:

- Method of monitoring the pumps to ensure proper operation, to include method of notifying personnel (Fayetteville Public Works Commission and Contractor) in the event of an emergency, activation of back-up pumps, etc.
- Method of monitoring upstream system levels to ensure surcharging does not result in back-ups into buildings, overflows, etc.
- The amount, if any, of any required surcharging.
- Method to initiate back-up pumps.
- Map showing general location of the pumps and bypass lines. This shall include means to maintain access to driveways, etc.
- Measures to secure the bypass system (lines, pumps, etc.) from traffic, vandalism, high stream flows, etc.

- Method of plugging (and securing the plug(s)) and type of plugs.
- Size and location of manholes or other access points for suction and discharge piping.
- Size of pipeline(s) or conveyance system(s) to be bypassed.
- Number, size, material, location, and method of installation of suction piping.
- Number, size, material, location, and method of installation of discharge piping.
- Bypass pump sizes, capacities, and number of each size to be provided on-site, including all primary, secondary, and spare pumping units.
- Calculations of static lift, friction losses, minimum inlet submergence, and flow velocity (pump curves showing pump operating range shall be submitted). Calculations shall be signed and sealed by a licensed Professional Engineer registered in the State of North Carolina. Calculations shall be provided for both the peak flow rate and a normal daily rate (see PUMPING AND BYPASSING section for sizing requirements).
- Measures to protect discharge manhole(s) or structure(s) from erosion and damage due to the bypass operation.
- Erosion control measures.
- Emergency contact information for the personnel responsible for the pump operation.
- Emergency contact information for Contractor personnel to respond in the event of an emergency.
- List of available resources (equipment, materials, personnel) and contact information for emergency response.
- Method to contain potential releases of sewer flow from air release valves.
- Contingency plan for responding to potential sewer spills caused by weather, vandalism, acts of God, etc. The plan shall include communication protocols, available resources, and the steps to be taken in the event of an emergency.

No bypass operations shall proceed until all bypass submittals have been reviewed and approved by the Fayetteville Public Works Commission.

COORDINATION

The Contractor shall fully coordinate their temporary bypass pumping operations with the Fayetteville Public Works Commission. It is the Contractor's responsibility to fully determine the scope and location of the temporary bypass pumping system. As outlined in these Contract Documents, the Fayetteville Public Works Commission may provide assistance with the building and maintenance of access roads, clearing of easements, etc. All coordination (to include location of the pumps and discharge lines) shall be fully discussed and agreed to prior to commencement of bypass operations.

The Contractor shall schedule a coordination meeting with the Fayetteville Public Works Commission and other personnel (Contractor, bypass sub-contractor, etc.) a minimum of three (3) business days prior to starting the temporary bypass pumping system. The purpose of this coordination meeting is to ensure that the Contractor and their sub-contractors have a good understanding of the requirements and expectations of operating the temporary bypass pumping system, discuss contingency plans (to include protocols for emergency contacts), identify location(s) of pumps, verify necessary materials (repair sleeves, containment devices, etc.) are on-site and available, and any other items necessary to ensure that the Fayetteville Public Works Commission has confidence that the appropriate personnel can operate and maintain the temporary bypass pumping system. Should, for any reason, the Fayetteville Public Works Commission deem that the Contractor and/or their sub-contractor is not prepared to operate and maintain the temporary bypass pumping system, the temporary bypass pumping system shall not be started. The Contractor shall take all necessary steps to address any concerns to the satisfaction of the Fayetteville Public Works Commission. Upon

completion of those actions, another coordination meeting shall be held, in order for the Fayetteville Public Works Commission to confirm that the Contractor and their sub-contractor is prepared to operate and maintain the temporary bypass pumping system. This process will be repeated until the Fayetteville Public Works Commission is satisfied that the Contractor and their sub-contractor are prepared to operate and maintain the temporary bypass pumping system. No additional contract time will be granted for this delay.

The temporary bypass pumping system shall run for a minimum of 24 hours, or longer as deemed by the Fayetteville Public Works Commission, prior to any activity occurring (cleaning, closed circuit television {CCTV}, etc.) within the main(s) being bypassed.

FLOW CONTROL PRECAUTIONS

Where the raw sewage flow will be blocked during the Work as a result of the temporary bypass pumping operation, the Contractor shall take all necessary precautions to protect the public health. No septic conditions shall be allowed due to Contractor's operations. The sewer system (mains, manholes, laterals, etc.) shall also be protected from damage. The following occurrences shall not be allowed:

1. No sewage shall be allowed to back up into any homes or buildings.
2. No sewage shall overflow any manholes, cleanouts or any other access to the sewers.
3. Users upstream of the project area shall be able to use all their water and sewer utilities without interruption or limitations.

If any of the above occur or are expected to occur, the Contractor shall take immediate action to alleviate one or all of the conditions. Additionally, the Contractor is required to observe the conditions upstream of the plug and be prepared to immediately increase bypass pumping or release the flows, as required. Any damage claims resulting from the Contractor’s failure to properly maintain sewer flows shall be the Contractor's responsibility.

All sump pumps, bypass pumps, trash pumps or any other type pump which pulls sewage or any type of material out of the sanitary sewer system shall discharge into another sanitary sewer manhole, or appropriate vehicle or container acceptable to the Fayetteville Public Works Commission. Under no circumstances shall untreated sanitary sewer be discharged, stored or deposited on the ground, swale, road or open environment. The Contractor shall not allow any flow of sewage onto private property, streets, or into creeks and drainage systems. Damage due to negligence of the Contractor, including, but not limited to, flooded dwellings, damaged property, damaged driveways, etc., shall be corrected immediately by the Contractor at no additional cost to the Fayetteville Public Works Commission.

PLUGGING AND BLOCKING

In some applications, the wastewater flow may be plugged and contained within the capacity of the collection system. This shall only be done when it has been determined the system can accommodate the surcharging without any adverse impact. The Contractor has the sole responsibility for determining whether the system can accommodate surcharging. If this option is selected, the Contractor shall be responsible for continuously monitoring the system to ensure no sewer spills or overflows occur.

A sewer line plug shall be inserted into the line at a manhole upstream from the section being surveyed or repaired. The plug shall be so designed that all or any portion of the operation flows can be released. The Contractor shall secure the plug, to prevent it from being dislodged and moving downstream. Flows shall be bypassed for the initial CCTV inspection and shall be bypassed throughout the duration of the work, to

include the final CCTV inspection. Flows shall be bypassed in accordance with the approved temporary bypass pumping plan. Upon acceptance of the work by the Fayetteville Public Works Commission, the temporary bypass pumping system shall be removed and flows restored.

PUMPING AND BYPASSING

The Contractor, when and where required, shall divert sewer flows for the sewer pipe rehabilitation process, cleaning, television inspection, pipe repairs, manhole replacement and/or rehabilitation, obstruction removals, or other related as required to complete the Work. The pumps and bypass lines shall be of adequate capacity and size to handle and prevent backup or overflow for all flows.

The temporary bypass pumping system shall be designed to maintain the flows necessary to meet the requirements of each particular location. The temporary sewer bypass system shall have the capacity to handle the flows outlined in these Contract Documents. The temporary sewer bypass system shall be sized to handle 2.5 times the average daily flow rate, or the specified peak flow – whichever is greater.

The Contractor shall be responsible for furnishing the necessary labor and supervision to set up, operate, and maintain the temporary bypass pumping system. A "set up" consists of the necessary pumps, conduits and other equipment to divert the flow of sewage, from the start to finish of work performed. Each "set-up", regardless of location, shall have Contractor personnel on-site at all times (24 hours a day, 7 days a week) and stationed at the pumps, unless otherwise approved by the Fayetteville Public Works Commission. The temporary bypass pumping system shall include:

- A minimum of one (1) redundant pump so that the temporary bypass pumping system is capable of transmitting the peak flow with the largest duty pump out of service.
- Pumps shall be provided with a means of automatic control via level sensing. Systems requiring manual starting and/or stopping shall not be allowed.
- All equipment (primary and secondary pumps) shall be equipped in a manner to keep noise to a maximum of 65 dBA at 30 feet.
- An automatic dialer (or similar) to immediately notify (in a sequential operation) Contractor and Fayetteville Public Works Commission personnel in the event of equipment failure. The automatic dialer shall be set to issue notifications prior to flow level reaching critical elevations and having a spill occur. All bypass pumps (regardless of location) shall be equipped with an automatic dialer (or similar).

The temporary bypass pumping system shall be provided in such a way as to maintain access for businesses and residences. The Contractor shall be responsible for determining the best location for the bypass equipment, and the need for any special provisions to ensure access for the residents and businesses. Such special provisions include, but are not limited to: installation of ramps, excavation and burial of the bypass lines, etc. The Contractor shall use bridges over the bypass lines, temporary lines under driveways, alternate routes, or other means to accomplish this item. The bypass plan submittal shall indicate the means of maintaining access. The Contractor bears all responsibility for the maintenance of any trenches, ramps, etc. necessary for the bypass operation.

Pumps, equipment, and bypass lines shall be continuously (24 hours a day, 7 days a week) monitored by on site Contractor personnel capable of starting, stopping, refueling and maintaining these pumps during the Work. The temporary bypass pumping system shall be provided with an automatic dialer (or other similar device) that will immediately notify (in a sequential operation) the Contractor and the Fayetteville Public Works Commission in the event of equipment failure. All bypass pumps (regardless of location) shall be

equipped with an automatic dialer. This automatic dialer (or similar) shall be set to issue notifications prior to flow levels reaching critical elevations and having a spill occur.

The automatic dialer shall be set to issue notifications through a sequential operation. Automatic dialers that are not set up for sequential notifications shall not be acceptable. The Contractor's personnel shall be the first to receive any notifications from the automatic dialer. The automatic dialer shall only notify the PWC personnel after all Contractor notifications have been ignored and/or not responded to. The Contractor shall properly adjust the level at which the automatic dialer initiates notification to provide adequate time for the sequential notification to occur. If the PWC personnel are notified by the automatic dialer, the PWC personnel shall assume that a spill is occurring or is imminent, and respond accordingly. The Contractor shall be responsible for all costs for the PWC to mobilize and respond to the notification, regardless if a spill occurred or not.

In some applications, it may be necessary to surcharge the system in order to ensure proper pump operation. This shall only be done when it has been determined the system can accommodate the surcharging without any adverse impact. The Contractor has the sole responsibility for determining whether the system can accommodate surcharging. In the event surcharging is necessary, the Contractor shall be responsible for continuously monitoring the system to ensure no sewer spills occur.

All bypass piping shall successfully pass a hydrostatic test prior to bypassing the sewer flows. The hydrostatic test pressure shall be no less than the expected discharge pressures, and shall be held for a minimum of one (1) hour. All testing shall be observed by the Fayetteville Public Works Commission. Testing shall be coordinated with the Fayetteville Public Works Commission a minimum of 24 hours in advance.

SPILL RESPONSE

The Contractor shall not discharge or pump any sewage, solids, or debris on the ground, streets, storm water system, ditches, or streams. Any sewage spills shall be immediately reported to the Fayetteville Public Works Commission Water Resources Construction Department, (910) 223-4716. After normal business hours, the Contractor shall contact the Fayetteville Public Works Commission Dispatch Center, (910) 678-7400 or (910) 323-0178. The Contractor shall take complete responsibility for all costs related to the clean-up of the spill, including any fines issued by the North Carolina Department of Environmental Quality (NC DEQ).

In the event that raw sewage (in any quantity) is spilled, discharged, leaked or otherwise deposited in the open environment, due to the Contractor's work, the Contractor is responsible for any cleanup of solids and disinfection of the area affected. This work will be performed at the Contractor's expense with no additional cost to the Fayetteville Public Works Commission. The Contractor is also responsible for complying with any and all regulatory requirements in regards to the size spill with no additional cost to the Fayetteville Public Works Commission. The Contractor shall cooperate fully with the Fayetteville Public Works Commission and the applicable State agencies in responding to and cleaning up the spill. Any work completed by the Fayetteville Public Works Commission in responding to a spill caused by the Contractor's operations shall be billed to the Contractor.

Where sewage has backed up into a property due to any aspect of the Contractor's operation, the Contractor shall immediately notify the Fayetteville Public Works Commission, inspect the property with the Fayetteville Public Works Commission and agree on remedial measures. The Contractor shall be responsible for all cleaning, repair and/or replacement of damaged property, temporary relocation of all occupants of the affected properties, if required, all to the satisfaction of the property owner. These actions shall be undertaken

immediately upon learning of the backup. Cleaning shall be performed by firms specializing in this type of work. All costs associated with the cleaning, repair, replacement of damages, occupant accommodations, insurance and spill remediation shall be borne by the Contractor. All remediation measures required as part of a spill response are part of acceptance of the project, and final payment shall not be made until such time all required measures are addressed and approved by the appropriate regulatory agency.

*** END OF SECTION ***

DIVISION 2
SITE WORK

02753 SUBMERSIBLE PUMP LIFT STATION

GENERAL

This section includes all pumps, piping; fittings, valves, structures and other appurtenances that form an integral part of a submersible pump lift station. All work shall be accomplished in a neat, workmanlike manner meeting the requirements of the City of Fayetteville Public Works Commission. PWC shall be supplied with shop drawings of all equipment and materials for approval prior to installation. The Contractor shall supply six (6) sets of O & M Manuals, for the lift station, including support literature, shop drawings and O & M instructions before final approval and acceptance of the operational station. The lift station start up shall be performed by a qualified factory representative capable of supervising PWC's personnel in proper operation and maintenance.

SUBMITTALS

Prior to fabrication, pump station equipment suppliers shall submit six (6) copies of submittal data for review and approval by PWC. Submittal shall include shop drawings, electrical ladder logic drawings, and support data as follows: Catalog cut sheets reflecting characteristics for major items of equipment, materials of construction, major dimensions, motor data, pump characteristic curves showing the design duty point capacity (GPM), head (FT), and hydraulic brake horsepower (BHP). Electrical components used in the motor and liquid level control shall be fully described. The electrical ladder logic drawings shall illustrate motor and liquid level control circuits to the extent necessary to validate function and integration of circuits to form a complete working system. Shop drawings for pre-engineered stations shall provide layout of mechanical equipment and contractor piping connections.

SUBMERSIBLE PUMPS

The pumps shall be non-clog, explosion proof, submersible units capable of passing a three-inch (3”) sphere. Pumps shall be specifically designed to handle raw, unscreened sanitary sewage and shall be selected to perform under following operating conditions:

Pump Performance	
Target Operating Point	gpm @ ft.
Maximum Pump Speed	RPM
Minimum Pump Efficiency	%

Pump discharge diameter shall be as noted on the plan drawings.

The pump shall be provided with an oil-filled cast iron, watertight enclosure sealed with O-rings. Heat sensors shall be attached to the windings and shall be wired for auto-shut off. The pump motor shall be provided with tandem seal arrangements incorporating two completely separate seals. Each seal shall be held in contact by its own spring system. The seal faces shall be tungsten carbide. The mechanical seal chamber shall be oil filled and equipped with a moisture detection device. The pump shall rotate on a minimum of two bearings permanently lubricated but capable of being re-greased, suitable for a minimum L10 bearing life of 40,000 hours.

All areas of the pump casing and volute, which are exposed to sewage, shall be constructed of cast iron meeting the requirements of ASTM A-48, Class 30.

The pumps shall be provided a rigid discharge base-elbow to support the total weight of the pumping unit. The base shall be bolted directly to the wet well floor with a 90° elbow having a 125-pound ANSI flange discharging vertically.

Pumps shall be Meyers or Fairbanks Morse.

IMPELLER

The impeller shall be two vane one piece, single suction, enclosed, non-clog, and ductile iron. The impeller shall be of a radial flow design with well-rounded leading vane edges and thick hydrofoil shape with large openings. The impeller shall be balanced and secured to a straight fit on the shaft by means of a key and fastener. The impeller waterways and clearance between the impeller periphery and volute cutwater shall be capable of passing a 3-inch sphere. The impeller is to be matched to a constant velocity equalizing pressure volute.

MOTORS

Each submersible solids handling pump shall be driven by a completely sealed, electric submersible squirrel cage induction motor with the following characteristics:

Motor Performance	
Horsepower	
Service Factor	
RPM	
Voltage / Phase	

The motor nameplate horsepower rating shall not exceed the brake horsepower requirements of the specified head and capacity conditions. The motor shall be UL listed for Class 1, Division 1, Group C and D explosion-proof hazardous locations. The windings and leads shall be insulated with moisture-resistant Class F insulation and shall be designed along with the motor, for

continuous duty. The motor shaft shall be one piece 416 stainless steel along with all appurtenant hardware. The rotor shall be dynamically balanced to meet NEMA vibration limits. Heavy duty lifting lugs shall be cast into the motor housing and shall be of adequate strength to lift the entire pump and motor assembly.

AUTOMATIC PUMP CONTROLS

1. General Requirements
    a. Refer to Chapter 9, Specification Section 13446 – Remote Telemetry, Lift Stations of PWC's Permit Design Manual for additional requirements.
    b. Refer to Chapter 9, Specification Section 16231 – Emergency Power Systems of PWC's Permit Design Manual for additional requirements.
    c. Refer to Chapter 9, Specification Section 16010 - Electrical of PWC's Permit Design Manual for additional requirements.
    d. Refer to applicable detail drawings contained within PWC's Permit Design Manual for additional requirements.
2. Functional Requirements
    a. The pump control panel shall be provided with an alarm horn, a remote mounted alarm light, and an alarm silence pushbutton. Remote Pump Control Panel Alarm Horn Disable/Enable contacts shall be provided from the RTU to control alarm horn actuation. The pump control panel shall annunciate all alarm and failure conditions on the inside dead front mounting panel. Only the High Wetwell Level Alarm shall cause the alarm horn and remote mounted alarm light to annunciate.
    b. Each pump shall be provided with a HAND-OFF-AUTO switch on the pump control panel. The pumps shall not run in the OFF position and run in HAND position. In AUTO position, the pumps shall operate as follows:
        i. On rising liquid level in the wetwell, a float switch shall start the lead pump. As the liquid level continues to rise, the second float switch shall start the lag pump. The pump(s) will continue to operate until the liquid level recedes to the level of a third float switch which shall stop all pumps. A fourth float switch shall actuate the high level alarm within the pump control panel, should the liquid level rise above the lag pump cut-on elevation. A fifth float switch shall be routed through the pump control panel to the RTU and shall actuate at the same level that the pump control panel's high level alarm float switch actuates.
        ii. The pumps shall automatically alternate between the lead and lag starts by means of an alternator relay in the pump control panel.
        iii. Remote RTU Control Enable and Start/Stop Command contacts shall be provided for each pump. When enabled, the RTU shall provide remote pump control of each pump

and override any automatic control functions excluding safety and equipment protection interlocks.

iv. On a restoration of power after loss event a timer(s) shall prevent simultaneous starting of pumps.

3. Pump Control Panel

a. A Pump Control Panel for each lift station shall be shipped to the site, completely pre-wired, pre-assembled and ready for service. The control panel enclosure shall be NEMA-4X stainless steel with a continuous hinged and pad-lockable door. The enclosure shall have a back mounting panel and a front inside hinged panel to make the control panel "dead-front" when outside door is open. The panel shall be UL508A and NEC 409 labeled and shall include the following as a minimum:

i. Multi-colored wires (or equivalent marking) shall be provided to facilitate trouble shooting. Refer to Division 16 – Electrical for wire color standards.

ii. Motor control shall be provided by a full voltage non-reversing (FVNR), reduced voltage auto-transformer (RVAT), or reduced voltage solid state starter (RVSS). Reduced voltage starters shall be capable of starting the motor under all expected load conditions. RVSS starters shall include a bypass contact in case of electronics failure. A combination type starter shall be provided for each pump motor, labeled "PUMP 1", "PUMP 2", etc. The starter for each motor shall be provided with under-voltage release and quick-trip ambient-compensated overload protection for each leg. Starter shall be Cutler-Hammer, Allen-Bradley, Square D, GE, or Siemens.

iii. Phase monitoring capability which shall override and stop the normal operation of the pumps.

iv. Automatic pump alternator relay as manufactured by TimeMark or equal.

v. Individual timers (0-999 sec.) for each pump to prevent pumps from starting at the same time on restoration of power after loss of power.

vi. A NEMA 3R transformer with a minimum rating of 3 KVA shall be provided mounted to the exterior of the pump control panel for supplying 120/240 VAC single phase loads. The transformer shall be provided with a secondary circuit breaker within the pump control panel. Branch circuit breakers shall be provided within the pump control panel for the follow loads as a minimum:

a) Pump controls

b) GFCI receptacle mounted on equipment rack (20A CB).

c) RTU control panel (15A CB)

d) Generator controls / battery charger

e) Generator heater

f) Spare 20A circuit breaker (800 watt minimum)

vii. The following controls shall be mounted on the exterior of the pump control panel:

a) Power Available white indicator light

b) NEMA 4X Alarm horn with adjustable volume. Alarm horn shall be by Edwards, Federal Signal, or equal.

viii. The following controls shall be mounted on the front inside panel of the pump control panel:

a) Hand-Off-Auto selector switch for each pump

b) Pump Running red indicator light for each pump

c) Pump Running Hours elapsed time meter for each pump. Meters shall be 6 digits with rear mounted reset.

d) Pump Motor Overload Alarm amber indicator light for each pump

e) Pump Motor High Temp Alarm amber indicator light for each pump

f) Moisture Intrusion Alarm amber indicator light for each pump (submersible pumps only)

g) High Wetwell Level Alarm amber indicator light

h) Loss of Phase Alarm amber indicator light

ix. The control panel shall have dry contact relay outputs to connect to the SCADA System RTU Panel. The outputs shall be as follows:

a) All pump off level

b) Lead pump on level

c) Lag pump on level

d) High level alarm

e) Loss of phase

f) Generator running

g) Pump 1 running

h) Pump 1 common failure

i) Pump 2 running

j) Pump 2 common failure

k) Pump 1 in auto

l) Pump 2 in auto

m) Refer to Specification 13446 Remote Telemetry, Lift Stations for signal interface requirements Pages 17 - 18), and Remote Telemetry Unit (RTU) Control Panel Construction Drawing (Sheet 4 of 4).

x. The pump control panel shall accept dry contacts (control inputs) from the SCADA System RTU. Refer to Specification 13446 Remote Telemetry, Lift Stations for signal interface requirements (Page 18), and Remote Telemetry Unit (RTU) Control Panel Construction Drawing (Sheet 4 of 4). The inputs shall be as follows:

a) Pump 1 start/stop command

b) Pump 1 RTU control enable

c) Pump 2 start/stop command

d) Pump 2 RTU control enable

e) Pump Control Panel alarm horn disable/enable

f) Spare

xi. All necessary internal wiring separation, relays, intrinsic safety barriers, etc. to provide an intrinsically safe operation for a Class I Division 1 Hazardous Area wetwell shall be provided. All signals provided to the RTU through the pump control panel from a hazardous area shall be provided with barriers eliminating the requirement for intrinsically safe wiring of that signal.

4. Standby Power Source: The generation unit and transfer switch shall provide control interface signals to the pump control panel and remote telemetry unit as specified therein.

a. Refer to Chapter 9, Specification Section 13446 – Remote Telemetry, Lift Stations of PWC's Permit Design Manual for additional requirements.

b. Refer to Chapter 9, Specification Section 16231 – Emergency Power Systems of PWC's Permit Design Manual for additional requirements.

c. Refer to Chapter 9, Specification Section 16010 - Electrical of PWC's Permit Design Manual for additional requirements.

d. Refer to applicable detail drawings contained within PWC's Permit Design Manual for additional requirements.

5. Appurtenances

a. Float switches shall be of the mercury-tube type, encapsulated in polyurethane or vinyl floats. The units shall be waterproof, shockproof, explosion-proof and equipped with

sufficient UV resistant submersible cable to extend to the control panel from the wetwell without splicing. Float switches shall be suspended in the wetwell on a suitable rack or rail of stainless steel construction. The float switch rack shall be easily accessible from outside the wetwell to eliminate "Confined Space" entry requirements for operation personnel. Float switches shall be unaffected by flows, etc., entering the wetwell. Any required weights shall be provided. Two sets of four (4) float switches shall be provided for duplex stations and two sets of five (5) provided for triplex stations. An additional High Level Alarm float connected to the RTU will be provided for a total of nine (9) or eleven (11) installed for duplex and triplex stations respectively. Each set shall be suspended separately in the wetwell, so that removal of either does not affect the operation of the other set. Both sets of float switches shall have their cables routed to the pump control panel and connected to terminals within the panel. The pump control panel will include a manual selector switch to allow alternation between the "primary" and "backup" sets of float switches. Each set of float switches shall provide for the following signals as a minimum:

i. All Pump Stop Level (provide two - Primary / Backup)

ii. Lead Pump Start Level (provide two - Primary / Backup)

iii. Lag Pump Start Level (provide two - Primary / Backup)

iv. Lag-Lag Pump Start Level – Triplex Stations only (provide two - Primary / Backup)

v. Pump Control Panel High Level Alarm (provide two - Primary / Backup)

vi. RTU High Level Alarm (One only)

Float switches provided shall be Meyers, Anchor Scientific (Roto-Float) or Conery (Model 2900).

b. A stainless steel equipment rack shall be provided to mount the electrical panels (e.g. meter base, main service disconnect, pump control panel, remote telemetry panel, etc.). The rack shall include a sun/rain shield and a concrete personnel pad. The pump control panel remote alarm light shall be mounted on the sun/rain shield at a location approved by PWC. The alarm light shall be a NEMA 4X red strobe light as manufactured by Edwards, Federal Signal, or equal. Refer to the detail drawings provided within PWC's *Permit Design Manual* for additional requirements.

c. The lift station site shall be provided with area lighting. The lighting shall meet the requirements of the local power company and should be sited as shown on the drawings.

PUMP REMOVAL / REPLACEMENT SYSTEM

The pump assembly shall be provided with a guide "rail" system to permit ease of installation and removal. The system shall consist of two - 2-inch diameter continuous stainless steel guide rail pipes and appropriate sized stainless steel cables. The guide rails shall align the pump with the discharge elbow as it is lowered into place. A rail guide bracket shall be used to support and align the rails at the top of the sump.

The pump shall be raised and lowered into position by a telescopic hoist assembly. The telescopic hoist shall extend a minimum of five-feet above the wet well access hatch when in the upright position and shall be secured by a pin-lock device. The hoist shall be located in a manner that permits the removal of either pump and shall allow full three hundred sixty degree rotation for direct loading into a service vehicle. The hoist shall be located on the wet well's slab, or located on its own foundation, provided the requirements of this specification are met. The hoist shall have a rated capacity of not less than 1,600 pounds. The stainless steel lifting cables shall be arranged to allow connection to the hoist for pump installation or removal.

VALVES AND PIPING

1. Ductile Iron Pipe and Fittings

   All piping in the lift station wetwell and valve vault shall be ductile iron, Class 53, AWWA/ANSI C115/A21.15. Flanges shall be Class 125, ANSI B16.1. Piping interior surfaces shall be coated with ceramic epoxy lining as specified in Section 09802 "Special Coatings – Ceramic". Exterior piping surfaces shall be shop primed. All flange gaskets shall be 1/8-inch full-face serrated rubber material.

2. Gate Valves

   Each pump shall be equipped with a resilient wedge gate valve to allow both pumps to be isolated from the force main. Valve shall pass 3" spherical solids. Gate valves shall be ductile iron body resilient wedge type rated for 250 psig working pressure gate valves and shall conform to AWWA C-515 and NSF 61. Valve body shall have flanged end connections drilled to 125 pound standard. Valves for aboveground use or installed inside vaults shall be NRS design with handwheel. Valves shall open by turning in a counterclockwise direction. The handwheel shall have an arrow cut in the metal, indicating the direction of opening. Valves shall have a clear waterway equal to the full nominal diameter of the valve. All valves shall be tested for leakage and distortion in strict accordance with the latest revision of AWWA Specification C-500. All gate valves shall be manufactured in strict accordance with the latest specifications of the AWWA. Valves shall be manufactured by: Mueller Company, Clow Corporation, American Darling Company, or approved equal. Certification shall be furnished to PWC by the manufacturer that all valves meet project specifications. Where specified on plans, resilient valves shall be supplied with gearing. Valves installed in a vertical position shall have spur gearing and bevel gearing for valves installed in a horizontal position.

Valve boxes shall be installed as specified in SECTION 02660, WATER DISTRIBUTION.

3. Check Valves

Each pump shall be equipped with a full flow type check valve with flanged ends and fitted with an external lever and spring. Each valve shall be capable of passing a 3" spherical solid. Valve clapper shall be cast iron, and shall swing completely clear of waterway when valve is full open. The seating shall be by a resilient field replaceable ring on the valve disc contacting a bronze or stainless seat ring in the valve body. Hinge pin shall be of 18 8 stainless steel construction and shall be utilized with bronze bushings and packing type seal. Valves shall be equipped with removable cover plate to permit entry or for complete removal of internal components without removing the valve from the line. Valve ends for use in above-ground or vault installations shall be flanged end connections drilled to 125 pound standard. Valve shall be rated at 175 psi water working pressure, 350 psi hydrostatic test pressure. Valves other than full flow type or valves mounted in such a manner that prevents the passage of a 3" spherical solid shall not be acceptable.

4. By-Pass Pumping Valves and Piping

All Lift Stations shall have a By-Pass Pumping Assembly incorporated into the force main piping downstream from valve vaults or common header piping. By-Pass Pumping Assemblies shall be installed according to plan drawings and details with materials as specified in SECTION 02732, SEWAGE FORCE MAINS. Valve boxes shall be installed as specified in SECTION 02660, WATER DISTRIBUTION.

WET WELL/VALVE VAULT

The wet well and valve pit structures shall be precast concrete sections with a coal tar epoxy interior coating. The structures shall be manufactured and installed in accordance with ASTM C-890, ASTM C-891, ASTM C-913 and ASTM C-478. Joints between precast sections shall be sealed with one-inch diameter butyl rubber sealant conforming to SS-S-00210-A and AASHTO-198. Flexible rubber pipe wall penetrations and/or connections shall be in accordance with ASTM C-923. The wet well shall be watertight. The wet well base shall be manufactured specifically for direct mounting to an open top manhole and shall be provided with all mounting hardware and anchor bolts.

The minimum wet well diameter shall be six (6) feet, and the minimum valve vault shall be five (5) feet.

Access hatches shall be provided as shown on the drawings. Hatches shall be 3/16-inch aluminum checker plate with a stainless steel hardware frame. The frame shall be 1/4-inch thick

aluminum reinforcement cast into the concrete top. The hatch shall be designed for H-2O loading and shall provide for a latch with locking device.

The cable junction box shall be provided in an NEMA 3 or NEMA 4 enclosure mounted outside of the wet well.

SITE LIGHTING

The lift station site shall be provided with area lighting. The lighting shall meet the requirements of the local power company and should be sited as shown on the drawings.

SITE FENCING

The lift station site shall be fenced as shown on the drawings. Fencing shall be installed as specified in SECTION 02831, CHAIN LINK FENCING.

SITE ACCESS

Site access to the lift station shall be provided by a gravel access drive/parking area. The drive shall be a minimum of 10-feet wide and shall be oriented as shown on the plans. It shall consist of a minimum of 6 inches compacted ABC stone base. The drive shall be graded to drain and shall be installed in such a way as to minimize the runoff and erosion potential. Parking area shall be of sufficient size for a vactor truck to turn around during wet well cleaning.

WATER SERVICE

Each lift station site shall be provided with a source of water for routine maintenance purposes. If possible, a fire hydrant shall be located adjacent to the lift station site to facilitate filling of the wet well during lift station start up.

A one (1) inch water service with a standard PWC meter box, a reduced pressure backflow preventer, and a yard hydrant shall be installed at each lift station. The meter shall be installed inside the easement or right-of-way, in accordance with PWC standards. The meter box shall be in accordance with PWC standards. The reduced pressure backflow preventer shall be installed within 100’ of the tap on the main and inside the lift station fencing unless the distance exceeds 100’. A non-freeze 1" yard hydrant shall be provided, located as shown on the approved site plan. The yard hydrant shall be installed in accordance with the Yard Hydrant standard detail.

INSTALLATION

Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Immediately after off-loading, contractor shall inspect pumps and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all equipment serial numbers and parts lists with shipping documentation. Notify the appropriate manufacturer's representative of any unacceptable conditions noted with shipper.

Install, level, align, and lubricate pumps and all related equipment as required by the manufacturer. Equipment installation shall be in accordance with written instructions supplied by the respective manufacturer.

FIELD QUALITY CONTROL

Prior to acceptance by PWC, an operational test of all pumps, drives, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition; and conforms to the specified operating characteristics.

After construction debris and foreign material has been removed from the wet well, the contractor shall supply clear water volume adequate to operate station through several pumping cycles. Observe and record operation of pumps, discharge gage readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment, test manual control devices, and automatic control systems. Be alert to any undue noise, vibration or other operational problems.

The Contractor shall co-ordinate station start-up with pump manufacturers technical representative. The representative or factory service technician shall inspect the completed installation and calibrate and adjust instrumentation, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures.

OPERATION AND MAINTENANCE MANUALS

Installation shall be in accordance with written instructions provided by the pump equipment supplier. Comprehensive instructions supplied at time of shipment shall enable personnel to properly operate and maintain all equipment supplied. Content and instructions shall assume operating personnel are familiar with pumps, motors, piping and valves, but lack experience on exact equipment supplied.

Documentation shall be specific to the pump station and collated in functional sections. Each section shall combine to form a complete system manual covering all aspects of equipment supplied. Support data for all equipment supplied shall be provided by those supplying the equipment, and included into the O&M manual. Instructions shall include the following as a minimum:

a. Functional description of each major component, complete with operating instructions.
b. Instructions for operating pumps and pump controls in all modes of operation.
c. Calibration and adjustment of equipment for initial start-up, replacement of level control components, or as required for routine maintenance.
d. Support data for all components shall be incorporated into the O&M Manual.
e. As-built electrical schematic diagram of the pump station circuits shall illustrate pump motor branch, control and alarm system circuits including interconnections. Wire numbers and legend symbols shall be shown. Schematic diagrams for individual components, not normally repairable by the station operator, need not be included. Partial schematics, block diagrams, and simplified schematics shall not be provided in lieu of an overall system diagram.
f. As-built mechanical layout drawing of the pump station and components, prepared in accordance with good commercial practice, shall provide installation dimensions and location of all pumps, motors, valves and piping.

QUALITY ASSURANCE

Upon request from PWC, pre-engineered pump station suppliers shall prove financial stability and ability to produce the pump system within the specified delivery schedules. Evidence of facilities, equipment and expertise shall demonstrate the manufacturer's commitment to long-term customer service and product support.

MANUFACTURER'S WARRANTY

The contractor shall warrant all equipment to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below.

All equipment, apparatus, and parts furnished shall be warranted for one (1) year, excepting only those items that are normally consumed in service, such as light bulbs, oils, grease, packing, gaskets, O-rings, etc. The pump manufacturer shall be solely responsible for warranty of the

pumps and all related equipment. The pump shaft seal shall be warranted for a minimum of four (4) years from date of shipment. Should the seal fail within the first year, the manufacturer shall furnish a new seal, without charge to owner, F.O.B. factory. The warranty replacement cost for seals after the first year will be pro-rated as follows:

Failure Within	Percent New Price
2 years	25%
3 years	50%
4 years	75%

Components failing to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer without cost of parts or labor to the owner.

DIVISION 2
SITE WORK

02754 SELF-PRIMING LIFT STATION

GENERAL

This section includes all pumps, piping, fittings, valves, structures, and other appurtenances that form an integral part of a duplex self-priming sewage lift station. All work shall be accomplished in a neat, workmanlike manner meeting the requirements of the City of Fayetteville Public Works Commission. PWC shall be supplied with shop drawings of all equipment and materials for approval prior to installation. The Contractor shall supply six (6) sets of O&M Manuals for the lift station, including support literature, shop drawings, and O&M instructions before final approval and acceptance of the operational station. The lift station start up shall be performed by a qualified factory representative capable of supervising the Owner's personnel in proper operation and maintenance.

The Contractor shall furnish and install a base mounted, automatic pump system. The pump system shall be complete with all equipment specified herein; including factory assembled pumps mounted on individual pump bases. Pre-engineered modular pump stations shall be submitted to the Owner for approval prior to bidding. Principal items of equipment shall include two horizontal, self-priming, centrifugal sewage pumps, v-belt drives, motors, two swing check valves, two resilient wedge gate valves, pump motor control panel, and an automatic liquid level control system. The Contractor shall be responsible for providing and installing the automatic pump control system, telemetry, emergency generator and associated automatic transfer switch according to Owner's specifications.

SUBMITTALS

Prior to fabrication, pump station supplier shall submit six (6) copies of submittal data for review and approval by the Owner. Submittal shall include shop drawings, electrical ladder logic drawings, and support data as follows: Catalog cut sheets reflecting characteristics for major items of equipment, materials of construction, major dimensions, motor and v-belt drive data, pump characteristic curves showing the design duty point capacity (GPM), head (FT), net positive suction head required (NPSHr), and hydraulic brake horsepower (BHP). Electrical components used in the motor and liquid level control shall be fully described. The electrical ladder logic drawings shall illustrate motor and liquid level control circuits to the extent necessary to validate function and integration of circuits to form a complete working system. Shop drawings for pre-engineered stations shall provide layout of mechanical equipment and contractor piping connections.

SELF- PRIMING SEWAGE PUMPS

Pumps shall be horizontal, self-priming centrifugal type, designed specifically for handling raw, unscreened, domestic sanitary sewage and shall be capable of passing a three-inch (3") sphere. The manufacturer of the pumps shall have a quality management system in place and shall be ISO 9001 certified. Each pump shall be selected to perform under following operating conditions:

Pump Performance	
Pump Capacity (GPM)	
Motor Size (HP)	
Total Dynamic Head (FT)	
Available NPSH (FT)	
Max. Re-priming Lift (FT)	

Pumps shall be Gorman-Rupp or Pioneer. Pump motors shall be set for a 3 phase, 60 hertz, 240 volt electrical service.

REPRIME PERFORMANCE

Consideration shall be given to the sanitary sewage service anticipated, in which debris is expected to lodge between the primary check valve and its seat, resulting in the loss of the pump suction leg, and siphoning of liquid from the pump casing to the approximate center line of the impeller. Such occurrence shall be considered normal, and the pump must be capable of automatic, unattended operation with an air release line installed. During unattended operation, the pump shall retain adequate liquid in the casing to insure automatic re-priming while operating at its rated speed in a completely open system. The need for a suction check valve or external priming device shall not be required.

Pumps must re-prime __ vertical feet at the required speed and impeller diameter. Re-prime lift is defined as the static height of the pump suction above the liquid, while operating with only one-half of the liquid remaining in the pump casing. The pump must re-prime and deliver full capacity within five minutes after the pump is energized in the re-prime condition. Re-prime performance must be confirmed with the following test set-up:

a. A check valve shall be installed down stream from the pump discharge flange. The check valve size shall be equal (or greater than) the pump discharge diameter.
b. A length of air release pipe shall be installed between the pump and the discharge check valve. This line shall be open to atmosphere at all times duplicating the air displacement rate anticipated at a typical pump station fitted with an air release valve.
c. No restrictions in the pump or suction piping will prevent the siphon drop of the suction leg. Suction pipe configuration for re-prime test shall incorporate a 2 feet minimum horizontal run, a 90 degree elbow and vertical run at the specified lift. Pipe size shall be equal to the pump suction diameter.

d. Impeller clearances shall be set as recommended in the pump service manual.
e. Repeatability of performance shall be demonstrated by testing five consecutive re-prime cycles. Full pump capacity (flow) shall be achieved within five minutes during each cycle.
f. Liquid to be used for re-prime test shall be water.

Upon request from PWC, certified re-prime performance test results, prepared by the manufacturer, and certified by a registered professional engineer, shall be submitted for approval prior to shipment.

PUMP CASING

Casing shall be cast iron Class 30 with integral volute scroll. Casing shall incorporate the following features:

a. Mounting feet sized to prevent tipping or binding when pump is completely disassembled for maintenance.
b. Fill port cover plate, 3 1/2" diameter, shall be opened after loosening a hand nut/clamp bar assembly. In consideration for safety, hand nut threads must provide a slow release of pressure, and the clamp bar shall be retained by detente lugs. A Teflon gasket or viton o-ring shall prevent adhesion of the fill port cover to the casing.
c. Casing drain plug shall be at least 1 1/4" NPT to insure complete and rapid draining.
d. Liquid volume and recirculation port design shall be consistent with performance criteria listed above.

COVERPLATE

Cover plate shall be cast iron Class 30. Design must incorporate following maintenance features:

a. Retained by hand nuts for complete access to pump interior. Cover plate removal must provide ample clearance for removal of stoppages, and allow service of the impeller, seal or wear plate without removing suction or discharge piping.
b. A replaceable wear plate secured to the cover plate by weld studs and nuts shall be AISI 1015 HRS.
c. In consideration for safety, a pressure relief valve shall be supplied in the cover plate. Relief valve shall open at 75-200 PSI.
d. O-ring of Buna-N material shall seal cover plate to pump casing.

ROTATING ASSEMBLY

A rotating assembly, which includes impeller, shaft, mechanical shaft seal, lip seals, bearings, seal plate and bearing housing must be removable as a single unit without disturbing the pump casing or piping. Design shall incorporate following features:

a. Bearing housing shall be cast iron Class 30. Separate oil filled cavities, vented to atmosphere, shall be provided for shaft seal and bearings. Cavities must be cooled by the liquid pumped and lip seals will prevent leakage of oil. The bearing cavity shall have an oil level sight gauge and fill plug check valve. The check valve shall vent the cavity but prevent introduction of moist air to the bearings.
b. Impeller shall be austempered ductile iron, two-vane, semi-open, non-clog, with integral pump out vanes on the back shroud. Impeller shall thread onto the pump shaft and be secured with a lock screw and conical washer. All internal passages and impeller vanes shall pass a 3" spherical solid. Smaller internal passages shall not be permitted.
c. Shaft shall be AISI 17-4 pH stainless steel.
d. Bearings shall be anti-friction ball or tapered roller type of proper size and designed to withstand all radial and thrust loads expected during normal operation. Bearings shall be oil lubricated from a dedicated reservoir. Pump designs, which use the same oil to lubricate the bearings and shaft seal, shall not be acceptable.
e. At a minimum, shaft seal shall be oil lubricated mechanical single-type with silicone carbide faces. For double-type seals the stationary and rotating seal faces shall be silicone carbide or tungsten titanium carbide alloy. Each mating surface shall be lapped to one-half light band flatness (5.8 millionths of an inch), as measured by an optical flat under monochromatic light. The stationary seal seat shall be double floating by virtue of a dual O-ring design; an external O-ring secures the stationary seat to the seal plate, and an internal O-ring holds the faces in alignment during periods of mechanical or hydraulic shock (loads which cause shaft deflection, vibration, and axial/radial movement). Elastomers shall be viton. Cage and spring to be AISI 316 stainless steel. Seal shall be oil lubricated from a dedicated reservoir. Seal shall be warranted in accordance with requirements listed under Manufacturer’s Warranty of this specification.
f. Adjustment of the impeller face clearance (distance between impeller and wear plate) shall be accomplished by external means. Stainless steel adjusting shims shall be used to move the entire rotating assembly as a unit when adjusting the working clearances. Clearance adjustment which requires movement of the shaft only, thereby adversely affecting seal working length or impeller back clearance, shall not be acceptable.
g. Spool flanges shall be one-piece cast iron, class 30 fitted to suction and/or discharge ports. Each spool shall have one 1-1/4" NPT and one 1/4" NPT tapped hole with pipe plugs for mounting gauges or other equipment.

MOTORS AND DRIVE UNIT

Pump motors shall be __ HP, horizontal ODP, ____ RPM, NEMA design B with cast iron frame with copper windings, induction type, with normal starting torque and low starting current characteristics, suitable for continuous service.

Power to pumps shall be transmitted by V-belt drive assemblies. The sheave/belt combination shall provide the speed ratio needed to achieve the specified pump operating conditions. Each drive assembly shall utilize at least two V-belts providing minimum a combined safety factor of 1.5. Single belt drives or systems with a safety factor of less than 1.5 are not acceptable. Computation of safety factors shall be based on performance data published by the drive manufacturer. Pump drives shall be enclosed on all sides by a guard constructed of fabricated steel or combination of materials including expanded, perforated, or solid sheet metal. No opening to a rotating member shall exceed 1/2 inch. Guards must be completely removable without interference from any unit component, and shall be securely fastened and braced to the unit base.

AUTOMATIC PUMP CONTROLS

1. General Requirements
    a. Refer to Chapter 9, Specification Section 13446 – Remote Telemetry, Lift Stations of PWC's Permit Design Manual for additional requirements.
    b. Refer to Chapter 9, Specification Section 16231 – Emergency Power Systems of PWC's Permit Design Manual for additional requirements.
    c. Refer to Chapter 9, Specification Section 16010 - Electrical of PWC's Permit Design Manual for additional requirements.
    d. Refer to applicable detail drawings contained within PWC's Permit Design Manual for additional requirements.
2. Functional Requirements
    a. The pump control panel shall be provided with an alarm horn, a remote mounted alarm light, and an alarm silence pushbutton. Remote Pump Control Panel Alarm Horn Disable/Enable contacts shall be provided from the RTU to control alarm horn actuation. The pump control panel shall annunciate all alarm and failure conditions on the inside dead front mounting panel. Only the High Wetwell Level Alarm shall cause the alarm horn and remote mounted alarm light to annunciate.
    b. Each pump shall be provided with a HAND-OFF-AUTO switch on the pump control panel. The pumps shall not run in the OFF position and run in HAND position. In AUTO position, the pumps shall operate as follows:
        i. On rising liquid level in the wetwell, a float switch shall start the lead pump. As the liquid level continues to rise, the second float switch shall start the lag pump. The pump(s) will continue to operate until the liquid level recedes to the level of a third

float switch which shall stop all pumps. A fourth float switch shall actuate the high level alarm within the pump control panel, should the liquid level rise above the lag pump cut-on elevation. A fifth float switch shall be routed through the pump control panel to the RTU and shall actuate at the same level that the pump control panel's high level alarm float switch actuates.

ii. The pumps shall automatically alternate between the lead and lag starts by means of an alternator relay in the pump control panel.

iii. Remote RTU Control Enable and Start/Stop Command contacts shall be provided for each pump. When enabled, the RTU shall provide remote pump control of each pump and override any automatic control functions excluding safety and equipment protection interlocks.

iv. On a restoration of power after loss event a timer(s) shall prevent simultaneous starting of pumps.

3. Pump Control Panel

a. A Pump Control Panel for each lift station shall be shipped to the site, completely pre-wired, pre-assembled and ready for service. The control panel enclosure shall be NEMA-4X stainless steel with a continuous hinged and pad-lockable door. The enclosure shall have a back mounting panel and a front inside hinged panel to make the control panel "dead-front" when outside door is open. The panel shall be UL508A and NEC 409 labeled and shall include the following as a minimum:

i. Multi-colored wires (or equivalent marking) shall be provided to facilitate trouble shooting. Refer to Division 16 – Electrical for wire color standards.

ii. Motor control shall be provided by a full voltage non-reversing (FVNR), reduced voltage auto-transformer (RVAT), or reduced voltage solid state starter (RVSS). Reduced voltage starters shall be capable of starting the motor under all expected load conditions. RVSS starters shall include a bypass contact in case of electronics failure. A combination type starter shall be provided for each pump motor, labeled "PUMP 1", "PUMP 2", etc. The starter for each motor shall be provided with under-voltage release and quick-trip ambient-compensated overload protection for each leg. Starter shall be Cutler-Hammer, Allen-Bradley, Square D, GE, or Siemens.

iii. Phase monitoring capability which shall override and stop the normal operation of the pumps.

iv. Automatic pump alternator relay as manufactured by TimeMark or equal.

v. Individual timers (0-999 sec.) for each pump to prevent pumps from starting at the same time on restoration of power after loss of power.

vi. A NEMA 3R transformer with a minimum rating of 3 KVA shall be provided mounted to the exterior of the pump control panel for supplying 120/240 VAC single phase loads. The transformer shall be provided with a secondary circuit breaker

within the pump control panel. Branch circuit breakers shall be provided within the pump control panel for the follow loads as a minimum:

a) Pump controls

b) GFCI receptacle mounted on equipment rack (20A CB).

c) RTU control panel (15A CB)

d) Generator controls / battery charger

e) Generator heater

f) Spare 20A circuit breaker (800 watt minimum)

vii. The following controls shall be mounted on the exterior of the pump control panel:

a) Power Available white indicator light

b) NEMA 4X Alarm horn with adjustable volume. Alarm horn shall be by Edwards, Federal Signal, or equal.

viii. The following controls shall be mounted on the front inside panel of the pump control panel:

a) Hand-Off-Auto selector switch for each pump

b) Pump Running red indicator light for each pump

c) Pump Running Hours elapsed time meter for each pump. Meters shall be 6 digits with rear mounted reset.

d) Pump Motor Overload Alarm amber indicator light for each pump

e) Pump Motor High Temp Alarm amber indicator light for each pump

f) Moisture Intrusion Alarm amber indicator light for each pump (submersible pumps only)

g) High Wetwell Level Alarm amber indicator light

h) Loss of Phase Alarm amber indicator light

ix. The control panel shall have dry contact relay outputs to connect to the SCADA System RTU Panel. The outputs shall be as follows:

a) All pump off level

b) Lead pump on level

c) Lag pump on level

d) High level alarm

e) Loss of phase

f) Generator running

g) Pump 1 running

h) Pump 1 common failure

i) Pump 2 running

j) Pump 2 common failure

k) Pump 1 in auto

l) Pump 2 in auto

m) Refer to Specification 13446 Remote Telemetry, Lift Stations for signal interface requirements Pages 17 - 18), and Remote Telemetry Unit (RTU) Control Panel Construction Drawing (Sheet 4 of 4).

x. The pump control panel shall accept dry contacts (control inputs) from the SCADA System RTU. Refer to Specification 13446 Remote Telemetry, Lift Stations for signal interface requirements (Page 18), and Remote Telemetry Unit (RTU) Control Panel Construction Drawing (Sheet 4 of 4). The inputs shall be as follows:

a) Pump 1 start/stop command

b) Pump 1 RTU control enable

c) Pump 2 start/stop command

d) Pump 2 RTU control enable

e) Pump Control Panel alarm horn disable/enable

f) Spare

xi. All necessary internal wiring separation, relays, intrinsic safety barriers, etc. to provide an intrinsically safe operation for a Class I Division 1 Hazardous Area wetwell shall be provided. All signals provided to the RTU through the pump control panel from a hazardous area shall be provided with barriers eliminating the requirement for intrinsically safe wiring of that signal.

4. Standby Power Source: The generation unit and transfer switch shall provide control interface signals to the pump control panel and remote telemetry unit as specified therein.

a. Refer to Chapter 9, Specification Section 13446 – Remote Telemetry, Lift Stations of PWC's Permit Design Manual for additional requirements.

b. Refer to Chapter 9, Specification Section 16231 – Emergency Power Systems of PWC's Permit Design Manual for additional requirements.

c. Refer to Chapter 9, Specification Section 16010 - Electrical of PWC's Permit Design Manual for additional requirements.

d. Refer to applicable detail drawings contained within PWC's Permit Design Manual for additional requirements.

5. Appurtenances

a. Float switches shall be of the mercury-tube type, encapsulated in polyurethane or vinyl floats. The units shall be waterproof, shockproof, explosion-proof and equipped with sufficient UV resistant submersible cable to extend to the control panel from the wetwell without splicing. Float switches shall be suspended in the wetwell on a suitable rack or rail of stainless steel construction. The float switch rack shall be easily accessible from outside the wetwell to eliminate "Confined Space" entry requirements for operation personnel. Float switches shall be unaffected by flows, etc., entering the wetwell. Any required weights shall be provided. Two sets of four (4) float switches shall be provided for duplex stations and two sets of five (5) provided for triplex stations. An additional High Level Alarm float connected to the RTU will be provided for a total of nine (9) or eleven (11) installed for duplex and triplex stations respectively. Each set shall be suspended separately in the wetwell, so that removal of either does not affect the operation of the other set. Both sets of float switches shall have their cables routed to the pump control panel and connected to terminals within the panel. The pump control panel will include a manual selector switch to allow alternation between the "primary" and "backup" sets of float switches. Each set of float switches shall provide for the following signals as a minimum:

   i. All Pump Stop Level (provide two - Primary / Backup)

   ii. Lead Pump Start Level (provide two - Primary / Backup)

   iii. Lag Pump Start Level (provide two - Primary / Backup)

   iv. Lag-Lag Pump Start Level – Triplex Stations only (provide two - Primary / Backup)

   v. Pump Control Panel High Level Alarm (provide two - Primary / Backup)

   vi. RTU High Level Alarm (One only)

   Float switches provided shall be Meyers, Anchor Scientific (Roto-Float) or Conery (Model 2900).

b. An equipment rack shall be provided to mount the electrical panels (e.g. meter base, main service disconnect, pump control panel, remote telemetry panel, etc.). The rack shall include a sun/rain shield and a concrete personnel pad. The pump control panel remote alarm light shall be mounted on the sun/rain shield at a location approved by PWC. The alarm light shall be a NEMA 4X red strobe light as manufactured by Edwards, Federal Signal, or equal. Refer to the detail drawings provided within PWC's *Permit Design Manual* for additional requirements.

c. The lift station site shall be provided with area lighting. The lighting shall meet the requirements of the local power company and should be sited as shown on the drawings.

LIFT STATION ENCLOSURE

Enclosures shall be as specified in Section 02755 – Fiberglass Reinforced Plastic Enclosures for Lift Stations or Section 02756 – Precast Concrete Enclosures for Lift Stations. Each separate

enclosure shall be placed over a single new pre-cast wet well with size and depth as shown on the drawings.

VALVES AND PIPING

1. Ductile Iron Pipe and Fittings

   All piping in the lift station wetwell and valve vault shall be ductile iron, Class 53, AWWA/ANSI C115/A21.15. Flanges shall be Class 125, ANSI B16.1. Piping interior surfaces shall be coated with ceramic epoxy lining as specified in Section 09802 "Special Coatings – Ceramic". Exterior piping surfaces shall be shop primed. All flange gaskets shall be 1/8-inch full-face serrated rubber material.

2. Gate Valves

   Each pump shall be equipped with a resilient wedge gate valve to allow both pump sets to be isolated from the force main. Valve shall pass 3" spherical solids. Gate valves shall be ductile iron body resilient wedge type rated for 250 psig working pressure gate valves and shall conform to AWWA C-515 and NSF 61. Valve body shall have flanged end connections drilled to 125 pound standard. Valves for aboveground use shall be NRS design with handwheel. Valves shall open by turning in a counterclockwise direction. The operating nut or wheel shall have an arrow cut in the metal, indicating the direction of opening. Valves shall have a clear waterway equal to the full nominal diameter of the valve. All valves shall be tested for leakage and distortion in strict accordance with the latest revision of AWWA Specification C-500. All gate valves shall be manufactured in strict accordance with the latest specifications of the American Water Works Association (AWWA). Valves shall be manufactured by: Mueller Company, Clow Corporation, American Darling Company, or approved equal. Certification shall be furnished to PWC by the manufacturer that all valves meet project specifications. Where specified on plans, resilient valves shall be supplied with gearing. Valves installed in a vertical position shall have spur gearing and bevel gearing for valves installed in a horizontal position.

3. Check Valves

   Each pump shall be equipped with a full flow type check valve with flanged ends and fitted with an external lever and spring. Each valve shall be capable of passing a 3" spherical solid. Valve clapper shall be cast iron, and shall swing completely clear of waterway when valve is full open. The seating shall be by a resilient field replaceable ring on the valve disc contacting a bronze or stainless seat ring in the valve body. Hinge pin shall be of 18 8 stainless steel construction and shall be utilized with bronze bushings and packing type seal. Valves shall be equipped with removable cover plate to permit entry or for complete removal of internal components without removing the valve from the line. Valve ends for use in above-ground or vault installations shall be flanged end connections drilled to 125 pound

standard. Valve shall be rated at 175 psi water working pressure, 350 psi hydrostatic test pressure. Valves other than full flow type or valves mounted in such a manner that prevents the passage of a 3" spherical solid shall not be acceptable.

4. Air Release Valves

   An automatic air release valve shall be furnished for each pump designed to permit the escape of air to the atmosphere during initial priming or unattended re-priming cycles. Upon completion of the priming cycle or re-priming cycle, the valve shall close to prevent recirculation. Valves shall provide visual indication of valve closure, and shall operate solely on discharge pressure. Valves which require connection to the suction line shall not be acceptable. All valve parts exposed to sewage shall be constructed of cast iron, stainless steel, or similar corrosion resistant materials. Diaphragms, if used, shall be of fabric reinforced neoprene or similar inert material. A cleanout port, three inches in diameter, shall be provided for ease of inspection, cleanout, and service. Valves shall be field adjustable for varying discharge heads.

5. By-Pass Pumping Valves and Piping

   All Lift Stations shall have a By-Pass Pumping Assembly incorporated into the force main piping downstream from valve vaults or common header piping. By-Pass Pumping Assemblies shall be installed according to plan drawings and details with materials as specified in SECTION 02732, SEWAGE FORCE MAINS.

SUPPORT/RESTRAINT

All pipes connected to the pumps shall be supported according to good commercial practice to prevent piping loads from being transmitted to the pumps. All lift station piping shall be properly anchored for thrust restraint.

WETWELL

The wet well shall be constructed of pre-cast concrete sections and shall include a coal tar epoxy coating. All concrete shall have a minimum allowable compressive strength of 4,000 psi at 28 days (ACI 301, 3.2). Concrete shall reach a minimum of 80 percent of this design strength before weight supporting forms may be removed (ACI 301, 4.5.5). The structure shall be manufactured and installed in accordance with ASTM C890, ASTM C891, ASTM C913, and ASTM C478. Joints shall be sealed with pre-formed butyl rubber conforming to the requirements of ASTM C990.

Wet wells shall have a minimum diameter of six (6) feet.

Access hatches shall be provided as shown on the drawings. Hatches shall be 3/16-inch aluminum checker plate with a stainless steel hardware frame. The frame shall be ¼-inch thick

aluminum reinforcement cast into the concrete top. The hatch shall be designed for H-20 loading. If hatch is located outside of enclosure it shall be lockable.

SITE LIGHTING

The lift station site shall be provided with area lighting. The lighting shall meet the requirements of the local power company and should be sited as shown on the drawings.

SITE FENCING

The lift station site shall be fenced as shown on the drawings. Fencing shall be installed as specified in SECTION 02831, CHAIN LINK FENCING.

SITE ACCESS

Site access to the lift station shall be provided by a gravel access drive/parking area. The drive shall be a minimum of 10-feet wide and shall be oriented as shown on the plans. It shall consist of a minimum of 6 inches compacted ABC stone base. The drive shall be graded to drain and shall be installed in such a way as to minimize the runoff and erosion potential. Parking area shall be of sufficient size for a vactor truck to turn around during wet well cleaning.

WATER SERVICE

Each lift station site shall be provided with a source of water for routine maintenance purposes. If possible, a fire hydrant shall be located adjacent to the lift station site to facilitate filling of the wet well during lift station start up.

A one (1) inch water service with a standard PWC meter box, a reduced pressure backflow preventer, and a yard hydrant shall be installed at each lift station. The meter shall be installed inside the easement or right-of-way, in accordance with PWC standards. The meter box shall be in accordance with PWC standards. The reduced pressure backflow preventer shall be installed within 100’ of the tap on the main and inside the lift station fencing unless the distance exceeds 100’. A non-freeze 1" yard hydrant shall be provided, located as shown on the approved site plan. The yard hydrant shall be installed in accordance with the Yard Hydrant standard detail.

INSTALLATION

Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Immediately after off-loading, contractor shall inspect pumps and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all equipment serial numbers and parts lists with shipping documentation. Notify the appropriate manufacturer’s representative of any unacceptable conditions noted with shipper.

Install, level, align, and lubricate pumps and all related equipment as required by the manufacturer. Equipment installation shall be in accordance with written instructions supplied by the respective manufacturer.

FIELD QUALITY CONTROL

Prior to acceptance by Owner, an operational test of all pumps, drives, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition; and conforms to the specified operating characteristics.

After construction debris and foreign material has been removed from the wet well, the contractor shall supply clear water volume adequate to operate station through several pumping cycles. Observe and record operation of pumps, suction and discharge gage readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment, test manual control devices, and automatic control systems. Be alert to any undue noise, vibration or other operational problems.

The Contractor shall co-ordinate station start-up with pump manufacturer's technical representative. The representative or factory service technician shall inspect the completed installation and calibrate and adjust instrumentation, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures.

OPERATION AND MAINTENANCE MANUALS

Installation shall be in accordance with written instructions provided by the pump equipment supplier. Comprehensive instructions supplied at time of shipment shall enable personnel to properly operate and maintain all equipment supplied. Content and instructions shall assume operating personnel are familiar with pumps, motors, piping and valves, but lack experience on exact equipment supplied.

Documentation shall be specific to the pump station and collated in functional sections. Each section shall combine to form a complete system manual covering all aspects of equipment supplied. Support data for all equipment supplied shall be provided by those supplying the equipment, and included into the O&M manual. Instructions shall include the following as a minimum:

a. Functional description of each major component, complete with operating instructions.
b. Instructions for operating pumps and pump controls in all modes of operation.
c. Calibration and adjustment of equipment for initial start-up, replacement of level control components, or as required for routine maintenance.
d. Support data for all components shall be incorporated into the O&M Manual.

e. As-built electrical schematic diagram of the pump station circuits shall illustrate pump motor branch, control and alarm system circuits including interconnections. Wire numbers and legend symbols shall be shown. Schematic diagrams for individual components, not normally repairable by the station operator, need not be included. Partial schematics, block diagrams, and simplified schematics shall not be provided in lieu of an overall system diagram.

f. As-built mechanical layout drawing of the pump station and components, prepared in accordance with good commercial practice, shall provide installation dimensions and location of all pumps, motors, valves and piping.

QUALITY ASSURANCE

Upon request from PWC, pre-engineered pump station suppliers shall prove financial stability and ability to produce the pump system within the specified delivery schedules. Evidence of facilities, equipment and expertise shall demonstrate the manufacturer's commitment to long-term customer service and product support.

MANUFACTURER'S WARRANTY

The contractor shall warrant all equipment to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below.

All equipment, apparatus, and parts furnished shall be warranted for one (1) year, excepting only those items that are normally consumed in service, such as light bulbs, oils, grease, packing, gaskets, O-rings, etc. The pump manufacturer shall be solely responsible for warranty of the pumps and all related equipment. The pump shaft seal shall be warranted for a minimum of four (4) years from date of shipment. Should the seal fail within the first year, the manufacturer shall furnish a new seal, without charge to owner, F.O.B. factory. The warranty replacement cost for seals after the first year will be pro-rated as follows:

Failure Within	Percent New Price
2 years	25%
3 years	50%
4 years	75%

Components failing to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer without cost of parts or labor to the owner.

DIVISION 2
SITE WORK

02755 FIBERGLASS REINFORCED PLASTIC (FRP) ENCLOSURES FOR LIFT STATIONS

PART 1 - GENERAL

1.1 REQUIREMENTS

Contractor shall furnish and install Fiberglass Reinforced Plastic (FRP) Enclosure(s) to shelter wastewater pumps, electrical switchgear and miscellaneous appurtenances as specified in Section 02740, SELF-PRIMING LIFT STATIONS. The enclosure(s) shall be transportable to the site and placed on concrete pad prepared in accordance with manufacturer's recommendations and the requirements of applicable sections of these specifications. Pre-engineered, factory built lift stations complete with Low-Profile FRP Enclosures may also be provided with prior PWC approval.

1.2 RELATED SECTIONS

Section 02740 - SELF-PRIMING LIFT STATIONS
Section 16010 – ELECTRICAL, LIFT STATIONS
Section 03301 – CONCRETE CONSTRUCTION, UTILITY

1.3 SUBMITTALS

Contractors shall within 30 calendar days after receiving Owner's Notice to Proceed, submit the following product data:

A. Materials list of items proposed to be provided under this Section.

B. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

C. Shop drawings showing plan, elevation and sectional views, materials of construction, and anchor details.

1.4 DELIVERY, STORAGE AND HANDLING

The fiberglass enclosure and the accessory items shall be carefully transported, stored, handled and set in place in a manner that will prevent distortion, misalignment or other damage to the units. During storage prior to installation and following installation, but prior to placing in service, the manufacturer's recommendations regarding handling shall be followed.

PART 2 – PRODUCTS

2.1 GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS

Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Engineer, reasonably convenient to the site.

2.2 FRP ENCLOSURES

Each separate FRP enclosure shall be secured to a concrete pad placed at grade and either wholly or partially over a single new pre-cast concrete wet well with size and depth as shown on the drawings. Enclosure outside dimensions shall be as specified in the following table:

Lift Station Designation	Structure Length	Structure Width	Roof Height at Peak

A. Provide a minimum of (4) four lifting eyes arranged on the corners to ease handling and installation onto a concrete pad furnished by the contractor.

B. FRP enclosure walls and roof shall be seamless, one-piece sprayed fiberglass panels laminated to form a structural composite as follows: 1/8" thick fiberglass outside surface, 1 ½" thick foam polyurethane core, 1/2" marine grade plywood, and 3/32" thick fiberglass inside surface.

C. Each wall panel shall be overlapped at the corner and form internal connection joint using stainless steel hardware. All panel joints shall be thoroughly sealed with silicone caulk. The FRP enclosure shall have a minimum R-10 insulation factor and shall be capable of withstanding 125 mph wind loads.

D. The wall sections shall be provided with vertical fiber-beam laminations located between the inner and outer skin of fiberglass to provide structural integrity and prevent de-lamination of the foam core and fiberglass skins. The vertical fiber beams shall be positioned no further than 10" apart.

E. All exterior surfaces shall be brick textured (green, or tan colored) with 18-20 mils of high quality gel coat, incorporating ultra-violet inhibitors.

F. All interior surfaces shall be sprayed with a white gel coat finish offering the same characteristics as the exterior surfaces.

G. The roof panel shall be a one-piece vaulted "hip" design, incorporating the same

materials of construction as the side walls without plywood. The roof shall be removable as a unit, allowing for complete access to the equipment with a crane. The pitch of the roof shall be sufficient for good moisture drainage, and withstand a minimum snow load of 30 pounds per square foot.

H. The FRP enclosure shall be provided with a 4.75” interior fiberglass base flange for mounting to the concrete slab by the installing contractor. The fully assembled enclosure shall be positioned on the concrete mounting pad and sealed with butyl tape. The interior base flange shall be drilled, positioned and fastened to the pad using Type 316 stainless steel expansion anchors on 24" maximum centers. Anchor bolts shall be provided by the contractor.

I. Furnish FRP enclosure factory wired except for service entrance conductors, system ground and as noted otherwise.

2.2.1 Doors and Hardware

A. Single Entrance Doors: The FRP enclosure shall be provided with one single entrance door, 3'-0" wide x 6'-8" high located on the structure as indicated on the plan drawings.

1) The door shall be constructed of laminated fiberglass and foam core materials and be completely compatible with the enclosure.
2) The door threshold shall be ½” high for easy stepover and transport of equipment through the doorway.
3) The door shall be hung with a minimum of (3) three 4” x 4” stainless steel ball bearing type hinges equipped with non-removable pins. The hinges shall be bolted through the doorjamb with stainless steel fasteners. Hinges shall be oriented in the full-mortised position with no fasteners exposed when door is closed.
4) The door shall be equipped with a three point closure system incorporating a door lever mechanism that may be padlocked in the closed position (padlocks furnished by PWC). The door shall be held tight to the enclosure at the top, side and bottom.
5) An adjustable door positioner and holder shall be provided at the top of the door which shall limit the door opening beyond 95 degrees.
6) Door shall be sealed with a weather tight neoprene gasket along the entire perimeter of the door.
7) Single door and all hardware shall be able to withstand 125 MPH winds.
8) A wall mounted drip molding shall be located above each door.

B. Double-Entrance Doors: The enclosure shall be provided with one double entrance door, 6'-0" wide x 6'-8" high located on the structure as indicated on the plan drawings.

1) Double hung door design shall incorporate 3-point locking hardware, door closer, and hinges on each section to allow complete access to the 6'-0" x 6'-8" full door opening without the need for a center sill.

2) Double door design shall adhere to the same material and workmanship specifications as described above for single door design.
3) Double door and all hardware shall be able to withstand 125 MPH winds.

2.2.2 Electrical Materials and Equipment

Electrical materials and equipment shall conform to the requirements in Section 16010 – ELECTRICAL, LIFT STATIONS.

A. Electrical Distribution: The enclosure shall be provided with two, duplex, GFCI receptacles, mounted 48" above finished floor. Receptacle shall be furnished with a corrosion resistant weatherproof cover. The receptacle shall be pre-wired to the electrical junction box. Circuit protection for the receptacles shall be provided within the pump control panel.

B. Interior Lighting: The enclosure shall be provided with, surface-mounted, vapor-tight, three (3) F32T8 lamp, fluorescent light fixtures providing a minimum of two (2) watts illumination per square foot. The enclosure shall be provided with a weatherproof wall switches mounted adjacent to both the single and double enclosure doors. The lighting shall be provided with conduit and wiring to the electrical junction box. Circuit protection for the lighting shall be provided within the pump control panel.

C. Exterior Lighting: The enclosure shall be provided with exterior security lighting mounted over both the single and double enclosure doors. The lighting fixtures shall be shielded to prevent "spillage" onto neighboring properties and shall be fitted with photocell sensors for dusk to dawn operation. Exterior lighting shall be provided with conduit and wiring to the electrical junction box. Circuit protection for the exterior lighting shall be provided within the pump control panel.

D. Exhaust Fan: The enclosure shall be provided with a thermostatically controlled, 120 VAC, exhaust fan with screen and weatherproof shutters shall be installed in the wall approximately opposite a fresh air intake vent. Manual on/off switches shall also be provided adjacent to both the single and double enclosure doors. The fan shall have a minimum capacity of 1600 CFM at free air and be capable of changing the air in the enclosure a minimum of six times per hour. The vent fan shall be pre-wired to the electrical junction box. Circuit protection for the vent fan shall be provided within the pump control panel.

E. Heater: A high capacity electric blower type heater shall be provided for the protection of the internal equipment. The heater shall maintain an inside/outside differential temperature of 30 degrees F while operating on the primary voltage supplied to the pump control panel. The heater shall be provided with an adjustable thermostat, and be wired through conduit to the electrical junction box. Circuit protection shall be provided within the pump control panel.

2.3 LOW-PROFILE FRP ENCLOSURES

Pre-engineered, factory built lift stations complete with Low-Profile FRP Enclosures may be provided with prior PWC approval. Low-profile FRP Enclosures shall contain and enclose all pumps and equipment, and be constructed to enhance serviceability by incorporating the following design characteristics:

A. Access panels shall be provided. Panels shall be sized and placed to permit routine maintenance operations through the panel openings of the enclosure. For these purposes, routine maintenance shall include pump and motor inspection, drive belt adjustment, and pump clean-out. Panels shall be secured with tamper-proof hardware.

B. Not less than two access panels shall be provided with a hinge and latch. Such panels shall provide access to frequently performed adjustments and inspections of the electrical controls. Hinges shall be the continuous type. Latches shall engage the enclosure at not less than two places, and shall be protected by a keyed lock.

C. One access panel shall contain a screened vent to maximize air flow for enclosure ventilation.

D. Station enclosure, less base, must be completely removable or able to be disassembled following the removal of reusable hardware. After removal or disassembly, no portion of the enclosure shall project above the surface of the base to interfere with maintenance operations or endanger personnel.

E. Removal or disassembly of the enclosure shall be accomplished by not more than two maintenance personnel without the use of lifting equipment.

2.3.1 Materials

Low-profile Enclosures for modular lift stations shall be manufactured of molded fiberglass reinforced orthophthalic polyester resins with a minimum of 30 percent fiberglass, and a maximum of 70 percent resin. Resin fillers or extenders shall not be used. Glass fibers shall have a minimum average length of 1-1/4 inches. Major design considerations shall be given to structural stability, corrosion resistance, and water-tight properties. The polyester laminates shall provide a balance of mechanical, chemical, and electrical properties to insure long life. They must be impervious to micro-organisms, mildew, mold, fungus, corrosive liquids, and gases which can reasonably be expected to be present in the environment surrounding the wet well.

All interior surfaces of the housing shall be coated with a polyester resin-rich finish. It shall provide:

A. Maintenance-free service.

B. Abrasion resistance.

C. Protection from sewage, greases, oils, gasoline, and other common chemicals.

The outside of the enclosure shall be coated with a suitable pigmented resin compounded to insure long, maintenance-free life.

2.3.2 Low-Profile FRP Enclosure Base

Station base shall be constructed of pre-cast, reinforced concrete, bonded inside a fiberglass form covering top and sides, and shall be designed to ensure adequate strength to resist deformation of structure during shipping, lifting, or handling. Base shall incorporate drainage provisions, and shall be provided with an opening of sufficient size to permit piping and service connections to the wet well. Station base shall incorporate anchor recesses for securing the pump station to the concrete pad supplied by the Contractor in accordance with the station plans. Color used shall de-emphasize the presence of dirt, grease, etc.

2.4 CONCRETE MATERIALS

Concrete materials including forms and reinforcement shall conform to Section 03301 – CONCRETE CONSTRUCTION, UTILITY

PART 3 - EXECUTION

3.1 FRP ENCLOSURE INSTALLATION

A. Locate FRP Enclosure as indicated on Drawings.

B. Block and shim as necessary to place at proper elevation plumb and level.

C. Snug down anchor bolt nuts and grout uneven places beneath enclosure base using non-shrink grout.

D. Install and make final electrical connections to all equipment shipped loose with water-tight flexible conduit and fittings.

3.2 CONCRETE

Construct concrete pad complying with the Project Drawings and applicable sections of these Specifications. Floor slab shall be a minimum of 6” thick, 4,000 psi @ 28 day minimum, steel reinforced concrete. Slab shall be level to within 1/8” in both directions, comply with local codes and standards, and shall be capable of supporting all imposed loads. Concrete forming, reinforcement, placement and curing shall conform to requirements in Section 03301 – CONCRETE CONSTRUCTION, UTILITY

3.3 ELECTRICAL

Installation of electrical equipment and materials shall conform to the requirements in Section 16010 – ELECTRICAL, LIFT STATIONS.

3.3 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

3.4 MANUFACTURER'S WARRANTY

The Fiberglass Enclosure shall be provided with a 5-year manufacturers warranty against defects in material and workmanship.

DIVISION 2
SITE WORK

02756 PRE-CAST CONCRETE ENCLOSURES FOR LIFT STATIONS

PART 1 - GENERAL

1.1 REQUIREMENTS

Contractor shall furnish and install Pre-cast Concrete Enclosure(s) to shelter wastewater pumps, electrical switchgear and miscellaneous appurtenances as specified in Section 02740, SELF-PRIMING LIFT STATIONS. The enclosure(s) shall be transportable to the site in modular wall and roof panel sections and assembled in place on a concrete slab prepared in accordance with manufacturer's recommendations and the requirements of applicable sections of these specifications.

1.2 RELATED SECTIONS

Section 02740 - SELF-PRIMING LIFT STATIONS
Section 16010 – ELECTRICAL, LIFT STATIONS
Section 03301 – CONCRETE CONSTRUCTION, UTILITY

1.3 CODES AND STANDARDS

The following Codes and Standards are incorporated by reference into this specification. The latest edition of these references shall be applicable.

A. ACI 318-99, "Building Code Requirements for Reinforced Concrete", American Concrete Institute.

B. ASCE 7-98, "Minimum Design Loads for Buildings and other Structures", American Society Of Civil Engineers

C. "Manual of Standard Practice", Concrete Reinforcing Steel Institute.

D. Local Codes and Standards for Project Location.

E. UL-752 Level 4 Bullet Resistance, certified by an independent structural engineer. (Pre-cast elements Only)

F. Fabricator must be producer member of the National Pre-cast Concrete Association (NPCA).

G. Building fabricator must have a minimum of five (5) years' experience manufacturing and setting transportable pre-cast concrete buildings.

In case of conflicting requirements between the specification and these referenced documents, the more stringent shall govern.

1.5 SUBMITTALS

Contractors shall within 30 calendar days after receiving Owner's Notice to Proceed, submit the following product data:

A. Materials list of items proposed to be provided under this Section.

B. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

C. Shop drawings showing plan, elevation and sectional views, materials of construction, and anchor details.

1.6 DELIVERY, STORAGE AND HANDLING

The pre-cast concrete enclosure panels and the accessory items shall be carefully transported, stored, handled and erected in a manner that will prevent damage. During storage prior to installation and following installation, but prior to placing in service, the manufacturer's recommendations regarding handling shall be followed.

PART 2 – PRODUCTS

2.1 GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS

Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacturer of such products and shall essentially duplicate items that have been in satisfactory use for at least 5-years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Engineer, reasonably convenient to the site.

2.2 PRE-CAST CONCRETE ENCLOSURES

Each separate enclosure shall be erected on a concrete slab placed at grade and either wholly or partially over a single new pre-cast concrete wet well with size and depth as shown on the drawings. Enclosure outside dimensions shall be as specified in the following table:

Lift Station Designation	**Structure Length**	**Structure Width**	**Roof Height at Peak**

2.2.1 Design Requirements

A. Seismic load performance category "C", Exposure Group I, III

B. Standard Roof Live Load - 40 psf.

C. Standard Floor Load – 250 psf.

D. Standard Wind Load – 44 psf (100 mph) (ASCE 7-93)

E. Floor: Floor shall include a ½" turn down edge on all four sides to prevent migration of water into building along bottom of wall panels.

F. Roof: Roof shall have a peak in center of 12-foot direction and shall slope 2" to each side. Roof shall extend a minimum of 3" beyond wall panels on all sides and include a ½" turn down edge with built in drip feature that caps all four walls to prevent migration of water into the building along top of wall panels. Roof shall have a smooth form edge on all four sides. The roof shall be removable as a unit, allowing for complete access to the equipment with a crane.

G. Roof, walls and floor panels shall be sealed at all joints. Wall panels shall set on top of floor panel with the exterior surfaces of the wall panels aligned flush with outside edges of floor panel so that no overhang is allowed.

2.2.2 Pre-cast Concrete Materials

A. Concrete: Steel reinforced, 5000 psi minimum 28-day compressive strength, air-entrained (ASTM C260), water reduced normal weight.

B. Reinforcing Steel: ASTM A615, grade 60, deformed bar unless otherwise indicated.

C. Post-tensioning Strand: 41K Polystrand CP50, .50, 270 KSI, 7-wire strand, greased plastic sheath, (ASTM A416). Roof and floor to be post-tensioned by a single, continuous tendon. Said tendon shall form a substantially rectangular configuration having gently curving corners and a corner where the tendon members are anchored. Tendons shall be greased and enclosed within sheathing. If post-tensioning is not used in the roof panel, the following guidelines must be followed to ensure a watertight roof design.

1) The entire pre-cast concrete roof panel surface must be cleaned and primed with a material that prepares the concrete surface for proper adherence to the coating material.
2) The entire pre-cast concrete roof panel surface shall be sealed with .045 EPDM continuous membrane cemented to the concrete with a compound designed for this purpose.

D. Caulking: All joints between panels shall be caulked on the exterior and interior surface of the joints. Caulking shall be Sonneborn "Sonolastic" NP-1 Limestone sealant or equal. Exterior caulk joint to be ½" x ½" square so that sides of joints are parallel for correct caulk adhesion.

E. Vents: Two extruded aluminum vents, clear anodized, with aluminum insect screen to be cast in rear wall. Vents shall be Sunvent FL 164, or equal.

F. Panel Connections: All panels shall be securely fastened together with ¼" thick steel brackets. Steel is to be of structural quality, hot-rolled carbon complying with ASTM A36 HR, prime coated after fabrication. All fasteners to be ½" diameter bolts complying with ASTM A307 for low-carbon steel bolts. Cast-in anchors used for panel connections to be Dayton-Superior #F-63, or equal.

2.2.3 Doors and Hardware

A. Single Entrance Doors: The pre-cast enclosure shall be provided with one single entrance door, 3'-0" wide x 6'-8" high located on the structure as indicated on the plan drawings.

1) The door shall comply with the Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (SDI-100) and as herein specified.
2) Door and frame are to be factory bonderized and primed.
3) The door threshold shall be ½" high for easy stepover and transport of equipment through the doorway.
4) The door and frame shall be complete with a stainless steel hasp and staple assembly intended for padlock use (padlocks furnished by PWC).
5) Single door and all hardware shall be able to withstand 125 MPH winds.
6) A wall mounted drip molding shall be located above each door.

B. Double-Entrance Doors: The enclosure shall be provided with one double entrance door, 6'-0" wide x 6'-8" high located on the structure as indicated on the plan drawings.

1) Double door and all hardware shall be able to withstand 125 MPH winds.
2) Double hung door design shall incorporate 3-point locking hardware, door closer, and hinges on each section to allow complete access to the 6'-0" x 6'-8" full door opening without the need for a center sill.
3) Double door design shall adhere to the same material and workmanship specifications as described above for single door design.

2.2.4 Finishes: The coating materials noted below are specified as the standard of quality. The usual "or equal" clause shall apply. No request for substitution will be considered which decreases the film thickness designated and/or the number of coats to be applied or which offers a change from the generic type of coating specified. Requests for substitution shall contain the full name of each product; descriptive literature and directions for use; its generic type, and its non-volatile content by volume. All materials shall be brought to the job site in the original sealed and labeled containers of the paint manufacturer and shall be subject to inspection by the Engineer on the job. Only new paint materials shall be used.

A. Interior of Building: Smooth steel form finish on all interior surfaces.

B. Exterior of Building:

1) Standard: Architectural, pre-cast, concrete Brick Finish: Finish must be imprinted in top face of panel while in form using an open grid impression tool. Finished brick size shall be 2-3/8" x 7-5/7" with vertical light broom finish. Joints between each brick must be 3/8" wide x 3/8" deep. Back of joint shall be concave to simulate a hand-tooled joint. Each brick face shall be coated with a silicone acrylic concrete stain as manufactured by H&C Concrete Care Products. Color shall be H&C #HC02 "Brick Red" unless specified otherwise. Stain shall be applied per manufacturer's recommendations. Joints shall be kept substantially free of stain to maintain a gray concrete color.

2) (Option): Washed brown riverstone aggregate finish on exterior wall surfaces. Aggregate must be seeded into top of panel while in form.

3) (Option): A Vertical Broom Finish shall be applied to exterior wall surfaces and shall be coated with a silicone acrylic concrete stain as manufactured by H&C Concrete Care Products. Color shall be H&C #HC25 "Concrete Gray" unless specified otherwise. Stain shall be applied per manufacturer's recommendations.

B. Doors and Frames

1) Standard: Door(s) and Frame(s) shall be top coated with one coat of Sherwin Williams #SW4025, "Anchor Gray" Industrial and Marine Coating (unless specified otherwise).
2) (Option): If either exterior finish option above is selected, then: Door(s) and Frame(s) shall be top coated with Sherwin-Williams #SW4001 "Bolt Brown" Industrial and Marine Coating (unless specified otherwise).

2.2.5 Electrical Materials and Equipment

Electrical materials shall conform to the requirements in Section 16010 – ELECTRICAL, LIFT STATIONS.

A. Electrical Distribution: Provide and install two, duplex, GFCI receptacles, mounted 48" above finished floor. Receptacle shall be furnished with a corrosion resistant weatherproof cover. The receptacles shall be wired to the electrical junction box. Circuit protection for the receptacles shall be provided within the pump control panel.

B. Interior Lighting: Provide and install surface-mounted, vapor-tight, three (3) F32T8 lamp, fluorescent light fixtures providing a minimum of two (2) watts illumination per square foot. A weatherproof wall switch mounted shall be mounted adjacent to the enclosure single door. Manual on/off switches shall also be provided and installed adjacent to both the single and double enclosure doors. The lighting shall be provided with conduit and wiring to the electrical junction box. Circuit protection for the lighting shall be provided within the pump control panel.

C. Exterior Lighting: Provide and install exterior security lighting fixtures mounted over both the single and double enclosure doors. The lighting fixtures shall be shielded to prevent "spillage" onto neighboring properties and shall be fitted with photocell sensors for dusk to dawn operation. Exterior lighting shall be provided with conduit and wiring to the electrical junction box. Circuit protection for the exterior lighting shall be provided within the pump control panel.

D. Exhaust Fan: Provide and install a thermostatically controlled, 120 VAC, exhaust fan with screen and weatherproof shutters shall be installed in the wall approximately opposite a fresh air intake vent. Manual on/off switches shall also be provided adjacent to both the single and double enclosure doors. The fan shall have a minimum capacity of 1600 CFM at free air and be capable of changing the air in the enclosure a minimum of six times per hour. The vent fan shall be wired to the electrical junction box. Circuit protection for the vent fan shall be provided within the pump control panel.

E. Heater: Provide and install a high capacity electric blower type heater for the protection of the internal equipment. The heater shall maintain an inside/outside differential temperature of 30 degrees F while operating on the primary voltage supplied to the pump control panel. The heater shall be provided with an adjustable thermostat, and be wired through conduit to the electrical junction box. Circuit protection shall be provided within the pump control panel.

2.3 CONCRETE MATERIALS

Concrete materials including forms and reinforcement shall conform to Section 03301 – CONCRETE CONSTRUCTION, UTILITY

PART 3 – EXECUTION

3.1 PRE-CAST CONCRETE ENCLOSURE INSTALLATION

A. Locate Pre-cast Enclosure as indicated on Drawings.

B. Erect enclosures using personnel experienced and trained in placement and securing of architectural pre-cast concrete units. Lift and handle pre-cast panels using lift points and embeds as shown on pre-cast shop drawings. Fill all lift holes with hydraulic cement.

C. Erection Tolerances: Erect within tolerances listed in PCI MNL 117, Appendix I or ACI 533R. Erect level, plumb, and true to line. Do not allow cumulative dimensional errors to develop. Adjustments such as shimming which would place additional stress on units will not be permitted. Adhere to dimensional tolerances in accordance with PCI recommendations. Erect and secure in a manner to prevent damage to units or units in place. Replace damaged units which cannot be successfully repaired.

D. Where two stage joint seal is required, sequence with sealant application to ensure that sealant, gaskets, and similar items required for interior side seal are installed concurrently with installation of pre-cast units.

3.2 CONCRETE

Construct concrete pad complying with the Project Drawings and applicable sections of these Specifications. Floor slab shall be a minimum of 6” thick, 4,000 psi @ 28 day minimum, steel reinforced concrete. Slab shall be level to within 1/8” in both directions, comply with local codes and standards, and shall be capable of supporting all imposed loads. Concrete forming, reinforcement, placement and curing shall conform to requirements in Section 03301 – CONCRETE CONSTRUCTION, UTILITY

3.3 ELECTRICAL

Installation of electrical equipment and materials shall conform to the requirements in Section 16010 – ELECTRICAL, LIFT STATIONS.

3.4 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

3.5 MANUFACTURER’S WARRANTY

The Pre-cast Concrete Enclosure shall be provided with a 5-year manufacturer's warranty against defects in material and workmanship.

DIVISION 2
SITE WORK

02762 MANHOLE LINING – POLYMERIC

GENERAL

The Contractor shall furnish all labor, materials, equipment and incidentals required and install the monolithic polymeric manhole lining system and appurtenances as specified herein. The lining system shall be used to rehabilitate the interior of all designated existing sewer manholes as indicated within these Contract Documents and as shown on the Contract Drawings. The installed lining system shall withstand all loading conditions and hydrostatic pressure.

The manhole lining system shall consist of a cementitious base coat applied to the cleaned and prepared manhole surfaces, followed by the polymeric lining system. The Contractor shall furnish all necessary materials, labor, and equipment necessary to properly prepare the surfaces and apply the polymeric lining system as specified herein. The lining system shall be compatible with the applied chimney seal. The chimney seal shall be in accordance with these Contract Documents.

The Contractor is responsible for properly preparing the existing manhole for lining prior to the installation of the lining system, including stopping all leaks, flow control, patching voids, removing steps/manhole rungs, cleaning (to include water blasting), removing rubble, root removal, debris removal, etc.

The Contractor is advised that the presence or absence of any leakage through the manhole walls as seen in the Contractor's independent inspection prior to bidding is dependent upon the ground water levels and conditions at the time of the inspections. The Contractor shall reflect his/her assumptions and judgments on leakage through the manhole walls based on this information in the unit prices bid. All leakage shall be stopped prior to installing the lining system. No additional payment will be made to the Contractor for repairing leaks not visible prior to bidding.

Cleaning, surface preparation, lining application, and thicknesses shall be as specified herein and shall meet or exceed the lining manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, the Contractor shall comply with the manufacturer's minimum recommendations.

RELATED SECTIONS

A. Section 02500 – Traffic Control
B. Section 02730 – Sanitary Sewer System
C. Section 02750 – Wastewater Flow Control
D. Section 02765 – Manhole Chimney Seals

REFERENCE STANDARDS

This Section contains references to the governing standards and documents listed below. They are a part of this Section as specified and modified; the current version shall apply unless otherwise noted. In case of conflict between the requirements of this section and those of the listed documents, the more stringent of the requirements shall prevail.

A. American Concrete Institute (ACI)

a. ACI 224.1R – Causes, Evaluation and Repair of Cracks in Concrete Structures
b. ACI 301 – Specifications for Structural Concrete
c. ACI 308R – Guide to Curing Concrete
d. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures and Commentary
e. ACI 515 – A Guide to the use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete
f. ACI 546.R – Concrete Repair Guide
g. ACI 546.3R – Guide for the Selection of Materials for the Repair of Concrete

B. ASTM International (ASTM)

a. ASTM C 868 – Standard Test Method for Chemical Resistance of Protective Linings
b. ASTM C 1583/1583M – Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
c. ASTM D 2794 – Standard Test Method for Resistance of Organic Linings to the Effects of Rapid Deformation (Impact)
d. ASTM D 4060 – Standard Test Method for Abrasion Resistance of Organic Linings by the Taber Abraser
e. ASTM D 4285 – Standard Test Method for Indicating Water or Oil in Compressed Air
f. ASTM D 4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
g. ASTM D 4414 – Standard Practice for Measurement of Wet Film Thickness by Notch Gages
h. ASTM D 4541 - Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers
i. ASTM D 6944 Standard Test Method for Measuring Humidity with a Physchrometer
j. ASTM D 7682 – Standard Test Method for Replication and Measurement of Concrete Surface Profiles Using Replica Putty
k. ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
l. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
m. ASTM F 2414 – Standard Practice for Sealing Sewer Manholes Using Chemical Grouting
n. ASTM G 210 – Standard Practice for Operating the Severe Wastewater Analysis Testing Apparatus

C. International Concrete Repair Institute (ICRI)

a. Guideline No. 310.1R – Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
b. Guideline No. 310.2 – Selecting and Specifying Concrete Surface Preparation for Sealer, Linings, and Polymer Overlays

D. National Association of Corrosion Engineers International (NACE)

a. NACE Publication 6D-173 – A Manual for Painter Safety
b. NACE SP0188 – Standard Practice for Discontinuity (Holiday) Testing of Protective Linings
c. NACE SP0892 – Standard Practice for Coatings and Linings over Concrete for Chemical Immersion and Containment Service
d. NACE No. 6/SSPC-SP13 – Surface Preparation of Concrete

E. Occupational Safety and Health Administration (OSHA)

a. Safety and Health Standards (29 CFR 1910/1926)

F. The Society for Protective Coatings (SSPC)

a. SSPC-SP13/NACE No. 6 – Surface Preparation of Concrete
b. SSPC-Guide 12 – Guide for Illumination of Industrial Painting Projects

G. Standard Practice for the Rapid Evaluation of Coatings and Linings by Severe Wastewater Analysis Test (S.W.A.T.)

Unless otherwise specified, references to documents shall mean the documents in effect at the time of receipt of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents or the last version of the document before it was discontinued.

In case of conflicting requirements between this specification and these referenced documents, the more stringent shall govern.

SUBMITTALS

Submit, in accordance with Section 01300 – Submittals and Section 01000 – Special Conditions, letters, shop drawings, and product data showing materials of construction, installation equipment and details of installation for the monolithic lining system including:

1. Product Data Sheets: Copies of current technical data for each component specified and applied as outlined in this Section.

2. Safety Data Sheets: Copies of current SDS for any materials brought on-site including all clean-up solvents, repair or resurfacing mortars and lining materials.

3. Qualification Data: Approved Installer Training Certificates from manufacturer.

4. Performance Testing Reports: Copies of test data for the entire physical, chemical, and permeation properties listed herein and as outlined within this Section.

5. Installation Instructions: Manufacturer's written installation instructions for the materials specified in this Section.

6. Construction Details: Copies of manufacturer's computer generated standard lining details for specified materials, including: leading edge termination, metal embedment in concrete, joint detail, wall-to-slab detail, pipe termination detail, and any other detail at the request of the Public Works Commission.

GUARANTEE

The installed lining system shall be guaranteed by the Contractor and Manufacturer for a period of five (5) years from the date of final acceptance. During this period, all defects discovered in the lining, as determined by the Public Works Commission, shall be repaired or replaced in a satisfactory manner by the Contractor at no cost to the Public Works Commission. All proposed repairs shall be submitted, reviewed, and approved by the Public Works Commission prior to the Contractor completing any work.

QUALITY ASSURANCE

The supplier shall be responsible for the provisions of all test requirements specified in the above referenced ASTM Standards as applicable. In addition, all lining products to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the Public Works Commission. The Contractor shall require the manufacturer's cooperation in these inspections. The cost of plant inspection of all lining products and materials approved for this Contract shall be borne by the Public Works Commission.

Inspections of the lining products and materials may also be made by the Public Works Commission after delivery. The lining products and materials shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though samples may have been accepted as satisfactory at the place of manufacture. Lining materials rejected after delivery shall be marked for identification and shall be removed from the job at once.

The Contractor shall initiate and enforce quality control procedures in accordance with the applicable ASTM, National Association of Corrosion Engineers (NACE), the Society for Protective Coatings (SSPC) standards, and in accordance with the manufacturer's instructions.

Acceptable Manufacturers: A company with a minimum of five (5) years experience in manufacturing of, and providing technical service for chemical resistant systems equivalent to those specified herein.

The manufacturer of the lining system of manholes shall be a company that specializes in the design and manufacture of corrosion protection systems for manholes. The Contractor shall be completely trained in leak repair, surface preparation, installation of the lining system, and corrosion materials application on manholes. The lining system materials/products shall be suitable for installation in a severe hydrogen sulfide

environment without any deterioration.

The applicator shall be trained and certified by the manufacturer for the handling, mixing, application and inspection of the manhole lining system as described herein.

DELIVERY, STORAGE AND HANDLING

Care shall be taken in shipping, handling and placing to avoid damaging the lining products. Extra care may be necessary during cold weather construction. Any lining product or material damaged in shipment shall be replaced as directed by the Public Works Commission.

Any lining product showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

While stored, the lining products shall be adequately packaged and protected. The lining products shall be stored in a manner as recommended by the manufacturer. The Contractor shall comply with the following:

1. Store the materials in sealed, original manufacturer's containers.
2. Store materials in a protected area out of direct sunlight.
3. Keep containers clean and undamaged.
4. Comply with manufacturer's published storage temperature and shelf life recommendations.
5. Protect all materials from freezing.

Deliver products to the job site in manufacturer's original, unopened containers bearing manufacturer's name and label and the following information

1. Product name.
2. Product description (generic product classification).
3. Manufacturer's lot number.
4. Color.

All materials shall be handled in accordance with their Safety Data Sheets (SDS) and the manufacturer's instructions.

PRODUCTS

The materials to be utilized in the lining of manholes shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. The manufacturer of corrosion protection products shall have a minimum of 10 years experience in the production of the lining products utilized and shall have satisfactory installation record. All rehabilitation products shall be manufactured by a single manufacturer, or the Contractor shall provide documentation that the materials are compatible with each other.

All lining materials shall be approved by U.S. EPA for sewer system rehabilitation.

The lining system shall be compatible with the thermal condition of the existing sewer manhole surfaces. Surface temperatures will range from 20°F to 100°F.

Any polymeric lining system that cannot provide test results of ASTM G 210 will not be approved for this application. (ASTM G 210– Standard Practice for Operating the Severe Wastewater Analysis Testing Apparatus).

The polymeric lining system shall provide a minimum service life of 50 years.

INFILTRATION CONTROL MATERIAL

Infiltration control materials shall be rapid-setting, high early strength, hand applied cementitious material for stopping infiltrating water and making repairs to concrete, brick or other masonry constructed manholes. The material shall be non-shrinking, non-metallic and non-corrosive. It shall be formulated at the factory and supplied in factory sealed and labeled pre-measured containers. The material shall be compatible with the lining material to be used. The material shall have the following minimum characteristics:

1. Compressive strength (in accordance with ASTM C-109):
   - 1 hour 1,000 psi
   - 1 day 2,400 psi
   - 7 day 3,500 psi
   - 28 day 4,500 psi

2. Tensile strength (in accordance with ASTM C-109):
   - 1 day 175 psi
   - 7 day 250 psi
   - 28 day 350 psi

3. Bond Strength (in accordance with ASTM C-321)
   - 30 minutes 50 psi
   - 1 day 85 psi

4. Freeze-Thaw Durability (in accordance with ASTM C-666)
   - 100 cycles no loss

5. Set Time (in accordance with ASTM C-191-92)
   - Initial 30 to 60 seconds
   - Final 1 hour

6. Shrinkage (in accordance with ASTM C-157) – 0%

Infiltration control material shall be CEMTEC Hydraulic Cement by A.W. Cook Cement; Mainstay ML-10 by Madewell Products Corporation; PLS-505 by Protective Liner Systems; Quad-Plug by Quadex; or approved equal.

Chemical sealants or grouts used to seal active manhole leaks, to patch cracks, to fill voids and to

otherwise prepare the manhole surfaces for the lining installation shall be suitable for the intended purpose and shall be compatible with the lining system as certified by the manufacturer.

All leaks shall be stopped prior to the installation of the lining system.

PATCHING MATERIAL

Voids in the existing manhole walls, benches, or damaged inverts must be repaired prior to installing the lining system. The patching material shall be a rapid setting, high early strength, corrosion resistant hand mixed and hand applied cementitious material intended for filling voids and repairing inverts in concrete, brick or other masonry constructed manholes. It shall be formulated in the factory and supplied in factory sealed and labeled pre-measured containers. The material shall be compatible with the lining material to be used. The material shall have the following minimum characteristics:

1. Compressive strength (in accordance with ASTM C-109):
   - 1 day 3,500 psi
   - 7 day 4,900 psi
   - 28 day 5,500 psi

2. Tensile strength (in accordance with ASTM C-109):
   - 1 day 200 psi
   - 7 day 250 psi
   - 28 day 550 psi

3. Freeze-Thaw Durability (in accordance with ASTM C-666)
   - 100 cycles no loss

4. Set Time (in accordance with ASTM C-191-92)
   - Initial 15 to 20 minutes
   - Final 20 to 25 minutes

Patching material shall be CEMTEC Rapid Cure Vertical Grade by A.W. Cook Cement; Mainstay ML-72 by Madewell Products Corporation; Hyperform by Quadex; or approved equal.

All voids and other repairs shall be completed prior to the installation of the lining system.

CEMENTITIOUS BASE COAT

The cementitious base coat shall be a pumpable Portland based 100% pure calcium aluminate cement. The lining shall be installed via trowel or low-pressure application. The materials shall be suitable for all the specified design conditions.

The cementitious base coat shall be a system suitable for use as a trowel- or spray-applied monolithic surfacing in sewer manholes. The cementitious lining system shall be Mainstay ML-CA by Madewell Products Corporation; Aluminaliner by Quadex; CEMTEC Silatec CAM by A.W. Cook Cement; PLS-507 by Protective Liner Systems; or approved equal.

The cementitious base coat shall be applied to the following minimum total thicknesses for all lining systems:

1. **For block and cast concrete manholes in good condition, apply to a minimum thickness of one-half (0.5) inch.**
2. **For all brick manholes and for block or cast concrete manholes in poor condition, apply to a minimum thickness of one (1.0) inch.**

It is the Contractor's responsibility to determine the required thickness of the cementitious base coat, based on the manhole condition, groundwater conditions, etc. to ensure the long-term integrity of the installed lining system.

The cementitious base coat shall be installed on the walls of existing manholes, from the invert to the manhole frame, as further directed below. All cementitious lining shall be troweled to consolidate the material, and then brushed to provide a profile surface for application of the polymeric topcoat. The initial trowelling shall be done in an upward motion, to compress the material into voids. The Contractor shall ensure that the cement is not over-troweled. The cured cementitious base coat surface shall be continuous with proper sealing connections to all unsurfaced areas. The Contractor shall take all measures to ensure that the cementitious base coat properly cures. The use of curing compounds is prohibited.

The materials used in the cementitious base coat shall be mixed on site in accordance with the manufacturer's recommendations. Water shall only be added to the materials during the mixing process and prior to material pumping or spray application. No water shall be added at the nozzle.

The cementitious base coat, when cured, shall have the following minimum characteristics at 28 days as measured by the applicable ASTM standards referenced herein:

1. Density (when applied) – 135 pounds/cubic foot, plus/minus 5 pounds/cubic foot

2. Compressive strength (in accordance with ASTM C-109):
   1 day 2,800 psi
   28 day 8,000 psi

3. Bond Strength (in accordance with ASTM C-321)
   28 day 1,700 psi

4. Flexural Strength (in accordance with ASTM C-78)
   28 day 1,500 psi

5. Shrinkage (in accordance with ASTM C-157) – 0%

6. Freeze-Thaw Durability (in accordance with ASTM C-666)
   300 cycles no loss

The cured cementitious base coat shall be continuously bonded to all the brick, mortar, concrete, chemical sealant, grout, pipe and other surfaces inside the sewer manhole.

Where the manhole to be rehabilitated is subject to vehicular traffic, the cementitious lining shall be installed to no closer than one (1) inch below the bottom of the manhole frame so as to avoid transfer of impact loads to the new liner. Where the manhole to be rehabilitated is not subject to vehicular loads, the cementitious liner shall be continuous up to the manhole frame.

POLYMERIC LINING SYSTEM

Materials

The lining system top coat shall be a polymeric system suitable for use as a trowel- or spray-applied monolithic surfacing in sewer manholes. The polymeric lining system may be a two part 100% solids epoxy, epoxy mortar or polyurethane resin system. Accepted manufacturers are:

Epoxy Systems:	Mainstay DS-5 Epoxy by Madewell Products Corporation; PLS-614 by Protective Liner Systems; Raven 405 by Raven Lining Systems; Dura-Plate 5900 HB Epoxy by Sherwin-Williams; Dura-Plate 6100 HP Epoxy by Sherwin-Williams; or approved equal.
Epoxy Mortar:	Dura-Plate 5900 HB Epoxy Mortar by Sherwin-Williams; or approved equal.
Polyurethanes:	Sher-Flex by Sherwin-Williams; or approved equal.

The lining system top coat shall be a 100% solids, epoxy polymer protective barrier material specifically designed to protect concrete and steel surfaces in severe wastewater environments, including associated abrasive physical attack and chemical attack from sewer gases and organic acids generated by microbial sources.

Epoxy lining shall be capable of achieving the specified thickness in a single coat application.

The polymeric top coat materials shall be applied by low pressure spray or hand applied to the minimum dry film thickness of 150 mils.

The polymeric materials shall be suitable for sewer system service and chemically resistant to any chemicals or vapors normally found in domestic and/or commercial sewage. The polymeric material shall be compatible with the cementitious base coat material, as per manufacturer's recommendations.

Installation

The polymeric lining system shall be installed over the cementitious base coat previously applied on the inverts, benches, and walls of the designated manholes. The polymeric liner shall be applied only after the cementitious base coat has properly cured, in accordance with the manufacturer's instructions.

The Contractor shall saw-cut the existing walls, benches, and/or inverts in order to "tie-in" the polymeric lining.

The cured surface of the polymeric lining system shall be smooth and continuous with proper sealing connections to all unsurfaced areas. The sprayed-on liner shall be troweled to consolidate the product into the profile of the substrate or resurfacing mortar.

When cured, the monolithic polymeric lining system shall form a continuous, tight-fitting, hard, impermeable surfacing which is suitable for sewer system service and chemically resistant to any chemicals or vapors normally found in domestic sewage. The polymeric lining shall be continuously bonded to the cementitious base coat.

Where the manhole to be rehabilitated is subject to vehicular traffic, the polymeric lining system shall be installed to no closer than one (1) inch below the bottom of the manhole frame so as to avoid transfer of impact loads to the new liner. In those locations where the manhole is subject to vehicular traffic, a chimney seal shall be installed to "bridge" the gap between the manhole frame and the polymeric lining system. Where the manhole to be rehabilitated is not subject to vehicular loads, the polymeric lining system shall be continuous up to the manhole frame. **The polymeric lining system shall not be applied to the manhole frame.**

SPECTRASHIELD LINING SYSTEM

In addition to the above products and materials, the "Spectrashield" lining system as furnished by CCI Spectrum, Inc. is an approved equal. All products and materials for the "Spectrashield" lining system shall be in accordance with CCI Spectrum, Inc. requirements. Manhole preparation shall be in accordance with the following:

- Stop all active leaks and infiltration utilizing an approved infiltration control material
- Patch all voids in the manhole utilizing an approved patching material
- Install the "Spectrashield" lining system to build back the manhole profile (the minimum thickness shall be **500 mills**)

All work shall be in accordance with these Contract Documents and as directed by the Public Works Commission.

INSTALLATION

GENERAL

All work shall be in accordance with these Contract Documents and as directed by the Public Works Commission.

The Contractor shall take appropriate action to comply with all local, state and federal regulations including those set forth by OSHA, EPA, the Public Works Commission and any other applicable authorities.

Prior to conducting any work, the Contractor shall perform an inspection of the structure to determine any need for protection against hazardous gases or oxygen depleted atmosphere and the need for flow control or flow diversion.

The Contractor shall clean each sewer manhole and shall properly dispose of any resulting material. The Contractor shall take sufficient precautions prevent any debris from their operations to enter the sewer system.

All surface washing, abrasive blasting, waterjetting, grinding, patching, filling and preparation shall be completed by the Contractor in accordance with the lining system manufacturer's recommendations.

The Contractor shall notify all property owners who discharge sewage directly to the manhole being rehabilitated that their service will be discontinued while the lining system is being installed, cured and active pipe and service connections reopened. The Contractor shall notify individual property owners at least 48 hours in advance, giving the date, start time and estimated completion time for the work being conducted.

Application procedures shall conform to recommendations of the manufacturer, including materials handling, mixing, environmental controls during application, safety and spray equipment. Material shall not be applied during freezing weather conditions. No material shall be placed when the ambient air temperature is below 40°F, or when the temperature is anticipated to fall below 32°F in the next 24 hours.

Spray equipment shall be specifically designed to accurately ratio and apply the liner system.

SURFACE PREPARATION

Surface preparation methods may include high pressure water cleaning, hydro blasting, abrasive blasting, grinding, detergent water cleaning, and shall be suited to provide a surface compatible for installation of the liner system. Remove all dust, biological growths, grease, oil, paint or any other surface contaminants or coatings from all surfaces to be lined, including manhole walls, corbelling and manhole frame. The choice of surface preparation lies solely with the Contractor. The Contractor shall determine the required surface preparation method based upon the condition of the manhole, the presence of potential contaminants, access to perform the work, and the required condition of the surface to apply to specified lining system, as required by the manufacturer.

The surface preparation method shall produce a cleaned, abraded and sound surface with no evidence of laitance, loose concrete, brick or mortar, contaminants or debris, and shall display a surface profile suitable for application of the manhole lining system. The Contractor shall prepare the surface in accordance with the applicable NACE and/or SSPC recommendations for the specified lining system.

Coatings that cannot be removed shall be properly prepared (in accordance with these Specifications) to obtain and insure adequate bonding of the cementitious base coat material.

The Contractor shall conduct a visual inspection of each manhole after it is cleaned. All active infiltration leaks shall be plugged or sealed with an appropriate infiltration control material compatible with the cementitious base coat. The Contractor shall remove all loose mortar and rubble from existing walls, benches and inverts. Repairs to exposed rebar, defective pipe penetrations or inverts, etc. shall be repaired utilizing non-shrink grout or approved alternative method. The Contractor shall prepare manhole to receive the cementitious base coat as necessary by reshaping and repairing benches, inverts, and walls where required. All interior surfaces shall be prepared as recommended by the base coat lining manufacturer. Minimum requirements are as listed below.

1. All cracks and other voids must be repaired and filled with suitable non-shrinking cements, sealants or grouts, including all voids between the existing sewer pipes and manhole walls. Patching compounds shall be compatible with the proposed lining system. All patches shall be smooth and even with the manhole wall.
2. All existing manhole rungs/steps shall be removed and the void patched or cut off and ground smooth.
3. All surfaces shall be suitably prepared for the required bonding of the cementitious base coat as recommended by the manufacturer.

Concrete surfaces to be coated shall be free of curing compounds and form release agents, laitance and foreign particles that may inhibit bonding. Prior to the start of the protective coating system application, the Contractor shall pre-clean as required, and inspect the substrate in accordance with SSPC-SP13/NACE No. 6, Severe Service. Surface preparation procedures shall be in accordance with NACE SP0892, SSPC-SP13/NACE No. 6 and ICRI Guideline No. 310.2. Surface preparation shall expose aggregate and obtain a uniform surface texture resembling the minimum recommended concrete surface ICRI-CSP profile. The Contractor shall remove all dust, biological growths, grease, oil, paint or any other surface contaminants or coatings from all surfaces to be lined, including any metal work to be coated.

Existing Concrete Application: Existing concrete structures to receive the protective coating system must be capable of withstanding imposed loads. All oil, grease, waste and chemical contaminants shall be removed from the surface of the concrete prior to preparation in accordance with NACE SP0892 and SSPC-SP13/NACE No. 6. Concrete surfaces must be sound and capable of supporting the proposed polymeric lining system. Surface preparation requirement is to expose a sound, uniform surface texture confirming to the minimum recommended ICRI-CSP. The appropriate cementitious repair mortar or epoxy cementitious repair material shall be applied to the entire, prepared surface to level surface suitable for coating.

Commencement of the Work of this Section shall indicate that the substrate and other conditions of installation are acceptable to the Contractor, and will produce a finished product meeting the requirements of these Contract Documents. All defects resulting from accepted conditions shall be corrected by Contractor at his own expense.

All concrete surfaces shall be prepared to a minimum of SSPC-SP13 prior to installation of the polymeric lining system.

Level or grind concrete substrates to produce a uniform and smooth surface, including removal of all sharp edges, ridges, form fins, and other concrete protrusions.

FLOW CONTROL

It is the intent of these Contract Documents that the Contractor will utilize flow-through plugs or other means to complete the manhole rehabilitation without the use of a temporary sewer bypass system. All temporary flow-through plugs shall be removed upon the completion of each step of the rehabilitation process (cementitious base coat, polymeric top coat). The Contractor shall be responsible for ensuring that their flow control system does not result in any sanitary sewer being discharged to the environment.

If required to properly complete the lining, the Contractor shall provide temporary bypass pumping of sewage flows where and when the rehabilitation work is being performed. The temporary bypass pumping shall be in accordance with Specification Section 02750 – Wastewater Flow Control and these Contract Documents.

INFILTRATION CONTROL

After surface cleaning, any visible leaks or infiltration shall be stopped, prior to installation of any patching material or the cementitious base coat. Infiltration and leaks shall be stopped utilizing hydraulic cement or other "typical" methods (i.e., oakum). It is the intent of these Contract Documents that the Contractor will take all necessary steps to stop all but the very large leaks without the use of chemical grout. Should a significant, very large leak be encountered that would require significant effort, large quantities of chemical grout, and/or other extreme measures, the method and cost to stop that leak shall be mutually agreed upon by the Contractor and the Public Works Commission, prior to commencing work.

A complete, watertight seal shall be provided at pipe and manhole wall connections. The Contractor shall submit details of how the watertight connections will be made to the Public Works Commission for review and approval.

REPAIR OF BENCHES AND INVERTS

The Contractor shall complete any necessary repairs to the bench and/or invert of the manhole, prior to installation of the specified lining system. All repairs shall be completed in accordance with the requirements of the Public Works Commission, and as outlined herein.

The invert channel shall be constructed of brick and mortar, in accordance with Public Works Commission standard details. The invert channel shall be smooth and semicircular in shape conforming to the inside of the connecting sewer section. Changes in direction of flow shall be made with a smooth curve as large as a radius as the size of the manhole will permit without a decrease in flow velocity. Changes in size and grade of the channel shall be made gradually and evenly. A shelf shall be provided on each side of any manhole invert channel. Inverts in manholes with standing water will not be acceptable.

CEMENTITIOUS BASE COAT

The Contractor shall furnish and place the cementitious base coat in each manhole as and where directed by the Public Works Commission. The installation of the cementitious base coat shall be in complete accordance with the manufacturers' specifications.

Prior to placing the cementitious base coat, the Public Works Commission and the Contractor must inspect and approve the surface preparation work. The Contractor shall notify the Public Works Commission when the manholes are ready for inspection. The Contractor is responsible for ensuring proper installation conditions including surface preparation, temperature, and moisture.

All bottom and horizontal surfaces shall have the cementitious base coat material applied to the required thickness by hand troweling or spray-on methods. All cementitious lining shall be troweled to consolidate the material, and then brushed to provide a profile surface for application of the polymeric

topcoat. The initial troweling shall be done in an upward motion, to compress the material into voids.

All side vertical surfaces shall have the cementitious base coat applied to the required thickness in one pass or application. Non-vertical surfaces may be completed in multiple passes to prevent sloughing of material.

Temperature limitations must be handled as appropriate and as approved by the manufacturer.

POLYMERIC TOP COAT

The Contractor shall furnish and place the polymeric lining over the previously installed cementitious base coat and all other surfaces to be lined, and as may be directed by the Public Works Commission. The installation of the polymeric lining top coat shall be in complete accordance with the applicable provisions of the manufacturers' specifications.

The Contractor shall provide documentation that the mixing of materials is in accordance with the manufacturer's instructions.

Prior to placing the top coat, the Public Works Commission and the Contractor must inspect and approve the cementitious base coat. The Contractor shall notify the Public Works Commission when the manholes are ready for inspection. The Contractor is responsible for ensuring proper installation conditions including cementitious base coat conditions, temperature and moisture.

The Contractor shall saw-cut the existing walls, benches, and/or inverts in order to "tie-in" the polymeric lining.

All surfaces shall have the monolithic polymeric lining applied by a spray-on method or by hand troweled applications in multiple passes to gradually build up to the required thickness.

Temperature limitations must be handled as appropriate and as approved by the manufacturer.

SPECTRASHIELD LINING SYSTEM

Installation of the "Spectrashield" lining system, as furnished by CCI Spectrum, Inc. shall be in accordance with the manufacturer's requirements. Manhole preparation shall be in accordance with the requirements outlined in these Contract Documents.

FIELD QUALITY CONTROL

The Contractor to perform the quality control procedures listed below in conjunction with the requirements of this Specification Section.

A. Inspect all materials upon receipt to ensure that all are supplied by the approved Manufacturer.

B. Surface pH Testing: The pH of the concrete substrate will be measured using pH indicating papers. The pH testing is to be performed once every 50 square feet. Acceptable pH values shall be a minimum 9.0 as measured using color indicating pH paper with readable color calibrations and a

scale at whole numbers (minimum). Use Hydrion Insta-Check Jumbo 1-12, or approved equal. The paper shall be touched to the surface once using moderate gloved finger pressure. The surface shall not be wiped or moved laterally to disturb the surface during pH testing. Following the one touch, lift the paper vertically to not "wipe" the surface. Compare the color indicated with the scale provided and record the pH. Spot check any questionable areas with a 1% phenolphthalein solution. The phenolphthalein solution shall turn bright pink on concrete.

TESTING

During application of the polymeric top coat, the Contractor shall measure the thickness and uniformity of the material by the use of a wet film thickness gage meeting the requirements of ASTM D 4414. Measurements shall be completed in the presence of the Public Works Commission. The Contractor shall document all measurements for each manhole and submit the documentation to the Public Works Commission. The documentation shall be submitted with each pay application.

Field acceptance of the manhole lining system shall be based on the Public Works Commission's evaluation of the appropriate installation of the base coat and top coat per field inspections and on observation of the measurements of the wet film thickness. Acceptance shall also be based on the Public Works Commission's evaluation of the curing test data and final testing.

The polymeric lining top coat shall provide a continuous monolithic surfacing with uniform thickness throughout the manhole interior and be free of pinholes, slumps and drips. A visual inspection shall be conducted to ensure that no pinholes are in the monolithic coating. The visual inspection shall include terminations and transitions of the polymeric liner.

Once the lining system has fully cured, it shall be checked via high voltage spark detection, in accordance with NACE SP0188 and the manufacturer’s instructions. All defects shall be corrected at no cost to the Public Works Commission. The high voltage spark detection shall be done in accordance with:

1. The manhole environment shall be properly vented prior to testing to ensure hazardous conditions do not exist.
2. The high voltage spark detection equipment shall be set at 100 volts per one (1) mil of of applied film thickness, or as recommended by the manufacturer.
3. All detected holidays shall be marked and the area of the liner shall be repaired. The surface area around the defect in the liner shall first be abraded using an appropriate grit paper or other hand abrasion tool. After abrading and cleaning the area, the area shall be patched by hand application of the polymeric lining topcoat material. All repair procedures shall follow manufacturer’s recommended procedures.
4. All repaired areas shall be spark tested.

The Contractor is expected to perform preliminary spark testing prior to scheduling a final test with the Public Works Commission. Any defects noted during this preliminary testing shall be repaired in accordance with these specifications and the manufacturer’s recommended procedures.

ACCEPTANCE

The Public Works Commission shall complete a final inspection of each manhole, to include a visual

inspection to verify that no leakage through the manhole wall is occurring, the manhole has been rehabilitated in accordance with the Contract Documents, and witness the final spark test. The Public Works Commission shall visually inspect every manhole and shall observe the final spark testing for every manhole. The Contractor shall coordinate with the Public Works Commission to schedule the final inspection. Any deficiencies noted during the final inspection shall be repaired in accordance with these specifications and the manufacturer's recommended procedures.

Inspection by the Public Works Commission does not absolve the Contractor from their responsibility for quality control inspection and testing as specified in these Contract Documents or as required by the manufacturer's instructions.

There shall be no groundwater infiltration or other leakage through the manhole wall after it has been lined. If leakage is found, it shall be eliminated with an appropriate method as recommended by the liner manufacturer and approved by the Public Works Commission. Any leakage shall be sealed utilizing materials compatible with the lining system, in accordance with the manufacturer's directions, and as approved by the Public Works Commission. The repair materials shall have the same life expectancy of the installed lining system. All repair materials shall be properly cured in accordance with the manufacturer's instructions. The use of curing compounds is prohibited.

All pipe connections shall be open and clear.

There shall be no cracks, voids, pinholes, slumps, drips, uncured spots, dry spots, lifts, delaminations or other type defects in the lining. The polymeric lining shall provide a continuous monolithic surface with uniform thickness throughout the manhole.

If any defective lining is discovered after it has been installed, it shall be repaired or replaced in accordance with the manufacturer's recommendations and in a satisfactory manner to the Public Works Commission. This requirement shall apply for the entire guarantee period.

The Contractor shall demonstrate that the installed lining system does not interfere with the proper sealing and locking (as applicable) of the manhole cover. Upon completion of the spark testing, all manholes shall be locked (if so equipped). For those manholes within paved areas, the Contractor shall apply four (4) dollops of roofing tar to the frame, to eliminate the cover from rattling. The dollops shall be equally spaced around the frame. The Public Works Commission Project Coordinator shall verify that the manholes are secured (locked and/or tarred).

At the completion of the Work, the Contractor shall remove all materials and debris associated with the Work of this Section.

The Contractor shall clean all surfaces not designated to receive the specified lining system. The Contractor shall restore all other work in a manner acceptable to the Public Works Commission.

The installed lining system shall be protected from damage until Final Acceptance of the Work. Any damage to the installed lining system shall be repaired or replaced at the discretion of the Public Works Commission, at no additional cost to the Public Works Commission.

*** END OF SECTION ***

DIVISION 2
SITE WORK

02765 MANHOLE CHIMNEY SEALS

GENERAL

The Contractor shall furnish all labor, materials, equipment, and incidentals required and install the manhole chimney sealing system and appurtenances as specified herein. The internal manhole sealing system shall seal the manhole, from the top of cone up to, and including, the joint between the manhole cone (including all extensions to the chimney area) and the manhole ring. The Contractor shall furnish all necessary materials, labor, and equipment necessary to properly prepare the surface and apply the sealing system. Installation of the sealing system shall be in accordance with these Contract Documents and the manufacturer's recommendations.

All manhole chimney sealing systems shall be installed after the manhole has been relined, unless otherwise directed by the Public Works Commission.

The Contractor shall accurately field measure and size each individual manhole. The Contractor is responsible for performing any and all necessary field measurements, in order to ensure that the sealing system is properly installed in accordance with the requirements of these Contract Documents and the manufacturer.

RELATED SECTIONS

A. Section 02500 – Traffic Control
B. Section 02762 – Manhole Lining – Polymeric
C. Section 02763 – Manhole Lining – Cured-in-Place

REFERENCE STANDARDS

The following American Society for Testing and Materials (ASTM) standards are incorporated by reference into this specification. The latest edition of the reference shall be used.

A. ASTM D412-06ae2 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
B. ASTM D2240-97e1 – Standard Test Method for Rubber Property - Durometer Hardness

In case of conflicting requirements between this specification and these referenced documents, this specification will govern.

SUBMITTALS

All submittals shall be provided in accordance with Section 01000 – Special Conditions and Section 01300 – Submittals.

GUARANTEE

All sealing systems installed shall be guaranteed by the Contractor for a period of five (5) years from the date of final acceptance. During this period, all defects discovered in the sealing system, as determined by the Public Works Commission, shall be repaired or replaced in a satisfactory manner by the Contractor at no cost to the Public Works Commission.

QUALITY ASSURANCE

The supplier shall be responsible for the provisions of all test requirements specified in the above referenced ASTM Standards as applicable. In addition, all products to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the Public Works Commission. The Contractor shall require the manufacturer's cooperation in these inspections. The cost of plant inspection of all products and materials approved for this Contract shall be borne by the Public Works Commission.

Inspections of the products and materials may also be made by the Public Works Commission after delivery. The products and materials shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though samples may have been accepted as satisfactory at the place of manufacture. Materials rejected after delivery shall be marked for identification and shall be removed from the job at once.

The manufacturer and/or applicator of the sealing system shall be a company that specializes in the design, manufacture or installation of corrosion protection systems for manholes. The applicator shall be completely trained in the installation of the sealing system in manholes. The sealing system shall be suitable for installation in a severe hydrogen sulfide environment without any deterioration to the liner.

The applicator shall be trained and certified by the manufacturer for the handling, mixing, application and inspection of the manhole sealing system as described herein.

DELIVERY, STORAGE AND HANDLING

Care shall be taken in shipping, handling and placing to avoid damaging the sealing system products. Extra care may be necessary during cold weather construction. Any sealing system product or material damaged in shipment shall be replaced as directed by the Public Works Commission.

Any sealing system product showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

While stored, the sealing system products shall be adequately packaged and protected. The sealing system products shall be stored in a manner as recommended by the manufacturer.

PRODUCTS

SEALING SYSTEM

The materials to be utilized in the sealing of manhole chimneys shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. Manufacturer of corrosion protection products shall have long proven experience in the production of the lining products utilized and shall have satisfactory installation record.

Equipment for installation of lining materials shall be high quality grade and be as recommended by the manufacturer.

The manhole seal shall be designed to prevent leakage of water into the manhole through the frame joint area and the area above the manhole cone including all extensions to the chimney area. Extensions shall include, but are not limited to: concrete adjustment rings, brick, and/or block material that may have been used to achieve grade.

The manhole seal shall remain flexible allowing for the repeated vertical or horizontal movements of the frame due to frost lift, ground movement or the thermal movement of pavements.

The manhole sealing material shall be made no less than 170 mils of corrosion resistant aromatic flexible urethane resin coating to be applied to the inside wall of the entire chimney area as described above.

The product shall have a minimum elongation of 800% and hardness (Durometer) of 75.

The installed sealing system shall have a minimum tensile and adhesion strengths of 1150 psi and 175 lb. l/in. respectively.

The manhole sealing system shall conform to the physical requirements of ASTM D- 412.

The lining product shall have an aromatic urethane primer resin on the complete surface.

The sealing system shall line the interior of the adjustment area from the cone/top of the manhole and onto the inside of the casting.

If the manhole has been relined prior to the seal installation the seal shall cover a minimum of 12 vertical inches, as measured from the casting.

PATCHING MATERIAL

Voids in the existing manhole walls must be repaired prior to installing the manhole chimney sealing system. The patching material shall be a rapid setting, high early strength, corrosion resistant hand mixed and hand applied cementitious material intended for filling voids and making repairs in concrete, brick or other masonry constructed manholes. It shall be formulated in the factory and supplied in factory sealed and labeled pre-measured containers. The material shall be compatible with the sealing system to be used. The material shall have the following minimum characteristics:

1. Compressive strength	ASTM C109	2,000 psi at 24 hours

2. Shrinkage	ASTM C 596	0 percent at 90 percent relative humidity
3. Set time	ASTM C 191-92	3 to 5 minutes

Product shall be Permacast-Patch as manufactured by Action Products Marketing Corp., Strong-Seal QSR by Strong Company, Preco-Patch by Fosroc Inc. or approved equal.

INSTALLATION

The Contractor shall remove all loose and protruding mortar and brick that would interfere with the sealing system's performance. Any protrusions on the casting shall be cut flush to the casting.

Any voids or repairs to the concrete, brick, or block manhole walls shall be repaired and filled with suitable non-shrinking cements, sealants, or grouts. The patching material shall be compatible with the chimney sealing system. All patches shall be smooth and even with the manhole wall. The Contractor shall allow the patching cement to completely sure prior to beginning installation of the chimney sealing system.

The Contractor shall prepare the surface by sandblasting and utilizing an acetone wet wipe to ensure a clean surface as required by the manufacturer. The substrate surface must be free of sand, loose debris, latencies, dust, oil, grease or chemical contamination. A blower or torch may be required to completely dry the substrate surface or as recommended by manufacturer.

All active, hydrostatic infiltration leaks shall be plugged or sealed with an appropriate grout compatible with the sealing system.

The Contractor shall properly mix the sealing system agents (if necessary), in accordance with the manufacturer's instructions.

The Contractor shall ensure that the casting and structure surfaces are clean and dry, prior to application of the primer. Primer shall be applied in accordance with the manufacturer's instructions.

Once the primer has dried in accordance with the manufacturer's instructions, the sealing system shall be applied to the entire chimney area, to include the frame joint area, the area above the manhole cone, and all extensions in the chimney area. The sealing system shall be installed in accordance with the manufacturer's instructions.

The chimney sealing system shall be as manufactured by Sealing Systems, Inc., or approved equal.

DIVISION 2
SITE WORK

02831 CHAIN LINK FENCING

GENERAL

Where shown on the plans there shall be installed a "chain link" fence with all necessary posts, braces, top rail, gates, fabric, extension arms, and three strand barbed wire.

The erected fence shall meet the following requirements:

> The enclosing fence shall have an overall fabric height of six feet (6') and an additional one foot (1') of three strand barbed wire, for a total height of seven (7'). The gates shall be seven feet (7') in overall height.

MATERIALS

Fabric: Fencing shall be chain link #9 gauge aluminized continuously woven wire 2" uniform square mesh without knots or ties, except for knuckling and barbing. Both the top and bottom edges of the fabric shall be barbed unless otherwise shown on the plans. The Contractor shall not piece together a number of short pieces of fence fabric.

Tensile Strength Test: Wire pickets of which this fabric is made to stand a tensile strength test of approximately 70,000 pounds per square inch based on the cross sectional area of the galvanized wire.

Framework: All posts and other appurtenances used in construction shall be hot-dipped, galvanized with a minimum of 1.8 oz. per square foot surface.

Line Posts: Hot dip galvanized "H" column (2" x 2 1/4") weight 4.1 pounds per linear foot, minimum carbon content 0.355. No used or open seam material will be permitted in posts or rails. (Alternate 2 1/2" O.D. galvanized pipe weight 3.65 pounds per linear foot or C-section line posts of the same dimension as H-post, 0.120 in wall thickness and fabricated from steel conforming to ASTM A-570, Grade E.) Intermediate posts shall be evenly spaced no more than 10 feet apart on center.

Top Rail: Hot dip galvanized pipe 1 5/8" O.D., weight 2.27 pounds per linear foot protected with outside sleeve type couplings at least 7 inches long. No used or open seam material will be permitted.

Terminal Posts: End, corner and pull posts hot dip galvanized pipe 3" O.D. - 5.79 pounds per linear foot. Gate posts hot dip galvanized pipe of "H" construction as specified.

Tension Wire: A bottom tension wire 7 gauge, alzd. (0.4 oz./s.f.), 6 inches above grade. Wire shall be fastened to fabric with aluminum rings at 24" on center and to each intermediate post.

Extension Arms: Hot dip galvanized. Line post arms of pressed steel malleable base; end, and corner post arms of malleable iron; gate posts to have ornamental top. Each extension arm to carry three strands of barbed wire approximately 12 inches out from fence line. Barbed wires to be securely fastened in by means of self-locking grooves. The barbed wire shall support a minimum of 400 lbs. vertical dead load from tip of arm. The barbed wire shall be 4-point pattern composed of two strands of No. 12 1/2 gauge galvanized wire.

Gates: Frame to be galvanized pipe 2.0 inches O.D. weighing 2.27 pounds per foot. Each frame to be equipped with 3/8-inch diameter adjustable truss rods. Gateposts and corner posts shall be 3 inches O.D. weighing 5.11 pounds per foot. Gates are to be manufactured using 2" aluminum tubing in lieu of the specified Schedule 40 steel pipe. Gateposts and corner posts shall be 6 5/8" O.D. for swing gates (greater than 20 feet in length and 4" O.D. for slide gates, weighing minimum of 5.11 pounds per foot. Corner fittings to be heavy pressed steel or malleable castings. Fabric to be same as in fence. Gates to be completed with malleable ball and socket hinges, catch, stops and rest. Hinges to permit gate to swing back against fence, 180 degrees if required. Latches shall be arranged for padlocking so that the padlock will be accessible from both sides of the gate regardless of the latching arrangement.

Braces: Brace material to be hot dip galvanized and same as top rail, to be spaced midway between top rail and ground, and to extend from terminal post to first adjacent line post. Braces to be securely fastened to post by suitable connections, and then trussed from line post back to terminal post with 3/8 inch round rod equipped with a turnbuckle for adjusting.

Fittings: Hot dip galvanized. All fittings to be malleable, cast iron or pressed steel.

Fabric-Bands: Fabric to be fastened to line post with (9 gauge) fabric bands spaced approximately 18 inches apart, and to top rail with wires (9 gauge) spaces approximately 24 inches apart.

Locks: Locks will be provided by the Owner.

INSTALLATION

General: Installation shall be made in a workmanlike manner by skilled workers experienced in the erection of this type of fence and in accordance with the manufacturer's recommendations. The fence shall be erected on a previously prepared surface to the lines and grades indicated on the plans.

Post Setting: All posts shall be set plumb and in alignment into a 36-inch concrete footing of proper size and shape so as to furnish sufficient support to withstand any strain or shock ordinarily brought to bear on a fence of this character. The concrete strength shall be 3000 psi (ASTM C-94) and the foundations a minimum of 9 inches in diameter for line post and 12 inches for terminal post.

Concrete shall be thoroughly compacted so as to be free of voids and finished in a dome. Straight runs shall not exceed 500 feet between brace posts. Concrete shall cure a minimum of 72 hours before any further work is done on the posts.

Fabric: The fabric and barbed wire shall be stretched to the proper tension as recommended by the manufacturer and securely fastened to the framework members to result in a straight fence line without sagging. The bottom of the fabric shall be held as uniformly as is practicable to the finished grade.

DIVISION 2
SITE WORK

02931 SOD

GENERAL

Restoration of existing lawn areas outside of the public right-of-way disturbed by construction activities shall be by installation of new sod. Restoration and sod shall be performed as soon as practical, but the time period between initial disturbance, the utility installation and sod placement shall not exceed 60 days. Sod is defined as blocks, squares, strips of turf grass and adhering soil used for vegetative planting. Sodding and preparation of the sod bed shall be performed by an experienced landscape subcontractor specializing in this type of operation unless otherwise approved by the Public Works Commission in writing.

The Contractor shall adhere to the standards set forth by the American Association of Nurseryman and the Associated Landscape Contractors of America. All personnel shall be appropriately trained with regard to the degree of involvement so to assure the Owner the highest level of workmanship. Sod species suitable in this area are hybrid bermuda, centipede and zoysia; however the sod placed for each individual's lawn shall be the same species of sod as existing. Sodding may be performed at any time of the year except frozen sod shall not be placed nor shall sod be placed on frozen ground. The Contractor shall adapt his operations to variations in weather or soil conditions as necessary for the successful establishment and growth of a vigorous, disease free and weed free sod lawn.

MATERIAL

Materials, equipment and products incorporated in the work shall be approved by the Public Works Commission. The Contractor shall submit a list of the proposed materials with samples, if required. Package materials should be delivered in unopened original containers showing weight, analysis and name of manufacturer. The Contractor shall protect the material from deterioration and/or damage

Sod shall contain 95 percent permanent grass; not more than five (5) percent weeds and undesirable grasses, good texture and free from obnoxious grasses, roots, stones and foreign materials. Sod shall be uniformly 1 ½ to 2 inches thick with a well developed fibrous root mat system in topsoil with clean cut edges. The sod shall be sufficiently dense and cut to the minimum required thickness such that if the sod is suspended by one corner, the sod will not tear apart. The sod shall be recently mowed to a height of not more than three (3) inches prior to harvest. The sod shall be supplied and maintained in a healthy condition as evidence by the grass being a normal green color in appearance, dense, and free from insects, pests, disease or injury. Sod shall be delivered to the job site within 24 hours after being cut and shall be installed within 24 hours after delivery. Any sod which is torn, broken or too dry will be rejected.

SOIL BED PREPARATION

Before landscape construction is to begin, the site shall be cleaned and disposed of brush, rubbish, stones, gravel and other foreign material within the area to be landscaped. Exposed ground surfaces disturbed during construction activities shall be graded to the original contours (allowing for the thickness of the sod) or as in the case of an altered contour such as a fill slope, graded as directed by the Public Works Commission to finish grade, or typical cross section. The sod bed shall be excavated to such a depth that after sod placement the top of the sod shall be flush with surrounding grade or contours. Rake areas to be sodded smooth, free from unsightly variations, bumps, ridges or depressions. Do not start work until conditions are satisfactory and do not work during inclement or impending inclement weather.

The surface area to receive sod shall contain a minimum of four (4) inches of good, fertile, friable, organic natural topsoil loam as a base for laying the sod. Topsoil shall be free of clumps, brush, sticks, weeds, stones, roots, trash or other objectionable material. Contractor shall insure all topsoil to be free of plants or plant parts of quackgrass, johnson grass, nut sedge, poison ivy or other noxious weeds. The Contractor shall furnish and supplement the existing topsoil at no additional costs to the Public Works Commission providing a minimum four (4) inch thickness as specified. Soil preparation shall not be performed in frozen or extremely wet conditions. The finished topsoil bed shall be uniform in grade, with a yard like appearance. All changes in grade shall have a smooth, rounded peaks and valleys.

The soil shall be scarified or otherwise loosened to a depth of not less than five (5) inches and all clods shall be broken. The top four (4) inches shall be worked into an acceptable smooth, friable and uniformly fine texture sod bed by use of soil pulverizes, drags, harrows or by other methods approved by the Public Works Commission. Commercial grade fertilizer (8% nitrogen, 8% phosphate, 8% potash) shall be applied at a rate of 20 pounds per 100 square feet, super-phosphate at 12 pounds per 1,000 square feet and lime (dolomite limestone containing not less than 85% total carbamates) shall be applied at a rate of 25 pounds per 1,000 square feet or at a rate recommended for the type of sod being placed. Apply soil amendments within 24 hours after raking topsoil base surface and not more than 48 hours prior to laying sod. Mix thoroughly a minimum depth into the upper four (4) inches of topsoil and lightly water to aid in dissipation. Sod placement shall not begin until the soil preparation is inspected and approved by the Public Works Commission. During application of soil amendment fertilizer etc., adequate precautions shall be taken to prevent damage to existing features such as traffic, structures, landscape, trees, vegetation, utilities or any other appurtenances. The Contractor shall be required to repair or clean any damages.

PLACING SOD

The Contractor and his landscape subcontractor shall coordinate the placing of the sod to begin

within 24 hours after the topsoil base preparation is completed and accepted by the Public Works Commission. Sod shall be brought to the site as near to the time of placing as possible. Store sod in the shade, and keep watered particularly in extreme hot and dry condition to insure vitality and to prevent the dropping off of soil during handling. During wet weather, the sod shall be allowed to dry sufficiently to prevent tearing. Handling shall be done in a manner which will prevent tearing, breaking, drying or other damage. Carefully place sod in rows with the longer side perpendicular to slopes and the ends staggered in each successive row in a brick-like pattern. Butt the ends and sides together tightly and do not overlap or stretch the sod. Do not leave any voids or gaps. Unavoidable gaps shall be closed with small pieces of torn or broken sod if kept moist and approved by the Public Works Commission. After the sod is laid, irrigate thoroughly to allow water to penetrate a minimum six (6) inches into the soil below the sod. Sod shall not be placed when the atmospheric temperature is below 32oF.

Tamp and roll completed sod installation with a manual roller or approved equipment to eliminate minor irregularities and to form close contact with the soil bed immediately after placing and watering. The type of rolling and tamping equipment to be used shall be submitted to the Public Works Commission for approval prior to construction. On steep slopes 3:1 (horizontal and vertical) or greater, in drainage ditches or any areas where sod slipping may occur, anchor sod with approved wooden stakes (½"x ¾" x 12") or staples spaced not over two (2) feet apart in any direction and/or in sufficient number to prevent slippage or displacement. The anchors shall be driven flush with the surface of the sod. The wide flat side of the stake shall be driven parallel to the slope. Staking shall be done concurrently with sod placement and prior to tamping. Sod shall be laid with the long horizontal edge of the strips parallel to the contour starting at the bottom of the slope. The edge of the sod shall be turned slightly in the ground at the top of a slope and a layer of earth placed over it and compacted so as to conduct the surface water over and onto the top of the sod. Upon completion of the above described work, the surface of the sodded areas shall coincide with the finished grade and not exceed ¼" plus or minus variation to adjoining grade or proposed contour. Extreme care shall be taken to prevent the installed sod from being torn or displaced.

MAINTENANCE

The Contractor shall, at no additional cost to the Public Works Commission, make whatever arrangements necessary to supply water of suitable quality and purity to sustain and encourage vigorous plant growth, and supply all equipment for proper delivery and application to planted areas. Water obtained from a PWC fire hydrant shall be metered and properly protected with an approved backflow prevention device. PWC must inspect and approved any connections to their water system to include the proposed water application and storage equipment. The Contractor shall not use private resident's water. The Contractor is solely responsible to provide watering of the sod. The method of application of water shall be approved by the Public Works Commission. Limit watering to early morning or late afternoon to enable to soil the absorb maximum amount of water.

Maintenance shall begin immediately after sodding operation. The Contractor shall maintain all sodded areas until sod is firmly established and as outlined below. Maintenance will include watering, fertilizer, pest control, soil amendments, disease control, erosion repair, mowing, protecting turf area from traffic (i.e. temporary fences, barriers, signs, etc.) and replacement of any dead or damaged sod.

Watering

- Water lawn areas once a day with a minimum ½ inch water for the first three (3) weeks after area sodded.
- After the three (3) week period, water twice a week with a ¾ inch of water each time unless a comparable amount of rainfall has occurred.
- Make weekly inspections to determine moisture content of soil and supplement the above watering schedule as needed.
- Excessive runoff puddling and wilting shall be prevented.

Fertilizer and Pest Control

- Evenly spread fertilizer composite at a rate of 40 pounds per 5,000 square feet or as recommended by the manufacturer. Fertilizer shall not be applied until two (2) weeks after initial placement of the sod or prior to the advent of winter dormancy.
- Treat areas of weed and insect infestation as recommended by the treatment manufacturer.

Mowing

- The Contractor shall do mowing operations, (in yards not being mowed by residents) until provisional acceptance.
- Mowing shall be done only when the grass is dry with a rotary type mower having a blade height set not lower than one and one half (1½) inches nor higher than three (3) inches.
- Mowing operations shall be conducted at intervals, which ensure grass height does not exceed four (4) inches between mowing.
- The Contractor shall complete at least one mowing operation before the work will be considered for acceptance.

The Contractor shall protect and not allow access of vehicular traffic into any newly sodded areas and shall repair any damaged turf to original grade. Maintenance shall continue for a period of 90 days after placement or until provisional acceptance by the Public Works Commission. A written record shall be furnished to the Owner of the maintenance work performed. At least two weeks shall elapse after chemical control is applied before a request of inspection.

ACCEPTANCE

Fifteen (15) days prior to the end of the 90 day maintenance period, the Contractor shall make a written request to the Public Works Commission for an inspection and provisional acceptance of

the sod. Failure to notify the Public Works Commission will not relieve the Contractor of the maintenance provisions required and the Contractor will continue to be responsible for the maintenance of the sod.

Replacement of dead sod shall be performed within seven (7) days after notification by the Public Works Commission and the maintenance period for these areas or individual lawns shall be extended for the 90 day maintenance period. Failure to replace dead sod within the specified seven (7) day period will result in the Public Works Commission having the work performed and deducting the cost from the Contract; however, the Contractor shall be responsible for the maintenance.

Final acceptance will be given upon satisfactory contract performance exhibited at final inspection and acceptance. Sodded areas are to be fully rooted prior to acceptance. The Owner shall be the sole judge as to whether or not the lawns are acceptable. Should any deficiencies be disclosed at final inspection, the Contractor shall make the necessary corrections in a timely manner and request re-inspection.

GUARANTEE

The Contractor shall guarantee a dense, vigorous stand of turf free of weeds, disease, pests or any dead areas more than one half of a square foot in size for a period of 90 days from initial placement or replacement whichever is greater. Total dead area shall not exceed one percent (1%) of total square footage for each individual resident's lawn.

DIVISION 2
SITE WORK

02933 LAWNS AND GRASSES (SEEDING)

GENERAL

All exposed ground surfaces that have been disturbed during construction shall be graded to original contours as practicable, shaped to drain, and free of trash and debris. Grassing shall be accomplished as soon as practicable after sections of work are completed. Seeding and/or planting shall be performed by an experienced subcontractor specializing in this type of operation, unless otherwise approved by the Public Works Commission in writing. Disturbed sections shall not exceed one mile, without prior approval by the Public Works Commission. Grassing shall be in accordance with the Contract Documents.

PREPARATION OF THE SOIL

The surface area to receive seed shall contain a minimum of four (4) inches of good, fertile, friable, organic natural topsoil loam as a base for spreading the seed. Topsoil shall be free of clumps, brush, sticks, weeds, stones, roots, trash or other objectionable material. Contractor shall insure all topsoil to be free of plants or plant parts of quackgrass, johnson grass, nut sedge, poison ivy or other noxious weeds. The Contractor shall furnish and supplement the existing topsoil at no additional costs to the Public Works Commission providing a minimum 4 inch thickness as specified. Soil preparation shall not be performed in frozen or extremely wet conditions. The finished topsoil bed shall be uniform in grade, with a yard like appearance. All changes in grade shall have a smooth, rounded peaks and valleys.

The topsoil shall be loosened and mixed to the depth of four inches (4"). Suitable equipment (cultipackers, harrows, drags) meeting the approval of the Public Works Commission shall be used. This operation shall be accomplished by cutting on one (1) foot centers parallel to the contour of the slopes. On slopes that are steeper than 2:1, both depth preparation and degree of smoothness may be reduced, if approved by the Public Works Commission, but in all cases the slope surface shall be scarified groove, trenched or punctured so as to provide a textural plane of cut forming pockets, ridges, or trenches in which seeding material can lodge. Soil preparation shall not be performed when the soil is frozen, extremely wet or in an otherwise unfavorable working condition. The soil shall be free of any substance that might inhibit plant growth. Assistance of the local agricultural agent is recommended.

Lime shall be applied at the rate of 1/2 tons per acre. 10-20-20 commercial fertilizer shall be applied at the rate of 1,000 pounds per acre and well worked in to the top four inches (4”) of top soil. If hydroseeding, use 500 pounds of 10-10-10 fertilizer on slopes steeper than 1/2 horizontal

to 1 vertical.

SEED MIXTURE AND SOWING THE SEED

Seed shall be seed certified to be the latest season's crop and shall be delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures and pure live seed. The producer's seed label shall indicate it the minimum percent of pure live seed (which shall be 82.45 for Bermuda, 88 for Rye Grain), the minimum percent of germination in hard seed and maximum percent of weed seed (no more than 1 percent for Bermuda, 0.5 percent for Rye Grain). Seed shall be labeled in conformance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable State seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable.

The following seed mixture shall be used:

	POUNDS OF SEED PER ACRE			
	K-31 Fescue	Grain Rye	Common Bermuda	Centipede
April 15 - Sept. 1	75	-	60 (hulled)	5
Aug. 15 - Nov. 15	120	-	25 (hulled)	5
Nov. 1 - April 1	120	120	25 (un-hulled)	5

Note: If there are differences in the seed mixture between the mixture stated in these specifications and that which is specified as part of an approved Erosion Control Plan, the seed mixture specified in the erosion control plan shall take precedence.

Where construction crosses a pasture that has been grassed, the Contractor shall re-seed the area with the same type of grass as found on the site. All highway rights-of-way, and private yards disturbed shall also be re-seeded or with the same type of grass previously found. The seed mixture specification shall be used as a guide and the Contractor is charged with the responsibility of seeding areas with the proper type of grass that matches the existing.

Seed shall be broadcast uniformly by hand or by approved sowing equipment. One half of the seed shall be sown in one direction and the remaining shall be sown at right angles to the first. Do not seed when the wind velocity exceeds five (5) miles per hour. Rake lightly into top 1/8 inch of the soil prior to compacting, with a roller not exceeding 100 pounds.

All seeded areas will be mulched with two (2) tons per acre of small grain straw or wood cellulose fiber spread uniformly, approximately 1/4 of ground should be visible to avoid

smothering seedlings. Asphalt emulsion (ASTM D-977 and ASTM D-2028) shall be used to anchor the straw applied at 150 gallons per ton of straw, or crimped to stabilize. Asphalt emulsion shall be required from November 1st to March 31st. The Contractor shall take sufficient precautions to prevent mulch from entering drainage structures through displacement by wind, water or other causes and promptly remove any blockage which may occur.

SPECIAL CONSIDERATIONS

Shrubbery shall be expertly removed and carefully preserved for replanting, unless otherwise directed by the Public Works Commission adequate earth ball shall be removed to guard against damage to the root system. Shrubbery shall be replanted only after all construction is complete. The excavation made for replanting shall be six inches (6") larger in every dimension than the root ball removed. This additional space shall be filled with a mixture of one half topsoil and one half peat moss. Care shall be taken to set the top of the ball slightly above or flush with the surrounding surface. Any shrubbery damaged or that dies shall be replaced with an equal or better plant material at the Contractor's expense.

MAINTENANCE

The Contractor shall protect and maintain grassed areas as necessary to establish a uniform turf composed of the grasses specified. The Contractor shall re-seed any bare areas and repair all eroded areas.

Watering of seeded areas will be required during periods of dry weather to promote maximum growth. The Contractor shall supplement natural rainfall to insure a minimum of one (1) inch of rainfall weekly.

Maintenance of lawns begins immediately after the area is planted and continues for the period required to establish acceptable lawns, but not less than sixty (60) days after initial seeding, or until provisional acceptance by Owner. Maintain seeded areas by watering, fertilizing, mowing, weeding and other operations such as rolling, re-grading, replanting, aerating, and mulching as required to establish an acceptable lawn free of eroded or bare areas.

ACCEPTANCE

Fifteen (15) days prior to the end of the sixty (60) day maintenance period, the Contractor shall make a written request to the Owner for an inspection and provisional acceptance of the seeded area. Failure to notify the Owner will not relieve the Contractor of the maintenance provisions required and the Contractor will continue to be responsible for the maintenance of the seeded area.

Replacement of dead seed area(s) shall be performed within seven (7) days after notification by the Public Works Commission and the maintenance period for these areas or individual lawns

shall be extended for an additional sixty (60) day maintenance period. Failure to replace seeded area(s) within the specified seven (7) day period will result in the Owner having the work performed and deducting the cost from the Contract; however, the Contractor shall be responsible for the maintenance.

Final acceptance will be given upon satisfactory contract performance exhibited at final inspection and acceptance. Seeded areas are to be fully rooted prior to acceptance. The Owner shall be the sole judge as to whether or not the lawns are acceptable. Should any deficiencies be disclosed at final inspection, the Contractor shall make the necessary corrections in a timely manner and request re-inspection.

Payment to the Contractor for seeding areas will be approved once the seed has been established and meets the requirements of this paragraph of this specification.

GUARANTEE

The Contractor shall guarantee a stand of turf is considered acceptable when a live vigorous stand of permanent grass is established with growing sprouts visible at the surface showing not less than 9 seedlings of permanent grass at least 2 inches long in each square foot, and where no gaps larger than 4 inches in diameter occur anywhere in the lawn area. Permanent grass is defined as Common Bermuda, Centipede, and Fescue.

DIVISION 2
SITE WORK

02934 SEEDING WETLANDS

GENERAL

All exposed ground surfaces that have been disturbed during construction shall be graded to original contours, reasonably smooth, and free of trash and debris. Grassing shall be accomplished as soon as practicable after sections of work are completed. Seeding shall be performed by an experienced subcontractor specializing in this type of operation, unless otherwise approved by the Engineer in writing. Disturbed sections shall not exceed one half mile, without prior approval by the Engineer. Grassing shall be in accordance with the following specifications:

PREPARATION OF THE SOIL

The topsoil shall be loosened and mixed to the depth of 4" to 8". Suitable equipment meeting the approval of the Engineer shall be used. The soil shall be free of clay lumps, brush, weeds, stones, roots, stumps or any other substance that might inhibit plant growth. Assistance of the local agricultural agent is recommended.

Provide agricultural lime at rate required to bring soil acidity to slightly acid - ph 6, according to soil test report.

Lime and fertilizer shall be applied uniformly and mixed with the soil during seedbed preparation. Apply 10-20-10 commercial fertilizers at the rate of 20-lbs./1000 s.f. for warm season mix and 10-20-10 commercial fertilizer at a rate of 20 lbs./1000 s.f. for cool season mix.

Apply 10-10-10 commercial fertilizers at the rate of 20-lbs./1000 s.f. for temporary cover crops. In addition, provide 15-lbs./1000 s.f. of superphosphate.

The following is for the warm season mix:

a. All warm grass seed shall be debearded or conditioned by brushing to create a product nearly the same as debearding. This does not apply to Switchgrass.

b. Disk two times to break-up crop residue and dirt clods prior to seeding.

c. Pack soil to create a firm seedbed with a cultipacker or roller.

d. If a rain shower should fall after the seedbed is prepared but before planting break-up any crust formation.
e. Seeding shall be installed to a depth of 1/4" utilizing a rangeland drill or conventional grass drills. It is extremely important that seed not be planted deeper than 1/2" depth. Do not disc

or harrow after seeding. This will put the seed too deep. A Brillion seeder will be acceptable.

The following seed mixture shall be used:

Dates	Types	Rate
April 1 - July 15	***Warm Season Mix*** Switchgrass, Cave-in-rock, Alamo	8 pls #/acre or 4 oz./1000 s.f.
	Smartweed; and	2 bulk #/acre or 1 oz./1000 s.f.
	Japanese Millet or Sorghum Sudan Grass Hybrids (Mow prior to maturity)	20-lb/acre or ½ lbs/1000 s.f.
July 16 - Sept 1	Temporary crop of Japanese Millet or Sorghum Sudan Grass Hybrids (To be followed by permanent mixture)	20-lb/acre or ½ lbs/1000 s.f.
Sept 2 - Nov 1	***Cool Season Mix*** Reed Canary Grass	12 bulk #/acre or 6 oz./1000 s.f.
	Smartweed	2 bulk #/acre or 1 oz./1000 s.f.
Nov 2 - March 31	Temporary Crop of Wheat (To be followed by permanent mixture	40 lbs/acre

All highway rights-of-way, and private yards disturbed shall also be re-seeded or sodded with the same type of grass previously found. The seed mixture specification shall be used as a guide and the Contractor is charged with the responsibility of seeding areas with the proper type of grass existing.

Seed shall be broadcast uniformly by hand or by approved sowing equipment. One half of the seed shall be sown in one direction and the remaining shall be sown at right angles to the first. Do not seed when the wind velocity exceeds 5 miles per hour. Rake lightly into top 1/8 inch of the soil prior to compacting, with a roller not exceeding 100 pounds.

All seeded areas will be mulched with 75 pounds to 100-lbs./1000 s.f. of clean wheat straw, spread uniformly, approximately 1/4 of ground should be visible to avoid smothering seedlings. If hydro-seeded, use virgin paper mulch only. The Contractor shall take sufficient precautions to prevent mulch from entering drainage structures through displacement by wind; water or other causes and promptly remove any blockage, which may occur.

MAINTENANCE AND GUARANTEE

The Contractor shall protect and maintain grassed areas as necessary to establish a uniform turf composed of the grasses specified. The Contractor shall re-seed any bare areas and repair all eroded areas.

Maintain seeded areas by watering, fertilizing, mowing, weeding, and other operations such as rolling, regrading, replanting, aerating, mulching as required to establish an acceptable lawn free of eroded or bare areas.

ACCEPTANCE

The Contractor shall guarantee a stand of turf is considered acceptable when a live vigorous stand of permanent grass is established with growing sprouts visible at the surface showing not less than 9 seedlings of permanent grass at least 2 inches long in each square foot, and where no gaps larger than 4 inches in diameter occur anywhere in the seeded area.

DIVISION 2
SITE WORK

03301 CONCRETE CONSTRUCTION (UTILITY)

GENERAL

Concrete construction specified in this section shall be applicable to all "site work" and is not intended to cover general building specifications. The concrete work shall include all furnishing, hauling, fine grading and subgrade, form work, etc. and all incidentals necessary for completion of the work as it pertains.

MATERIALS

Concrete

The Contractor shall furnish and place concrete in strict accordance with the requirements of ACI 318 (most recent edition). Ready-mixed concrete from an approved mixing plan shall be used throughout the work and conform to the requirements of ASTM C-94 for batch, mixing, and transporting. Concrete shall be in accordance with the following requirements:

A. Under Ground - Regular Weight Concrete

28-day compressive strength	3000 psi
Coarse aggregate	1 ½” max. size stone
Slump	2" minimum, 4" maximum
Air Entrainment	No requirement

B. Walls, Slabs, Sidewalks, Curb and Gutter - Regular Weight Concrete

28-day compressive strength	3000 psi
Coarse aggregate	3/4" max. size stone
Slump	2" minimum, 4" maximum
Air Entrainment	5 more or less 1

The Contractor shall submit for approval mix designs, designed and tested by an approved testing laboratory, following the requirements of ACI 318 for each class of concrete to be used on this project. Mix designs in excess of one year old shall be verified. The Contractor will be responsible for all costs involved in the mix design. Material suppliers and material proportions incorporated in the mix design and certification shall not change without written permission from the Public Works Commission.

Admixtures used to produce entrained or air shall be sulforated hydrocarbons or neutralized vinsol resins conforming to ASTM C-260. Calcium chloride, other accelerators, or "anti-freeze"

shall not be used without written approval by the Public Works Commission.

Reinforcing Steel

Reinforcing bars shall be new billet stock and shall conform to ASTM A-615, Grade 60. Bars shall be deformed to conform to ASTM A-305. The Contractor shall check and submit for approval four (4) sets of shop and erection drawings prepared by the fabricator. Reinforcement detailing and placement shall conform to ACI 318. All reinforcing bars shall be tied in place according to approved erection drawings, using bar supports and accessories conforming to ACI 315. Laps or splices shall conform to ACI 318, and consist of the following minimum dimensions:

Tension Splices	36 Bar Diameters
Compression Splices	30 Bar Diameters

All reinforcing bars shall be tagged and stored in such manner as to be readily available at the time needed. Tag mark substitutions will not be made.

Welded wire mesh fabric reinforcing shall conform to the requirements of ASTM A-185. Lap splices shall be at least one full mesh plus 2" staggered to avoid continuous laps in either direction and securely wired or clipped.

GRADING

The Contractor shall use every effort to observe any possible misalignments in line or grade of the installed forms and will call such to the attention of the Public Works Commission promptly. The Contractor is cautioned that he shall be responsible for any damage to utility lines caused by his negligence. The Public Works Commission or his representative shall then inspect the forms and if approved, pouring operations may begin. Where unstable material exists, the Contractor shall remove such material to a depth required to provide a stable subgrade at no additional cost to the Public Works Commission.

FORM WORK

Metal forms shall be used throughout the work except for short, odd length sections and in accordance with ACI 301 and ACI 347 (most recent editions). Earth cuts may be used as forms for unexposed vertical surfaces on footings, provided the soil and workmanship allow an accurate and curable excavation. Forms shall be kept in good condition at all times. Any forms which have become out of shape or otherwise unsuitable shall be removed from the work. Forms shall be of such section and design that they will adequately support the concrete and any construction equipment used in the work. Form sections shall be provided with interlocking joints to insure that the forms are tightly jointed together free from movement. Forms shall be held in place by metal pins, not less than eighteen (18) inches in length, with fastenings of metal and wedges to insure a correct, rigid setting.

Forms shall be of the dimension required for the designed cross-section shown on the plans. Built up sections to attain the required depth will not be permitted.

Forms shall be set true to the lines and grades established by the Design Engineer or as indicated on the plans.

Forms shall be held rigidly in position and shall be of sufficient strength to resist springing out of line when concrete is placed.

PLACING CONCRETE

Prior to placing concrete, the subgrade shall be moistened and the contact side of the forms shall be cleaned and coated with a heavy oil. The Contractor shall not place any concrete without the forms, reinforcing steel and subgrade being inspected and approved by the Design Engineer. Placing of concrete is to be in accordance with ACI 304 (most recent edition). Water shall be removed from the excavation before placing concrete and water shall be diverted to prevent washing over freshly deposited concrete.

Concrete shall be placed as not to disturb concrete already in place and in such a manner as to require the minimum amount of lateral movement. Concrete shall be deposited in the forms without segregation. A tremie shall be used when the fall exceeds five (5) feet. Care shall be taken not to upset any forms during the concrete pouring operations. Any concrete showing misalignment due to form movement shall be removed and replaced at no additional cost to the Public Works Commission.

All concrete shall be consolidated in accordance with ACI 309 (most recent edition). Mechanical vibrators shall be operated by experienced workmen. Spading and rodding may be required to supplement mechanical vibration. Consolidation shall be adequate to remove any voids and after removal of the forms, no honeycomb shall be present. Should any honeycomb be present, the Design Engineer shall determine if the honeycomb is of a minor nature, the voids may be filled with mortar as approved by the Design Engineer.

All concrete within forms shall be brought to true section by the use of an approved straight edge and shall be tamped with straight edge to bring mortar to the surface, after which it shall be floated smooth by means of wood floats. No steel floats will be permitted. After true surface of section has been obtained, and after initial set has taken place, the entire surface shall be brushed with a dampened brush. All joints and all exposed edges shall be rounded off with approved jointing and edging tools. The type of finish required will be specified in the specific item of work specified or indicated on the drawings. All exposed surfaces of retaining walls, structures, etc. shall be given a Class 2 finish with ¼ inch chamfered edges.

No more concrete shall be laid than can be properly finished and covered during the daylight, unless adequate artificial light satisfactory to the Design Engineer is provided.

Immediately after finishing operations have been completed, the entire surface of the concrete shall be sprayed with an approved curing compound. The use of liquid retarding agents shall conform to standards specified by current AASHTO or ASTM Specifications.

Cold weather concreting shall be in accordance with ACI 306 (most recent edition) and hot weather concreting shall be in accordance with ACI 305 (most recent edition). Concreting shall be done when weather conditions are favorable unless otherwise directed by the Design Engineer. Concrete operations shall be discontinued when the temperature of 40 degrees Fahrenheit is reached on a falling thermometer. No concreting shall be attempted when local weather bureaus indicate temperatures below freezing within the ensuing 24 hours unless proper precautions are made to protect concrete by covering with straw or other thermal insulation satisfactory to the Design Engineer. The Contractor shall be responsible for the quality and strength of the concrete laid during cold weather or hot weather and any concrete damaged by frost action or freezing shall be removed and replaced as directed by the Design Engineer and/or the Public Works Commission at the Contractor's expense.

Forms shall not be removed from the concrete for a minimum of 7 days, unless approved by the Design Engineer. The Contractor shall apply a curing compound or provide measures to maintain moisture for proper curing at his expense, if early form removal is approved. Immediately after the forms have been removed, all honeycomb areas shall be repaired (with one part cement and two parts sand) and earth backfill material shall be placed adjacent to the finished concrete and smoothed off to prevent an accumulation of standing water, subgrade saturation or under wash in the event of rain.

Both pedestrian and vehicle traffic shall be excluded from crossing the concrete for a period of 14 days by the erection and maintenance of suitable barricades. Contractor shall be responsible for any damage resulting from traffic within the 14 day period and he shall remove and replace any concrete damaged as directed by the Design Engineer and/or Public Works Commission.

MASONRY MATERIALS

Brick shall be in accordance with ASTM C-32 Grade MS laid in full beds of mortar with shove joints.

Concrete masonry blocks shall be in accordance with ASTM C-139. Blocks shall be at least 5", but not more than 8" in thickness nor less than 8" in length and of such shape that the joints can be effectively sealed and bonded with cement mortar.

Cement mortar for brick work shall be in accordance with ASTM C-270, Type M. Use Type IIA cement in accordance with ASTM C-150.

TESTING

The requirements of ACI318 (most recent edition) shall be used to control the evaluation of all concrete strengths. The strength is to be checked during construction by four (4) cylinders at the option and cost of the Public Works Commission, of which 1 shall be broken at 7 days, 2 at 28 days. If the specified strength is not achieved in 28 days, 1 reserved shall be stored and broken as specified by the Design Engineer. Cylinders shall be made and stored in accordance with ASTM C-13. Cylinders shall be for each day concrete is poured in excess of 10 cubic yards of each different type of concrete, as determined by the Design Engineer. All additional expenses required because of the failure of the materials to meet routine testing requirements, or poorly scheduled concrete deliveries, shall be borne by the Contractor.

DIVISION 2
SITE WORK

09801 ANTI-MICROBIAL ADMIXTURE

GENERAL

All reinforced concrete precast manholes shall include a liquid anti-microbial admixture to render the concrete uninhabitable for bacterial growth. The admixture shall be included in the fabrication of the manhole by an approved concrete precast manhole manufacturer. Coatings applied to the interior walls of the manhole shall not be acceptable.

Further, all field mixed mortar, utilized in concrete precast manholes, shall include the anti-microbial admixture. The intent and purpose of this specification is to render all concrete and/or mortar within sanitary sewer service uninhabitable for bacterial growth. Any defects shall be cause for the replacement and correction of such defect as directed by the Fayetteville Public Works Commission (PWC), at no expense to the Fayetteville Public Works Commission.

RELATED SECTIONS

A. 02730 – Sanitary Sewer Systems
B. 02732 – Sewage Force Mains

REFERENCES

A. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections
B. ASTM C1443 – Standard Specification for Precast Reinforced Concrete Pipe
C. ASTM C1577 – Standard Specification for Precast Reinforced Concrete Pipe

SUBMITTALS

All submittals shall be provided in accordance with the Contract Documents, and the requirements outlined herein. The Contractor shall submit, in accordance with the Contract Documents, product data, certifications, and product data, to include the following:

1. U.S. Environmental Protection Agency (EPA) registration number.
2. Documentation that the product has a minimum of 10 years of successful prevention of microbial induced corrosion in sanitary sewers.
3. Documentation that the precast facility is certified by the anti-microbial manufacturer.
4. Documentation from the precast facility stating that the correct amount and correct mixing procedure was followed for all anti-microbial concrete.

QUALITY ASSURANCE

A color identifier shall be applied to the interior of each concrete piece fabricated with the anti-microbial admixture. Each piece shall also be plainly stenciled with the name of the anti-microbial admixture on the exterior of each piece.

MATERIALS

All manholes shall conform to PWC standard specifications and details, unless otherwise approved in writing by the Fayetteville Public Works Commission. All concrete and mortar utilized in the construction of the manholes shall contain an anti-microbial admixture.

Anti-Microbial Admixture:

The liquid anti-microbial admixture shall be used in accordance with the manufacturer's recommendations. The amount of the admixture shall be included in the total water content of the concrete or mortar mix design. The admixture shall be added to the concrete or mortar mix water, to ensure even distribution of the admixture throughout the concrete or mortar mix. When properly prepared, the anti-microbial admixture shall render the concrete or mortar uninhabitable for bacterial growth.

The anti-microbial admixture shall be ConShield, ConBlock, or approved equal. The ConShield liquid anti-microbial admixture can be obtained from ConShield Technologies, Inc. or an approved precast facility. TheConBlock liquid anti-microbial admixture can be obtained from ConSeal Concrete Sealants, Inc., or an approved precast facility.

Field Repairs:

Field repairs to the precast concrete or mortar shall be in accordance with the admixture manufacturer's recommendations. All field repairs shall be completed in accordance with PWC requirements.

ACCEPTANCE

Acceptance of the concrete and mortar with the anti-microbial admixture shall be based on conformance with the requirements herein, the Fayetteville Public Works Commission's review of the installed manhole, and results of all testing.

DIVISION 2
SITE WORK

09802 SPECIAL COATINGS - CERAMIC EPOXY (PROTECTO401)

GENERAL

The interior surfaces of all ductile iron pipe and fittings shall be full coated with a ceramic epoxy lining. The ceramic epoxy lining shall be applied to ductile iron pipe free of any other interior lining material. The finish coat shall be applied to yield a minimum dry film thickness of 40 mils for a complete lining.

MATERIALS

The lining material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quarts pigment.

The epoxy material shall meet the following minimum performance requirements:

Permeability Rating: 0.00 perms when tested according to ASTM E-96 Procedure A with a test duration of 30 days.

ASTM 6-95 Cathodic Disbandment: 1.5 volts at 77° F.

ASTM B-117 Salt Spray: 0.00 undercutting after one year.

Immersion Testing ASTM D-714	Duration
20% Sulfuric Acid	1 Year
25% Sodium Hydroxide at 140° F	1 Year
160° F Distilled Water	1 Year
120° F Tap Water	1 Year

The above requirements shall be verified and tested by an approved testing laboratory. Copies of the laboratory test showing that the lining conforms to the specifications shall be furnished to the Public Works Commission, certified by the Supplier.

APPLICATION OF LININGS

Surface Preparation: All interior barrel and joint surface areas which will be exposed to the sewer liquids and gases shall be prepared for lining by removing all laitance form oil and other loose, foreign or deleterious materials which would adversely affect the bond of the lining compound of the pipe surface. All areas to receive the protective coating shall be abrasive blasted using compressed air nozzles with sand or grit media. The entire surface to be lined shall be struck with blast media so

that all rust, loose oxides, etc., are removed from the surface. Any area where rust appears before lining must be re-blasted.

Qualification of Applicator and Workmen:

The lining shall be applied by a competent firm with a five year history of lining sewer pipe. The workmen employed by the applicator shall be experienced and competent in the application and inspection of the lining compound to be applied. The Public Works Commission shall have the right to require the applicator to furnish bonds covering proper performance and guaranteeing the payment of all obligations arising as a result of improper materials and workmanship.

Equipment: All application equipment shall be as recommended by the suppliers of the lining compound.

Application Technique: After the surface has been thoroughly prepared for application, the interior of the pipe shall be coated with the ceramic epoxy to a minimum dry film thickness of 40 mils. No lining shall take place when the substrate or ambient temperature is below 40° F. The surface must be dry and dust free. The number of coats of lining material applied shall be as recommended by the lining manufacturer, but in no case shall it be applied above the dry film thickness per coat recommended by the lining manufacturer. The time between coats shall be that specified by the lining manufacturer.

Repair: All damaged areas or test areas shall be repaired in accordance with the manufacturer's recommendation, so that the repaired areas are equal to the undamaged lined areas in all respects.

Inspection: All pipe linings shall be checked for thickness using a magnetic film thickness gauge, the thickness testing shall be done in accordance with the method outlined in SSPC-PA-2 film thickness rating. The interior linings shall also be tested for pinholes with a non-destructive 2,500 volt test. Any defects found shall be repaired as noted above.

Markings: Each joint, manhole unit, or pipe bend special shall be marked with the date of application of the coating system, the date of inspection, and the numerical sequence of application on that date.

Shipping and Handling: Equipment used to handle and transport the lined pipe shall be suitably designed and operated not to damage the lining. Any damage which does occur shall be repaired prior to the installation of the pipe in accordance with the manufacturer's recommendations, so the repaired area is equal to the undamaged lining in all respects.

DIVISION 2
SITE WORK

09804 SPECIAL COATINGS – EPOXY LINING (PERMOX OR TNEMEC)

GENERAL

The interior surfaces of all ductile iron pipe and fittings in sanitary sewer service shall be fully coated with a ceramic epoxy lining. The lining system shall be a two component, amine cured novalac epoxy. The ceramic epoxy lining shall be applied to ductile iron pipe free of any other interior lining material. The finish coat shall be applied to yield a minimum dry film thickness of 40 mils for a complete lining. Any defects in the lining shall result in the pipe or fitting being replaced, at no additional cost to the Public Works Commission.

RELATED SECTIONS

A. 02730 – Sanitary Sewer Systems
B. 02732 – Sewage Force Mains

REFERENCES

A. ASTM B 117 – Standard Practice for Operating Salt Spray (Fog) Apparatus
B. ASTM C 413 – Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes
C. ASTM C 868 – Standard Test Method for Chemical Resistance of Protective Linings
D. ASTM D 714 – Standard Test Method for Evaluating Degree of Blistering of Paints
E. ASTM D 870 – Standard Practice for Testing Water Resistance of Coatings Using Water Immersion
F. ASTM D 1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
G. ASTM D 1653 – Standard Test Methods for Water Vapor Transmission of Organic Coatings
H. ASTM D 2240 – Standard Test Method for Rubber Property – Durometer Hardness
I. ASTM D 2370 – Standard Test Method for Tensile Properties of Organic Coatings
J. ASTM D 2583 – Standard Test Method ofr Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
K. ASTM D 2794 – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
L. ASTM D 4060 – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
M. ASTM D 4400 – Standard Test Method for Sag Resistance of Paints Using a Multinotch Applicator
N. ASTM D 4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
O. ASTM G 8 – Standard Test Methods for Cathodic Disbonding of Pipeline Coatings
P. ASTM G 95 – Standard Test Method for Cathodic Disbondment Test of Pipeline Coatings
Q. ASTM G154 – Standard Practice for Operating Fluorescent Ultraviolet Lamp Apparatus for Exposure of Nonmetallic Materials

Unless otherwise specified, references to documents shall mean the documents in effect at the time of bid. If the referenced document(s) have been discontinued by the issuing organization, references to those documents shall mean the replacement documents or the last version of the document before it was discontinued.

Where conflicts exist between the standards and this specification, the more stringent shall apply.

MATERIALS

All ductile iron pipe and fittings shall be in accordance with the Public Works Commission standard specification 02730 – Sanitary Sewer Systems, Public Works Commission standard specification 02732 – Sewage Force Mains, and these Contract Documents.

The lining material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment (no silica fume, fly ash, or alumina dust). The lining shall be both coal tar (polycyclic aromatic hydrocarbons) free and hazardous air polluting solvents (HAPS) free. The lining system shall be 100% solids by volume.

The ceramic epoxy lining system shall be the Perma-Shield PL Series 431 as manufactured by Tnemec Company, Inc., Permox-CTF as manufactured by Permite Corporation, or approved equal.

The ceramic epoxy lining system shall meet the following minimum performance requirements:

A. Abrasion (ASTM D 4060, CS-17 wheel, 1,000 grams) – 76 mg loss
B. Adhesion (ASTM D 4541) – not less than 1,860 psi
C. Severe Wastewater Analysis Test (150oF, 500 ppm H2S, 4,000 ppm NaCl, 10% sulfuric acid, EIS Permeation Analysis) – Initial impedance of 11.2 (log-z). No blistering, cracking, checking, or loss of adhesion. Reduction in electrical impedance of 0.5 after 28 days of exposure.
D. Cathodic Disbondment (ASTM G 8, 1.5 V, Classification Group A) – no more than 0.000 inch disbanded equivalent circle diameter.
E. Dielectric Strength (ASTM D 149) – greater than 600 V per mil
F. Hardness (ASTM D 2240) – Shore D hardness of 79
G. Impact (ASTM D2794) – No visible cracking or delamination after 160 inch-pounds direct impact.
H. Chemical resistance by immersion testing, in accordance with ASTM D 714, as outlined in the following table:

20% Sulfuric Acid at 77° F	2 years, no effect
25% Sodium Hydroxide at 140° F	2 years, no effect
5% Sodium Chloride at 77° F	2 years, no effect
Distilled Water at 160° F	2 years, no effect

I. Salt Spray (ASTM B 117) – No blistering, cracking, rusting, or delamination of film. No rust creepage at scribe after 1,000 hours.
J. Sag Resistance (ASTM D 4400) – Not less than 90 mills wet film thickness.

K. Water Absorption (ASTM C 413) – 0.0 percent water absorption
L. Water Vapor Transmission (ASTM D 1653, Method B, Wet Cup, Condition C) – 1.25 g/m2 per 24 hour water vapor transmission and 0.09 perms water vapor permeance.

The above requirements shall be verified and tested by an approved testing laboratory. Copies of the laboratory test showing that the lining conforms to the specifications shall be furnished to the Public Works Commission upon written request and certified by the Supplier.

QUALITY ASSURANCE

The manufacturer of the specified coating system shall have a minimum of 10 years experience in manufacturing high performance epoxy coating systems. The epoxy coating material shall be from a single manufacturer.

Application of the ceramic epoxy lining system shall be in accordance with the manufacturer's requirements. Preparation of the ductile iron pipe to be lined shall be completed by an installer approved by the lining system manufacturer.

SUBMITTALS

In accordance with these Contract Documents, the Contractor shall submit the following:

1. Manufacturer's certification that the coatings comply with the specified requirements and are suitable for the intended application.
2. Product data sheet.
3. Material Safety Data Sheet.
4. Copies of test data for all the physical, chemical, and permeation properties listed within this specification.

WARRANTY

The ceramic epoxy lining manufacturer shall warranty its products as free from material defects for a period of five (5) years. The Public Works Commission will solely determine whether the pipe should be replaced if any defects are discovered in the lining within the warranty period. All costs to replace the pipe or fitting, including but not limited to, bypass pumping, excavation, and traffic control shall be the manufacturer's responsibility.

APPLICATION OF LININGS

Application of the ceramic lining system shall be completed by an installer approved by the manufacturer of the lining system.

Surface Preparation: All interior barrel and joint surface areas which will be exposed to the sewer liquids and gases shall be prepared for lining by removing all laitance, form oil and other loose, foreign or deleterious materials which would adversely affect the bond of the lining compound of the pipe surface. All areas to receive the protective coating shall be abrasive blasted using compressed air nozzles with

sand or grit media. The entire surface to be lined shall be struck with blast media so that all rust, loose oxides, etc., are removed from the surface. Any area where rust appears before lining must be re-blasted.

Qualification of Applicator and Workmen: The ceramic epoxy lining shall be applied by a competent firm with a ten (10) year history of lining sewer pipe. The workmen employed by the applicator shall be experienced and competent in the application and inspection of the lining compound to be applied. The Public Works Commission shall have the right to require the applicator to furnish bonds covering proper performance and guaranteeing the payment of all obligations arising as a result of improper materials and workmanship.

Equipment: All application equipment shall be as recommended by the suppliers of the lining compound.

Application Technique: After the surface has been thoroughly prepared for application, the interior of the pipe shall be coated with the ceramic epoxy to a minimum dry film thickness of 40 mils. No lining shall take place when the substrate or ambient temperature is below 40°F. The surface must be dry and dust free. The number of coats of lining material applied shall be as recommended by the lining manufacturer, but in no case shall it be applied above the dry film thickness per coat recommended by the lining manufacturer. The time between coats shall be that specified by the lining manufacturer.

Repair: All damaged areas or test areas shall be repaired by the lining manufacturer prior to shipment, in accordance with the manufacturer's recommendation, so that the repaired areas are equal to the undamaged lined areas in all respects.

Inspection: All pipe linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done in accordance with the method outlined in SSPC-PA-2 film thickness rating. The interior linings shall also be tested for pinholes with a non-destructive 2,500 volt test. Any defects found shall be repaired as noted above. All ceramic epoxy lined pipe and fittings shall be visually inspected for any defects, including runs, sags, or debris within the lining. All repairs shall be performed by the manufacturer prior to shipment.

Markings: Each joint, manhole unit, or fitting shall be marked with the date of application of the coating system, the date of inspection, and the numerical sequence of application on that date.

Shipping and Handling: Equipment used to handle and transport the lined pipe shall be suitably designed and operated not to damage the lining. Any damaged pipe or fitting shall be replaced at no cost to the Public Works Commission.

INSTALLATION

Cutting Pipe: The Contractor shall cut the pipe without damaging the pipe or interior ceramic epoxy coating. All cuts shall be at right angles to the pipe axis. All cut ends shall be dressed with a power grinder to remove all sharp edges. The cut ends of push-on joint pipe shall be beveled in accordance with the pipe manufacturer’s instructions. All field cuts shall be coated and sealed prior to installation. Application of the lining shall be done in accordance with the ceramic epoxy lining manufacturer’s recommendations.

Handling: All ceramic epoxy lined pipe and fittings shall be handled only from the outside. No forks, chains, straps, hooks, cables, or other equipment shall be placed inside the pipe and fittings for lifting, positioning, or installation. The pipe and fittings shall not be dropped or unloaded by rolling. The pipe and fittings shall not strike sharp objects while moving or unloaded. Ductile iron pipe shall not be placed on grade utilizing hydraulic pressure from machinery or hammers. The use of nylon straps or other similar lifting devices are to be used.

Pipe Installation: All pipe and fittings shall be installed in accordance with PWC standard specifications 02222 – Excavation, Trenching, and Backfilling for Utility Systems, 02730 – Sanitary Sewer Systems, 02732 – Sewage Force Mains, and these Contract Documents.

Tryon Drive Drainage Improvements

APPENDIX D

Permits, Reports, and Supporting Documentation

FAYETTEVILLE NC

AMERICA'S CAN DO CITY

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
WILLIAM E. TOBY VINSON, JR
Interim Director

NORTH CAROLINA
Environmental Quality

October 10, 2023

LETTER OF APPROVAL

City of Fayetteville
Douglas Hewett, Manager
433 Hay Street
Fayetteville, NC 28301

RE: Project Name: Tryon Drive Drainage Improvements
Acres Approved: 3.8
Project ID: CUMBE-2024-038
County: Cumberland, City: Fayetteville
Address: Tryon Drive
River Basin: Cape Fear
Stream Classification: Other
Submitted by: Travis Crissman
Date Received by LQS: September 22, 2023
Plan Type: Utility

Dear Mr. Hewett:

This office has reviewed the subject erosion and sedimentation control plan. We find the plan to be acceptable and hereby issue this Letter of Approval. The enclosed Certificate of Approval must be posted at the job site. This plan shall expire three (3) years following the date of approval, if no land disturbing activity has been undertaken, as is required by Title 15A NCAC 4B .0129.

As of April 1, 2019, all new construction activities are required to complete and submit an electronic Notice of Intent (NOI) form requesting a Certificate of Coverage (COC) under the NCG010000 Construction Stormwater General Permit. This form MUST be submitted and COC issued prior to the commencement of any land disturbing activity on the above-named project. The NOI form may be accessed at deq.nc.gov/NCG01. Please direct questions about the NOI form to Annette Lucas at Annette.lucas@ncdenr.gov or Paul Clark at Paul.clark@ncdenr.gov. After you submit a complete and correct NOI Form, a COC will be emailed to you within **three business days**. Initially, DEMLR will not charge a fee for coverage under the NCG01 permit. However, on or after June 1, 2019, a $100 fee will be charged annually. This fee is to be sent to the DEMLR Stormwater Central Office staff in Raleigh.

Title 15A NCAC 4B .0118(a) and the NCG01 permit require that the following documentation be kept on file at the job site:

1. The approved E&SC plan as well as any approved deviation.
2. The NCG01 permit and the COC, once it is received.
3. Records of inspections made during the previous 30 days.

Also, this letter gives the notice required by G.S. 113A-61.1(a) of our right of periodic inspection to ensure compliance with the approved plan.

North Carolina's Sedimentation Pollution Control Act is performance-oriented, requiring protection of existing natural resources and adjoining properties. If, following the commencement of this project, the erosion and sedimentation control plan is inadequate to meet the requirements of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statute 113A-51 through 66), this office may require revisions to the plan and implementation of the revisions to ensure compliance with the Act.

Acceptance and approval of this plan is conditioned upon your compliance with Federal and State water quality laws, regulations, and rules. In addition, local city or county ordinances or rules may also apply to this land-disturbing activity. This approval does not supersede any other permit or approval.

Please note that this approval is based in part on the accuracy of the information provided in the Financial Responsibility Form, which you provided. You are requested to file an amended form if there is any change in the information included on the form. This permit allows for a land-disturbance, as called for on the application plan, not to exceed the approved acres. Exceeding the acreage will be a violation of this permit and would require a revised plan and additional application fee. Any addition in impervious surface, over that already noted on the approved plan, would also require a revised plan to verify the appropriateness of the erosion control measures and the stormwater retention measures. (GS 113A-54.1(b)). In addition, it would be helpful if you notify this office of the proposed starting date for this project. Please notify us if you plan to have a preconstruction conference.

Your cooperation is appreciated.

Sincerely,

Chris Baker

Chris Baker
Assistant Regional Engineer
DEMLR - Fayetteville Regional Office

Enclosures: Certificate of Approval

cc: Joseph Staton, City of Fayetteville Permit Office – email copy
Fayetteville Regional Office

FROEHLING & ROBERTSON, INC.

Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Tryon Drive Drainage Improvements
Fayetteville, North Carolina
F&R Project No. 66A-0075

Prepared For:
Kimley-Horn
421 Fayetteville Street, Suite 600
Raleigh, North Carolina 27601

Prepared By:
Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, North Carolina 27603

July 15, 2022

FROEHLING & ROBERTSON, INC.

Engineering Stability Since 1881

310 Hubert Street
Raleigh, North Carolina 27603-2302
T 919.828.3441 | F 919.828.5751

NC Engineering License # F-0266

July 15, 2021

Mr. Travis Crissman, P.E.
Kimley-Horn
421 Fayetteville Street, Suite 600
Raleigh, North Carolina 27601

Subject: Report of Subsurface Exploration and Geotechnical Engineering Evaluation
Tryon Drive Drainage Improvements
Fayetteville, North Carolina
F&R Project No. 66A-0075

Dear Mr. Crissman:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the Tryon Drive Drainage Improvements project in Fayetteville, North Carolina. Our services were performed in general accordance with F&R's Proposal 2266-00046 dated February 28, 2022. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and general subsurface conditions, and presents our geotechnical recommendations for design and construction of the project.

We have enjoyed working with you on this project. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.



Brian W. McCarthy, P.E.
Geotechnical Staff Engineer

Michael S. Sabodish Jr., Ph.D., P.E.
Geotechnical Department Manager

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APPENDICES

APPENDIX I

Site Vicinity Map, Figure No. 1
Boring Location Plan, Figure No. 2
Subsurface Profile, Figure No. 3

APPENDIX II

Table of Boring Coordinates
Key to Soil Classification
Unified Soil Classification Chart
Boring Logs

APPENDIX III

Laboratory Test Results

APPENDIX IV

GBA Document

1.0 PURPOSE & SCOPE OF SERVICES

The purpose of this subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions in the area of the proposed culvert replacements in order to provide geotechnical engineering recommendations that can be used during the design and construction phases of the project.

F&R's scope of services included the following:

- Completion of seven soil test borings (B-1 through B-7) to depths of 20 feet below the existing ground surface;
- Preparation of typed boring logs and development of a subsurface profile;
- Performing geotechnical laboratory testing on representative soil samples;
- Performing a geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction; and
- Preparation of this report by professional engineers.

2.0 PROJECT INFORMATION

The project site is located along Tryon Drive and Swann Street in Fayetteville, North Carolina. The site generally consists of single-family homes with manicured lawns and landscaping. A small stream runs through a pipe/culvert under Tryon Drive between 1752 and 1751 Tryon Drive. The stream then daylights and runs in a generally southeast direction through the front of 1743 Tyron Drive. The stream then traverses under Swann Street through a pipe/culvert, and terminates on the east side of 1716 Tryon Drive.

It is our understanding that improvements are being made to the City of Fayetteville's stormwater system. Based on the provided plan "Tryon Road Drainage Improvements" dated February 21, 2022, the proposed construction will consist of two box culverts ranging from 10'W x 4'H to 12'W x 4'H, which will replace the existing pipes/culverts under Tryon Drive and Swann Street.

3.0 EXPLORATION PROCEDURES

3.1 SUBSURFACE EXPLORATION

F&R advanced seven (7) soil test borings, B-1 through B-7, to depths of 20 feet below the existing ground surface. The approximate boring locations are shown on the Boring Location Plan presented as Figure 2 in Appendix I. The test boring locations were established in the field by F&R using a hand-held GPS unit with reported sub-meter accuracy. Ground surface elevations were

estimated from the Cumberland County GIS. Given these methods of determination, the boring locations and ground surface elevations should only be considered approximate.

The test borings were advanced by an ATV-mounted drill rig using 2-1/4" inside diameter (I.D.) hollow stem augers for borehole stabilization. Representative soil samples were obtained using a standard, two-inch outside diameter (O.D.) split-barrel sampler in general accordance with ASTM D 1586, Penetration Test and Split-Barrel Sampling of Soils (Standard Penetration Test). The number of blows required to drive the split barrel sampler three, consecutive 6-inch increments with an automatic hammer is recorded and the blows of the last two 6-inch increments are added to obtain the Standard Penetration Test (SPT) N-value representing the penetration resistance of the soil. Five (5) SPT samples were collected in the top 10 feet and then at a nominal interval of 5 feet thereafter.

A representative portion of the soil was obtained from each SPT sample, sealed in an eight-ounce glass jar, labeled, and transported to our laboratory for final classification and analysis by a geotechnical engineer. The soil samples were classified in general accordance with the AASHTO classification system, using visual-manual identification procedures (ASTM D2488). A Boring Log for each test boring is presented in Appendix II.

Groundwater measurements were attempted in all borings, with the exception of boring B-6, at the termination of drilling, and the borings were then backfilled with soil cuttings. An asphalt cold patch was placed at the surface of boring B-4 which was conducted in the roadway.

3.2 LABORATORY TESTING

F&R selected three (3) soil samples and subjected them to geotechnical index testing consisting of natural moisture content, sieve analysis (% passing #200 sieve only), and Atterberg Limits determinations. The purpose of the index testing was to aid in classification of the soil samples and development of engineering recommendations. The laboratory testing was performed in general accordance with applicable ASTM standards. The laboratory test results are presented in Appendix III of this report.

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The referenced site is located within the Coastal Plain Province of North Carolina. The Coastal Plain Province is a broad, flat plain with widely-spaced and low-rolling hills where the near-surface soils have their origin from the deposition of sediments several million years ago during the period that the ocean receded from this area to its present location along the Atlantic coast. It is noted that the coastal plain soils vary in thickness from only a few feet along the western border (one to two

counties north and west of the site) to over ten thousand feet in some areas along the coast. Our test borings were terminated in Coastal Plain soils.

According to the *Geologic Map of North Carolina (1985)*, the site is specifically located within an area mapped as Cretaceous-period deposits and is comprised of sedimentary deposits that appear to be located within the Middendorf Formation. The Middendorf Formation is described as sandy deposits that vary in color from gray to orange gray with discontinuous bedding with cross bedding common.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally-accepted geotechnical engineering judgments. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Data from the specific soil test borings are shown on the boring logs presented in Appendix II of this report.

A subsurface profile has been prepared from the boring data and is presented as Figure 3 in Appendix I to graphically illustrate the subsurface conditions encountered at the site. Strata breaks designated on the boring logs and subsurface profile represent approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples. This section of the report provides a general discussion of subsurface conditions encountered within areas of proposed construction at the project site. More-detailed descriptions of the subsurface conditions at the individual boring locations are presented on the boring logs provided in Appendix II.

4.2.2 Surficial Materials

Asphalt was encountered at the surface of boring B-4 due to its location in the road. The thickness of the asphalt was about 3 inches. Approximately 2 inches of Surficial Organic Soils were encountered at the surface of the remaining borings (B-1 through B-3, B-5, B-6, and B-7). The Surficial Organic Soils generally consisted of dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed Surficial Organic Soil materials. Therefore, the term Surficial Organic Soil is not intended to indicate suitability for landscaping and/or other purposes. The Surficial Organic Soil depths provided in this report are based on driller observations and should be

considered approximate. We note that the transition from Surficial Organic Soil to underlying materials may be gradual, and therefore the observation and measurement of the Surficial Organic Soil depths is subjective. Actual Surficial Organic Soil depths should be expected to vary.

4.2.3 Fill Soils

Below the existing asphalt and surficial organic soils, fill soils were encountered in all of the borings to depths ranging from 2 to 6.5 feet. The presence of this fill is likely a result of the original culvert construction and residential development of the area. The fill consisted of very loose to medium dense silty and clayey sands (USCS – SM and SC soils) with SPT N-values from 4 to 25 blows per foot (bpf). N-values of less than 4 bpf are generally indicative of fill with poor compaction while N-values of 5 to 8 bpf are generally indicative of fill with moderate compaction. Well-compacted structural fill would generally be expected to exhibit N-values of 9 bpf or greater. In general, it appears the fill soils encountered are moderately compacted with localized areas of poorly and well-compacted soils.

4.2.4 Alluvial Soils

Alluvial and possible alluvial soils were encountered below the fill soils in all of the borings, with the exception of boring B-7, at depths ranging from 2 to 3.5 feet below the existing ground surface, and extended to depths ranging from 6.5 to 13.5 feet. Alluvial soils are defined as soils that have been transported by water. Alluvial soils are likely to be encountered in other unexplored areas of the site along areas of the site along drainage and surface water features. The alluvial and possible alluvial soils generally consisted of very loose to loose silty and clayey sands (SC and SM) with SPT N-values from weight-of-hammer (WOH) to 9 bpf.

4.2.5 Coastal Plain Soils

The native Coastal Plain and possible Coastal Plain soils were encountered below the fill soils in boring B-7, and below the alluvial and possible alluvial soils in the remaining borings (B-1 through B-6). The Coastal Plain soils generally consisted of silty and/or clayey sands (SM and SC), and sandy silts (USCS – ML). The soils typically exhibited very loose to dense relative density for the sands with SPT N-values ranging from WOH to 42 bpf, and stiff consistency for the silts with a SPT N-value of 13 bpf.

Highly plastic silty clays (USCS – CH) were encountered deeper in the soil profile in borings B-3 and B-7 at depths of 13.5 and 18.5 feet, respectively, and extended to 18.5 feet in boring B-3, and to boring termination at 20 feet in boring B-7. The highly plastic silty clays typically exhibited stiff to hard consistency with SPT N-values ranging from 9 to 31 bpf.

4.3 Soil Moisture and Groundwater Conditions

Moist soil conditions (i.e., within 3 to 5 percent of the estimated optimum moisture content) were encountered in the borings in the upper 2 to 6.5 feet of the soil profile. Below the moist soils, wet and/or satuarted soil conditions (5 to 6 percent or greater over the estimated optimum moisture content) were encountered in the borings and typically extended to termination depth of the borings. Moist soil layers were encountered deeper in the soil profile in boring B-3 from a depth of 13.5 to 18.5 feet and boring B-6 from a depth of 18.5 to 20 feet.

Groundwater level measurements were attempted at the termination of drilling in all borings with the exception of boring B-6, and after a stabilization period of at least 24 hours in all of the borings with the exception of boring B-4. Immediately after drilling completion, groundwater was encountered in all borings except B-6, at depths ranging from 9.0 to 16.0 feet. Temporary observation wells were installed in three borings (B-2, B-5, and B-6) to facilitate the measurement of stabilized groundwater levels. Stabilized groundwater was encountered in all borings except boring B-4, at depths ranging from 5.9 feet to 7.5 feet below the existing ground surface. Borehole cave depths were also recorded in the borings, which can sometimes be an approximate indicator of the groundwater table. Caving of the borehole was encountered in the borings at depths ranging from about 9.0 to 10.1 feet.

It should be noted that groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report. F&R notes that due to the presence of relatively impervious silty and clayey soils noted on the project site, trapped or perched water conditions may be encountered during periods of inclement weather and during seasonally wet periods.

5.0 GEOTECHNICAL ENGINEERING EVALUATION AND RECOMMENDATIONS

5.1 GENERAL

The conclusions and recommendations contained in this section of the report are based upon the results of the seven (7) soil test borings performed by F&R, our experience with similar projects and subsurface conditions, and the information provided to us regarding the proposed construction. It is our opinion that the subsurface conditions encountered at the project site are generally suitable for the proposed construction from a geotechnical engineering perspective provided the recommendations presented in subsequent sections of this report are followed throughout the design and construction phases of this project. It is our understanding that design and construction of the stormwater culverts will generally conform to the Fayetteville PWC Standard Specifications.

5.2 STRUCTURAL FILL PLACEMENT AND COMPACTION

It is expected that the low-plasticity on-site cut soils (SM, SC and ML) that are free of organics will be suitable for use as structural fill/backfill material provided they are at a moisture content suitable to achieve proper compaction and are stable during compaction and at final bearing grade. These low to moderately plastic soils are generally considered fair to good materials for use as structural earth fill. Highly plastic clay (CH) soils were encountered in borings B-3 and B-7 at depths ranging from 13.5 and 18.5 feet, respectively, and extended to depths of approximately 18.5 and 20 feet, respectively. Highly plastic soils are considered poorer materials for re-use as structural fill because they can be difficult to properly place and compact and have the potential to shrink and/or swell with varying moisture levels. It is generally recommended that these soils be used in the lower portions of the excavations or wasted.

Most of the cut soils are expected to be wet and/or saturated. Based on anticipated excavation depths and site conditions at the time of construction, some soils may require moisture conditioning (*e.g.*, drying of wet soils or wetting of dry soils) prior to use as structural fill. As such, it is recommended that earthwork be performed during the summer months when the weather conditions are more conducive to moisture conditioning of fill materials.

If imported soils are determined to be necessary, F&R recommends that a qualified geotechnical engineer or engineering technician working under the direction of the geotechnical engineer approve the suitability of the imported soils prior to their delivery to the site. Imported structural fill should consist of low plasticity soil (LL<35, PI<20), have a maximum dry density of at least 100 pcf, and be free of organic and other deleterious materials.

Structural earth fill should be compacted at a moisture content within $\pm$3 percentage points of the optimum moisture content and placed in loose lifts not exceeding 8 inches. All structural earth fill (*i.e.,* fill placed in roads and driveways) should be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM D-698 and 100 percent in the top 12 inches. Structural earth fill placed in non-structural/grassy areas should be compacted to at least 92 percent of the standard Proctor maximum dry density. At a minimum, the corresponding cross-section of the area removed (asphalt, concrete, or gravel) should be replaced per the original section.

All structural fill material should be placed and compacted under the full-time control and supervision of a qualified geotechnical engineer or engineering technician working under the direction of the geotechnical engineer. The placement and compaction of all fill material should be tested at frequent intervals in order to confirm that the recommended degree of compaction is achieved.

As previously stated, the on-site soils have sufficient silt/clay content to render them moisture sensitive. The on-site soils will become unstable (*i.e.,* pump and rut) during normal construction activities when in the presence of excess moisture. Soils with a moisture content greater than three percentage points above the optimum moisture content are generally considered to have excessive moisture. During earthwork and construction activities, surface-water runoff must be drained away from construction areas to prevent water from ponding on or saturating the soils within excavations or on subgrades.

Exposure to the environment may weaken the soils at the bearing level if excavations remain open for long periods of time. The bearing surfaces should be level or suitably-benched and free of loose soil, ponded water, and debris. If the bearing soils are softened by surface water intrusion, subsurface seepage or exposure, the softened soils should be removed from the excavation immediately prior to placement of stone, concrete, or other pipe bedding materials.

5.3 EXCAVATION CHARACTERISTICS

Based on the results of the soil test borings and indicated excavation depths which range from 6 to 8 feet below ground surface, we anticipate that the open-cut excavations can be performed using conventional backhoes and tracked excavators. However, steps should be implemented to suitably lower groundwater levels in advance of the excavation operations to provide for adequate slope stability, safety and more efficient grading operations. A majority of the soils consisted of very loose to dense sands and stiff to hard silts and silty clays. Very hard/very dense soils or PWR were not encountered within the depth of the exploration at any of the boring locations. As such, it is not anticipated that difficult excavation with respect to very hard/dense soil or PWR will be encountered within the excavation depths based on the provided storm drain inverts and anticipated culvert foundation bearing grades.

5.4 CULVERT RECOMMENDATIONS

We understand the existing culverts will be replaced with new culverts. Based on the information provided by Kimley-Horn, it is anticipated the culvert invert elevations will range from 6 to 8 feet below the existing ground surface (approximately EL 166.5 to 172 feet).

Based on the results of the borings and provided culvert invert elevations, it is anticipated that the soils at the culvert bearing grades will consist of wet and/or saturated, very loose to loose silty and clayey sands (SM and SC). Given the presence of very loose, wet and/or saturated soils, and groundwater at and/or above the proposed invert elevations, subgrade repair will likely be required to provide a stable foundation bearing grade for the proposed box culverts. We anticipate the very loose soils may need to be undercut to depths of 2-4 feet below the bearing grade and replaced with No. 57 washed stone up to the planned bearing grade and encased with a geotextile filter fabric. The washed stone thickness should not exceed two feet before the surface

of the washed stone is required to be densified with a heavy vibratory plate compactor to the satisfaction of the geotechnical engineer or their representative.

As previously mentioned, groundwater was encountered in the borings at depths ranging from approximately 5.9 to 7.5 feet below existing ground surface. Also, wet and/or saturated soil conditions were encountered in the borings typically at depths ranging from 2 to 6.5 feet below existing ground surface. Based on proposed invert elevations, groundwater will likely be encountered at the culvert invert elevation in the areas near borings B-1 and B-2, and to about 1-4 feet *above* the proposed invert elevations in the areas near borings B-3 through B-7. As such, it should be expected that groundwater will likely be encountered during construction in these areas and dewatering will likely be required. Dewatering will be discussed in detail in a later section.

Spread foundations bearing on approved native soils (stiff/ medium dense or better) or properly-compacted structural fill or NCDOT No. 57 washed stone and/or concrete overlying approved native materials can be proportioned for a net allowable soil bearing capacity of 2,000 psf. Final foundation sizes should be determined by the culvert designer based on the actual design loads, building code requirements, and other structural considerations.

We recommend that the foundation excavations and culvert subgrade be observed by a qualified geotechnical engineer or their representative prior to placement of NCDOT No. 57 washed stone and/or concrete. The purpose of the engineering observation would be to determine that the foundations bear on suitable and stable soils and that unsuitable, soft or loose materials are undercut and backfilled appropriately. Hand augers and Dynamic Cone Penetrometer (DCP) testing may be recommended to verify the consistency of the bearing grade and underlying soils. Exposure to the environment may weaken the soils at the footing bearing level if the excavation remains open for long periods of time. The foundation bearing surface should be level or suitably-benched and free of loose soil, ponded water, and debris. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation immediately prior to placement of the washed stone and geotextile.

5.5 LATERALLY LOADED WALLS

We expect that culvert headwalls and wingwalls will consist of conventional cast-in-place concrete cantilever retaining walls. Recommendations for conventional walls are provided below. If another wall type is proposed, such as Mechanically Stabilized Earth (MSE), F&R should be notified so that we can provide recommendations for that specific wall type.

F&R assumes that the walls will be permitted to rotate at the top and therefore should be designed to resist active lateral earth pressures. Assuming the walls will be backfilled with low plasticity on-site or off-site borrow materials (USCS ML, SC or SM soils), the walls should be

designed using an active earth pressure coefficient (Ka) of 0.33. Assuming a most unit weight of 120 pounds per cubic foot (pcf), F&R recommends an active earth pressure equivalent fluid weight (EFW) of 40 pcf be used in design. For sliding resistance along the base of the foundations, a friction factor (tan δ) of 0.25 should be utilized for concrete bearing on native soils. A passive earth pressure coefficient (Kp) of 1.25 can be used in design where the foundation faces bear directly against undisturbed, medium dense native soils; this coefficient incorporates a factor of safety of 2.0 to limit the amount of movement to mobilize the passive resistance. Assuming an in-situ buoyant density of approximately 60 pcf for native, undisturbed soils, the passive earth pressure equivalent fluid weight (EFW) would be 75 pcf. It is recommended that the upper 2 feet of soil not be considered as contributing to the passive resistance due to possible disturbances during construction (e.g., installation of utilities, re-grading, etc.).

Lateral earth pressures arising from surcharge loading (vehicular traffic), earthquake loading, and groundwater (including flood events) should be added to the above soil earth pressures to determine the total lateral earth pressure, which the walls must resist. Transient loads imposed on the walls by construction equipment during backfilling should be taken into account during design. In addition, the toe of the walls should be properly protected from scour/erosion and/or designed with additional embedment to account for the soil loss.

Excessive compaction near the wall(s) may cause damage to the walls; F&R recommends that low ground pressure equipment (such as small, walk-behind rollers) be utilized to compact material to a distance of at least 8 to 10 feet behind the walls. F&R recommends that all walls be provided with a drainage system to maintain the wall backfill in a drained condition at all times such that the walls are not subject to hydrostatic pressures.

While borings were not requested at possible locations of headwalls or wing walls, it is anticipated that headwall and wing wall subgrades will likely consists of wet, loose soils due to their anticipated construction locations typically being within close proximity to existing drainage features. As such, we anticipate spread foundations bearing on these soils can likely be proportioned for a net allowable soil bearing capacity of 2,000 psf after the completion of previously recommended repairs, but should be confirmed by the project geotechnical engineer. Final foundation sizes should be determined by the structural engineer based on the actual design loads, building code requirements, and other structural considerations.

We recommend that the headwall and wing wall foundation bearing grades be observed by a qualified geotechnical engineer or his representative. In addition, hand augers and Dynamic Cone Penetrometer (DCP) testing should be performed to verify the consistency of the bearing grade and underlying soils. The purpose of the engineering observation would be to determine that the foundations bear on suitable and stable soils and that unsuitable, loose materials are undercut and backfilled appropriately.

5.6 DEWATERING

As previously mentioned, groundwater was encountered in the borings at depths ranging from approximately 5.9 to 7.5 feet below the existing ground surface. Also, wet and/or saturated soil conditions were encountered in the borings typically at depths ranging from 2 to 6.5 feet below the existing ground surface. Based on proposed culvert invert elevations, groundwater will likely be encountered at and/or 1-4 feet above the inverts. As such, it should be expected that groundwater will likely be encountered during construction and dewatering will likely be required. As such, excavation dewatering will be required in order to maintain a drained, stable excavation and to prevent softening/loosening of the excavation subgrade. The groundwater should be lowered to a depth of at least 3 to 4 feet below the bottom of the excavation and should be lowered prior to removal of the final 3 to 4 feet of overburden. Depending upon the prevailing weather conditions during construction and flow in the channel, pumping from sump pits may be sufficient to maintain a drained excavation. However during periods of inclement weather, sump pits and pumping may not be sufficient to control both groundwater and surface water, and more extensive drainage/dewatering measures may be required. The method of surface water and groundwater control should be determined and designed by the contractor, but may require well points, creek diversion, coffer dams, sheet piling, or other means.

It should be noted that if groundwater levels are not effectively maintained below the base of the excavation during construction, unstable and loosened/softened subgrade conditions could develop, which may cause excessive settlements to develop beneath the completed structure or require additional subgrade repair (*e.g.,* densification, undercutting & replacement with washed stone, etc.). Therefore, efforts should be incorporated in the construction sequence to properly control groundwater levels during construction. Additionally, it is recommended that only excavation contractors experienced in similar excavations and groundwater control should be allowed to perform this work.

5.7 TEMPORARY EXCAVATION RECOMMENDATIONS

Due to the limited construction area available within the easement for the existing culvert, we anticipate the excavations may not be able to be sufficiently sloped and will require temporary shoring. Trench boxes or internally-braced excavations are anticipated; however, the type of excavation stabilization or shoring system used should be selected and designed by the contractor.

Mass excavations and other excavations required for construction of this project should be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations), or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas and

protective systems by a “competent person” for evidence of situations that could result in cave-ins, indications of failure of a protective system, or other hazardous conditions. All excavated soils, equipment, building supplies, etc., should be placed away from the edges of excavations at a distance equaling or exceeding the depth of the excavation. F&R cautions that the actual excavation slopes will need to be evaluated frequently each day by the “competent person” and flatter slopes or the use of shoring may be required to maintain a safe excavation depending upon excavation-specific circumstances. The contractor is responsible for providing the “competent person” and all aspects of site excavation safety. F&R can evaluate specific excavation slope situations if we are informed and requested by the owner, designer, or contractor’s “competent person”.

6.0 CONTINUATION OF SERVICES

The Geotechnical Engineer of Record should be retained to monitor and test earthwork activities, and subgrade preparations for foundations and excavations, as applicable. It should be noted that the actual soil conditions at the various invert elevations and culvert bearing grades will vary across this site and thus the presence of the Geotechnical Engineer and/or their representative during construction will serve to validate the subsurface conditions and recommendations presented in this report. We recommend that F&R be employed to monitor the earthwork and foundation construction, and to report that the recommendations contained in this report are completed in a satisfactory manner. Our involvement on the project will aid in the proper implementation of the recommendations discussed herein. The following is a recommended scope of services:

- Review of project plans and construction specifications to verify that the recommendations presented in this report have been properly interpreted and implemented;
- Observe and perform testing during earthwork to document that subsurface conditions encountered during construction are consistent with those anticipated in this report;
- Observe subgrade preparation including undercutting of soft/loose unsuitable soils, installation of drainage materials, geotextiles and fill placement;
- Observe placement and compaction of any structural fill and backfill, and perform laboratory and field compaction testing of the fill; and
- Observe all foundation excavations and footing bearing grades for compliance with the geotechnical recommendations.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of Kimley-Horn and/or their agents, for specific application to the referenced project in accordance with generally-accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us; the data obtained from the

previously-described, subsurface exploration program, and generally-accepted geotechnical engineering practice. The evaluations and recommendations do not reflect variations in subsurface conditions, which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our recommendations based upon our on-site observations of the conditions.

There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by the Geoprofessional Business Association (GBA), which is included in the Appendix IV. We ask that you please review this information.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork, and foundation construction to observe that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the proposed construction, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

APPENDIX I

FIGURES



Site Vicinty Map

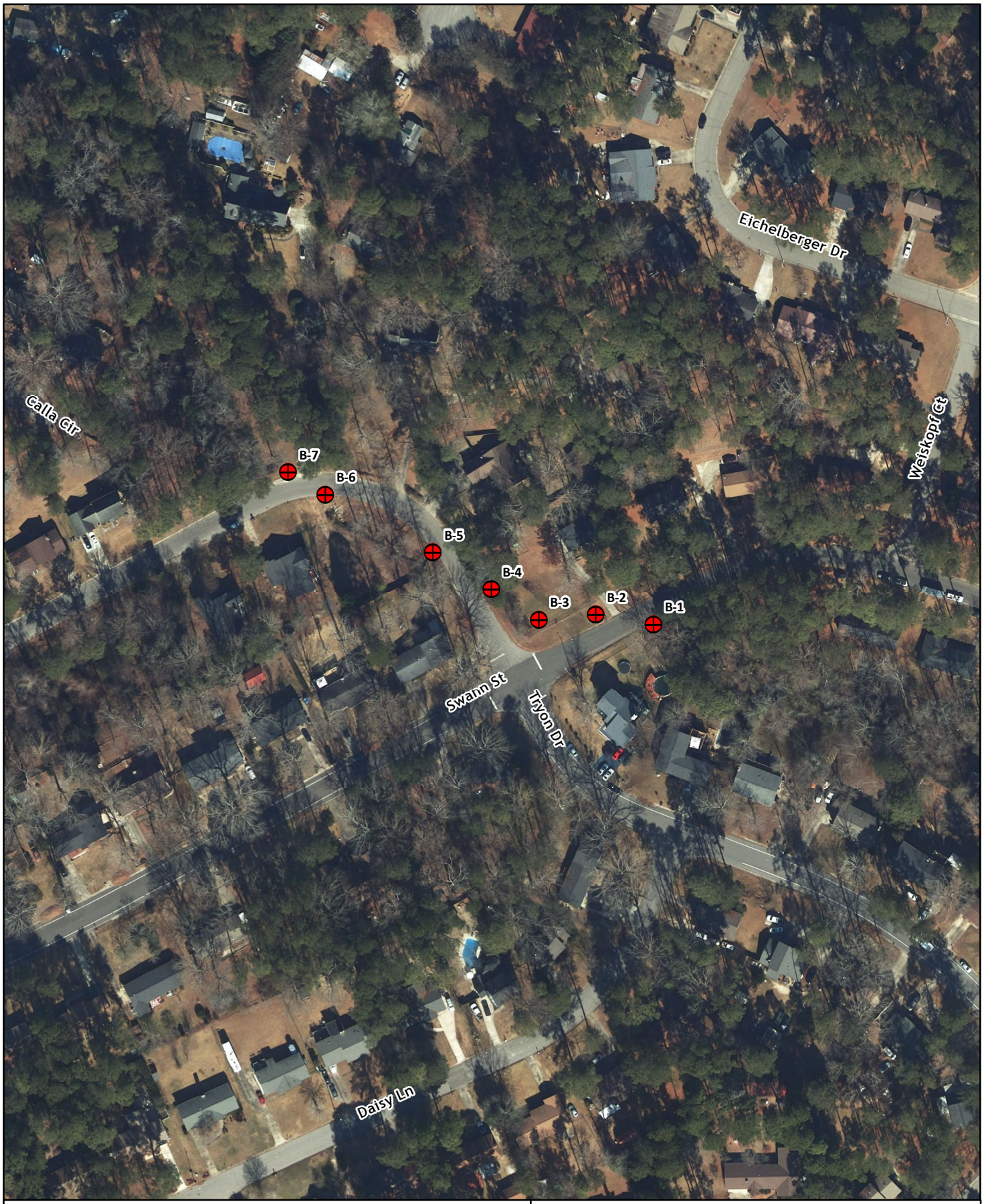
0 250 500 1,000 1,500 2,000 Feet

Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	Kimley Horn
Project:	Tryon Dr. Drainage Improvement
Location	Fayetteville, Cumberland County, NC
Project Number:	66A-0075
Data:	Open Street
Date:	July 2022

Scale: 1 inch = 1,000 feet

FIGURE No.: 1



Boring Location Plan

0 37.5 75 150 225 300 Feet

N

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310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	Kimley Horn		
Project:	Tryon Dr. Drainage Improvement		
Location	Fayetteville, Cumberland County, NC		
Project Number:	66A-0075		FIGURE No.: 2
Data:	NCOne Map Aerial 2021		
Date:	July 2022	Scale: 1 inch = 150 feet	

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SUBSURFACE PROFILE

Plot Based on Elevation

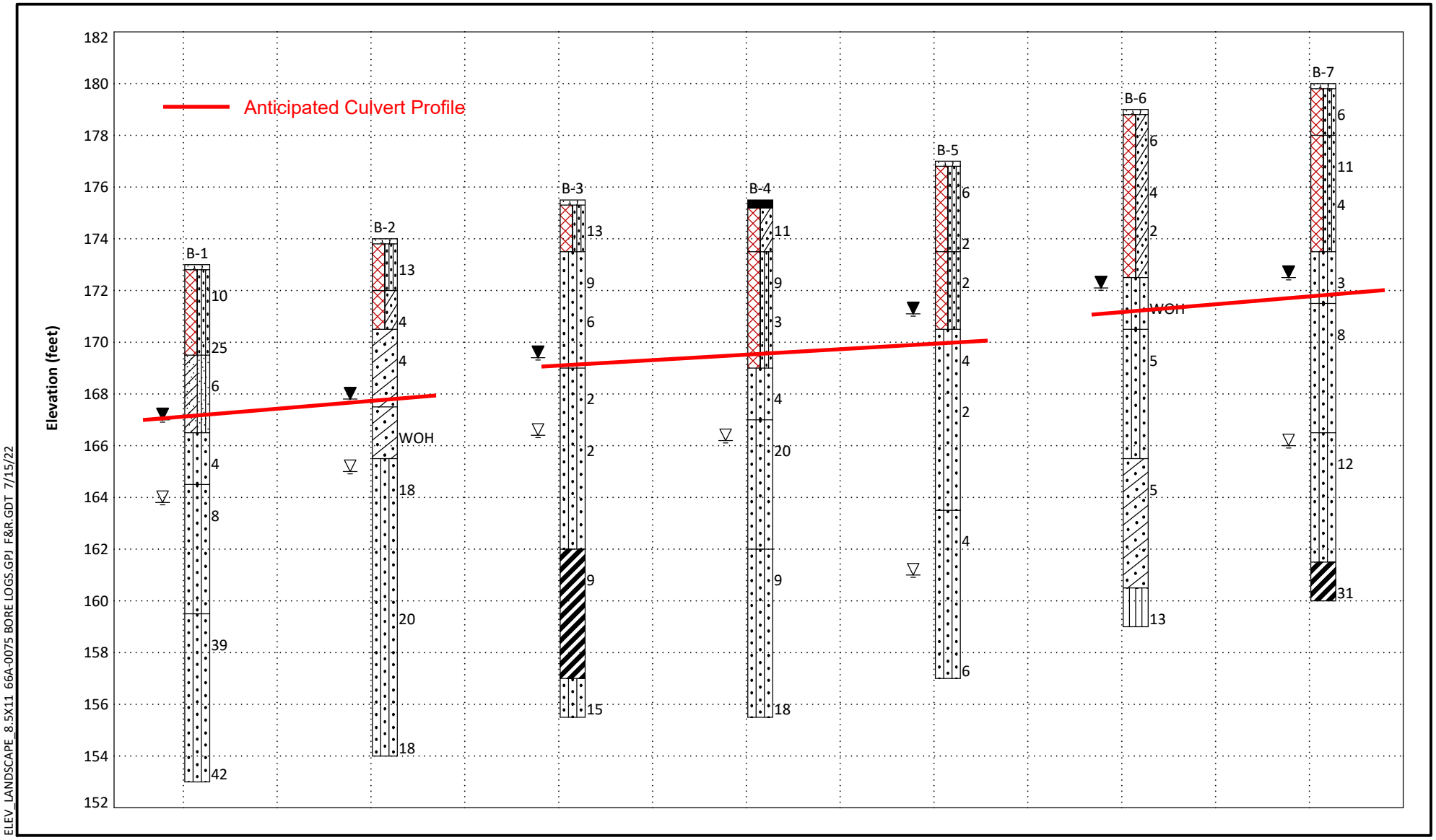
Profile Name: Figure No. 3

Project No: 66A-0075

Client: Kimley Horn

Project: Tryon Dr. Drainage Improvement

City/State: Fayetteville, NC



ELEV_LANDSCAPE_8.5X11 66A-0075 BORE LOGS.GPJ F&R.GDT 7/15/22

APPENDIX II

BORING LOGS

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Table 1: Boring Coordinates		
Boring	**Northing**	**Easting**
B-1	488344	2019560
B-2	488355	2019493
B-3	488349	2019426
B-4	488385	2019371
B-5	488428	2019303
B-6	488495	2019177
B-7	488521	2019133

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

Sands and Gravels

No. of Blows, N	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

Silts and Clays

No. of Blows, N	Relative Density
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
31 - 50	Hard
Over 50	Very hard

Particle Size Identification (Unified Classification System)

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

Modifiers

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

Approximate Content	Modifiers
≤ 5%:	Trace
5% to 12%:	Slightly silty, slightly clayey, slightly sandy
12% to 30%:	Silty, clayey, sandy
30% to 50%:	Very silty, very clayey, very sandy

Field Moisture Description	
Saturated:	Usually liquid; very wet, usually from below the groundwater table
Wet:	Semisolid; requires drying to attain optimum moisture
Moist:	Solid; at or near optimum moisture
Dry:	Requires additional water to attain optimum moisture

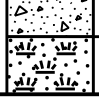
Ground Water

▽ Water Level in Bore Hole Immediately after Drilling

▼ Static Water Level after 24 Hours

SINCE F&R 1881

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION				TYPICAL NAMES
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
			GP	Poorly graded gravels
	GRAVELS with fines		GM	Silty gravels
			GC	Clayey gravels
SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
			SP	Poorly graded sands
	SAND with fines		SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
			CL	Sandy or silty clays of low to medium plasticity
			OL	Organic silts of low plasticity
SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS				PWR (Partially Weathered Rock)
				Rock
				Asphalt
				ABC Stone
				Concrete
				Surficial Organic Soil

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BORING LOG

Boring: B-1 (1 of 1)

Project No: 66A-0075
Client: Kimley Horn
Project: Tryon Dr. Drainage Improvement
City/State: Fayetteville, NC

Elevation: 173 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/21/22
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
172.8	0.2	SURFICIAL ORGANIC SOILS	4-5-5	0.0	10	GROUNDWATER DATA: 0 Hr: 9.2', Caved at 9.3' 24 Hrs: 6.0', Caved at 9.7'
		FILL: Loose to Medium Dense, Dry, Orange and Gray, Silty Fine SAND (SM) with Fine Gravel and Trace Roots		1.5		
			12-13-12	2.0	25	
169.5	3.5	POSSIBLE ALLUVIUM: Loose, Wet, Gray, Silty Clayey Fine to Coarse SAND (SC-SM)	7-3-3	3.5	6	
				5.0		
166.5	6.5	ALLUVIAL: Very Loose, Wet, Dark Gray, Silty Fine to Coarse SAND (SM) with Wood Fragments and Roots	2-2-2	6.5	4	
				8.0		
164.5	8.5	COASTAL PLAIN: Loose, Saturated, Light Gray, Silty Fine to Coarse SAND (SM)	2-3-5	8.5	8	
				10.0		
159.5	13.5	Dense, Wet, Orange, Silty Fine to Coarse SAND (SM)	13-17-22	13.5	39	
				15.0		
			20-21-21	18.5	42	
153.0	20.0	Boring Terminated at 20.0 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-2 (1 of 1)

Project No: 66A-0075
Client: Kimley Horn
Project: Tryon Dr. Drainage Improvement
City/State: Fayetteville, NC

Elevation: 174 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/21/22
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
173.8	0.2	SURFICIAL ORGANIC SOILS	5-6-7	0.0	13	GROUNDWATER DATA: 0 Hr: 9.0' inside PVC 24 Hrs: 6.2' inside PVC
		FILL: Medium Dense, Dry, Orange, Silty Fine to Coarse SAND (SM)		1.5		
172.0	2.0	Very Loose, Moist, Orange and Brown, Clayey Fine to Medium SAND (SC)	2-2-2	2.0	4	
170.5	3.5	ALLUVIAL: Very Loose, Wet, Gray, Clayey Fine to Coarse SAND (SC) with Roots	2-2-2	3.5	4	
				5.0		
167.5	6.5	POSSIBLE COASTAL PLAIN: Very Loose, Wet, Gray and Brown, Clayey Fine to Coarse SAND (SC)	WOH-WOH-WOH	6.5	0	
				8.0		
165.5	8.5	COASTAL PLAIN: Medium Dense, Saturated, Gray and Orange, Silty Fine to Coarse SAND (SM)	4-8-10	8.5	18	
				10.0		
			5-8-12	13.5	20	
				15.0		
			6-6-12	18.5	18	
154.0	20.0	Boring Terminated at 20.0 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-3 (1 of 1)

Project No: 66A-0075
Client: Kimley Horn
Project: Tryon Dr. Drainage Improvement
City/State: Fayetteville, NC

Elevation: 175.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/21/22
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
175.3	0.2	SURFICIAL ORGANIC SOILS	5-6-7	0.0	13	GROUNDWATER DATA: 0 Hr: 9.1', Caved at 9.3' 24 Hrs: 6.1', Caved at 10.1'
		FILL: Medium Dense, Moist, Brownish Gray, Silty Fine to Coarse SAND (SM)		1.5		
173.5	2.0	ALLUVIAL: Loose, Wet, Dark Gray, Silty Fine to Coarse SAND (SM) with Wood Fragments	4-4-5	2.0	9	
			3-3-3	3.5	6	
				5.0		
169.0	6.5	Very Loose, Wet, Dark Gray, Silty Fine to Coarse SAND (SM) with Roots	1-1-1	6.5	2	
				8.0		
			1-1-1	8.5	2	
				10.0		
162.0	13.5	COASTAL PLAIN: Stiff, Moist, Dark Gray, Silty CLAY (CH)	2-4-5	13.5	9	
				15.0		
157.0	18.5	Medium Dense, Saturated, Orange, Silty Fine to Coarse SAND (SM)	3-5-10	18.5	15	
155.5	20.0	Boring Terminated at 20.0 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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Engineering Stability Since 1881

BORING LOG

Boring: B-4 (1 of 1)

Project No: 66A-0075
Client: Kimley Horn
Project: Tryon Dr. Drainage Improvement
City/State: Fayetteville, NC

Elevation: 175.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/21/22
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
175.2	0.3	SURFICIAL ORGANIC SOILS	5-5-6	0.0	11	GROUNDWATER DATA: 0 Hr: 9.3', Caved at 9.4' Backfilled Immediately After Drilling
		FILL: Medium Dense, Moist, Light Brown, Clayey Fine to Medium SAND (SC) with Fine Gravel		1.5		
173.5	2.0	Loose to Very Loose, Moist, Orange, Silty Fine to Coarse SAND (SM)	6-5-4	2.0	9	
			4-2-1	3.5	3	
				5.0		
169.0	6.5	ALLUVIAL: Very Loose, Wet, Black, Silty Fine to Medium SAND (SM) with Wood Fragments	1-2-2	6.5	4	
				8.0		
167.0	8.5	POSSIBLE COASTAL PLAIN: Medium Dense, Wet, Gray, Silty Fine to Medium SAND (SM)	4-10-10	8.5	20	
				10.0		
162.0	13.5	COASTAL PLAIN: Loose to Medium Dense, Saturated, Orange, Silty Fine to Coarse SAND (SM)	11-6-3	13.5	9	
				15.0		
			4-8-10	18.5	18	
155.5	20.0	Boring Terminated at 20.0 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-5 (1 of 1)

Project No: 66A-0075
Client: Kimley Horn
Project: Tryon Dr. Drainage Improvement
City/State: Fayetteville, NC

Elevation: 177 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/20/22
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
176.8	0.2	SURFICIAL ORGANIC SOILS	2-3-3	0.0	6	GROUNDWATER DATA: 0 Hr: 16.0' inside PVC 24 Hrs: 5.9' inside PVC
		FILL: Loose to Very Loose, Moist, Light Brown to Orange, Silty Fine to Coarse SAND (SM) with Roots		1.5		
			2-1-1	2.0	2	
173.5	3.5	Very Loose, Saturated, Tan, Silty Fine to Coarse SAND (SM)	1-1-1	3.5	2	
				5.0		
170.5	6.5	POSSIBLE ALLUVIAL: Very Loose, Wet, Dark Gray, Silty Fine to Coarse SAND (SM) with Roots	2-2-2	6.5	4	
				8.0		
			1-1-1	8.5	2	
				10.0		
163.5	13.5	COASTAL PLAIN: Very Loose to Loose, Saturated, Gray-Tan, Silty fine to Coarse SAND (SM)	2-2-2	13.5	4	
				15.0		
			3-3-3	18.5	6	
157.0	20.0	Boring Terminated at 20.0 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-6 (1 of 1)

Project No: 66A-0075
Client: Kimley Horn
Project: Tryon Dr. Drainage Improvement
City/State: Fayetteville, NC

Elevation: 179 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/20/22
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
178.8	0.2	SURFICIAL ORGANIC SOILS	4-3-3	0.0	6	GROUNDWATER DATA:
		FILL: Loose to Very Loose, Moist, Brown, Clayey Fine to Medium SAND (SC)		1.5		0 Hr: Not Measured
			3-2-2	2.0	4	24 Hrs: 6.9' inside PVC
				3.5		
			1-1-1		2	
				5.0		
172.5	6.5	ALLUVIAL: Very Loose, Wet, Gray and Dark Gray, Silty Fine to Coarse SAND (SM) with Trace Rootlets	WOH-WOH-WOH	6.5	0	
				8.0		
170.5	8.5	POSSIBLE COASTAL PLAIN: Loose, Saturated, Gray, Fine to Coarse Silty SAND (SM)	1-2-3	8.5	5	
				10.0		
165.5	13.5	COASTAL PLAIN: Loose, Wet, Gray and Orange, Clayey Fine to Coarse SAND (SC)	2-2-3	13.5	5	
				15.0		
160.5	18.5	Stiff, Moist, Dark Gray, Fine Sandy SILT (ML)	6-6-7	18.5	13	
159.0	20.0	Boring Terminated at 20.0 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-7 (1 of 1)

Project No: 66A-0075
Client: Kimley Horn
Project: Tryon Dr. Drainage Improvement
City/State: Fayetteville, NC

Elevation: 180 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/20/22
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
179.8	0.2	SURFICIAL ORGANIC SOILS	2-3-3	0.0	6	GROUNDWATER DATA: 0 Hr: 14.0', Caved at 14.6' 24 Hrs: 7.5', Caved at 9.0'
		FILL: Loose, Moist, Brown, Silty Fine to Medium SAND (SM) with Trace Rootlets		1.5		
178.0	2.0	Medium Dense to Very Loose, Moist, Gray, Silty Fine to Medium SAND (SM)	5-5-6	2.0	11	
			3-2-2	3.5	4	
				5.0		
173.5	6.5	POSSIBLE COASTAL PLAIN: Very Loose, Saturated, Dark Gray and Gray, Silty Fine to Coarse SAND (SM)	2-2-1	6.5	3	
				8.0		
171.5	8.5	COASTAL PLAIN: Loose, Saturated, Gray, Silty Fine SAND (SM)	1-2-6	8.5	8	
				10.0		
166.5	13.5	Medium Dense, Saturated, Orange, Silty Fine to Coarse SAND (SM)	6-5-7	13.5	12	
				15.0		
161.5	18.5	Hard, Wet, Gray, Silty CLAY (CH)	8-15-16	18.5	31	
160.0	20.0	Boring Terminated at 20.0 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

APPENDIX III

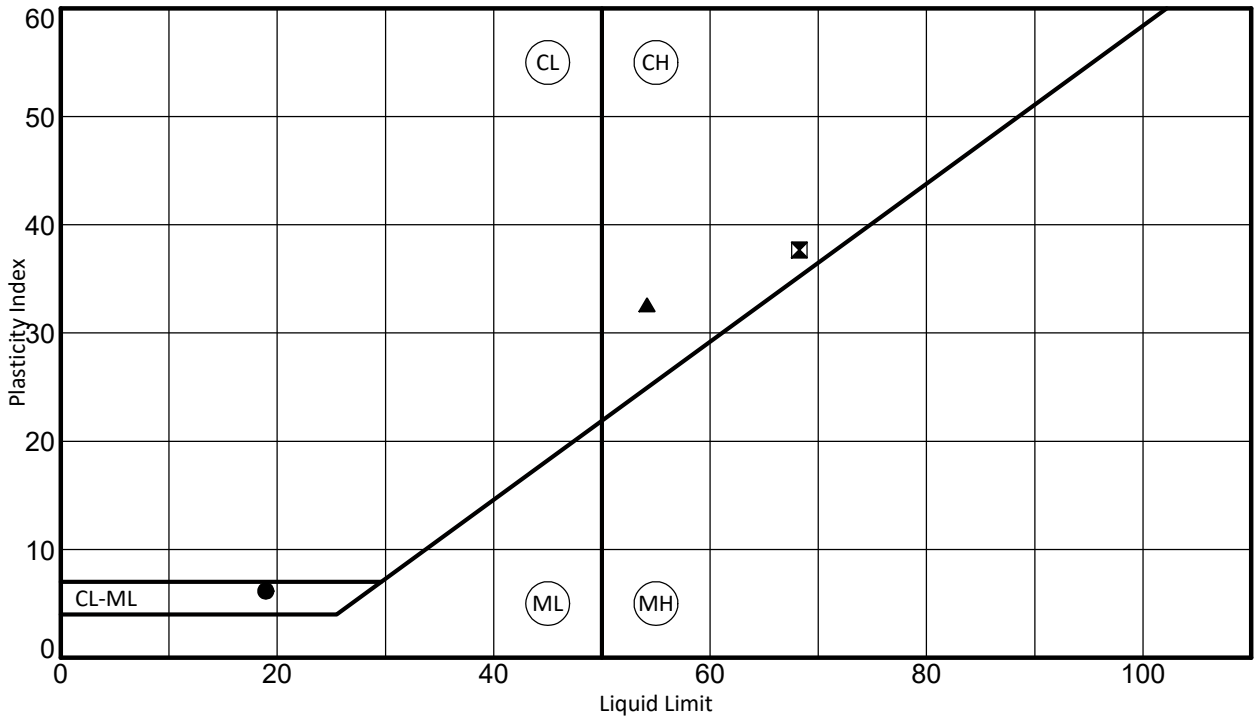
LABORATORY TEST RESULTS

FROEHLING & ROBERTSON
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ATTERBERG LIMITS

Sheet: 1 of 1

Project No: 66A-0075
Client: Kimley Horn
Project: Tryon Drive Drainage Improvements
City/State: Fayetteville, NC



Boring No.	Depth	LL	PL	PI	Fines	Classification	% Natural Water Content
● B-1	3.5' - 5.0'	19	13	6	21.0	SILTY, CLAYEY SAND (SC-SM)	11.4
⊠ B-3	13.5' - 15.0'	68	31	37	95.4	FAT CLAY (CH)	31.7
▲ B-6	13.5' - 15.0'	54	22	32	23.3	CLAYEY SAND (SC)	22.8

APPENDIX IV

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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FROEHLING & ROBERTSON, INC.

Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Tryon Drive Drainage Improvements – Additional Borings
Fayetteville, North Carolina
F&R Project No. 66C-0159

Prepared For:
Kimley-Horn
421 Fayetteville Street, Suite 600
Raleigh, North Carolina 27601

Prepared By:
Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, North Carolina 27603

February 13, 2025

FROEHLING & ROBERTSON

Engineering Stability Since 1881

February 13, 2025

Travis Crissman, P.E.
Kimley-Horn
421 Fayetteville Street, Suite 600
Raleigh, North Carolina 27601

Subject: Report of Subsurface Exploration and Geotechnical Engineering Evaluation
Tryon Drive Drainage Improvements – Additional Borings
Fayetteville, North Carolina
F&R Project No. 66C-0159

Dear Mr. Crissman:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the Tryon Drive Drainage Improvements – Additional Borings project in Fayetteville, North Carolina. Our services were performed in general accordance with F&R's Proposal 2466-00171 Rev. 2 dated September 19, 2024. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and general subsurface conditions, and presents our geotechnical recommendations for design and construction of the project.

We have enjoyed working with you on this project. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.

Dave Morse, E.I., M.S.
Geotechnical Staff Engineer

NORTH CAROLINA PROFESSIONAL SEAL 029927 ENGINEER Michael S. Sabodish, Jr

Michael S. Sabodish Jr., Ph.D., P.E.
Geotechnical Department Manager

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Boring Location Plan, Figure No. 2
Subsurface Profile, Figure No. 3
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APPENDIX II
Key to Soil Classification
Unified Soil Classification Chart
Boring Logs
Table of Soil Parameters

APPENDIX III
Laboratory Test Results

APPENDIX IV
GBA Document "Important Information about This Geotechnical-Engineering Report"

1.0 PURPOSE & SCOPE OF SERVICES

The purpose of this subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions in the areas of the proposed stormwater improvements, and to provide geotechnical engineering recommendations that can be used during the design and construction phases of the project.

F&R's scope of services included the following:

- Completion of three soil test borings (C-1 through C-3) each advanced to a depth of 30 feet below the existing ground surface;
- Preparation of typed boring logs and development of a subsurface soil profile;
- Performing geotechnical laboratory testing on representative soil samples;
- Performing a geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction; and
- Preparation of this report by professional engineers.

2.0 PROJECT INFORMATION

The project site is located within residential lots located along Swann Street and Daisy Lane in Fayetteville, North Carolina. The site generally consists of single family homes with manicured lawns and landscaping. An existing utility easement starts at Tryon Drive and runs southeast between 1759 and 1763 Tryon Drive and between 1735 and 1737 Swann Street before terminating at an existing curb inlet on the north side of Swann Street. The utility easement then continues on the south side of Swann Street starting between 1732 and 1734 Swann Street and runs southeast before turning to the southwest behind 1733 Daisy Lane, and then again turning to the southeast between 1729 and 1733 Daisy Lane. From there, the easement terminates on the north side of Daisy Lane at its intersection with Webster Avenue.

It is our understanding that improvements are being made to the City of Fayetteville's stormwater system. Based on the provided plan "Tryon Drive Drainage Improvements 100% Design Drawings" dated January 2024, the proposed construction will consist of the replacement of reinforced concrete pipes (RCP) varying in diameter between 24 and 30 inches within the existing easements. In select locations, it will be necessary to install shoring and/or foundation protection systems for the single family homes located at 1732, 1734, 1735, and 1737 Swann Street, and at 1729 and 1733 Daisy Lane. Between catch basin (CB) 12 and CB-15, approximately 298 feet of 42-inch diameter RCP will be installed. Further south along the alignment, approximately 447 feet of 30 to 42-inch diameter RCP will be installed between CB-17 and CB-21.

Based on topographic information obtained from the Cumberland County GIS database, existing site grades in the areas of the proposed improvements slope down from south to north with a high elevation of about 210 feet between 1729 and 1733 Daisy Lane, to a low elevation of about 196 feet between 1735 and 1737 Swann Street.

3.0 EXPLORATION PROCEDURES

3.1 SUBSURFACE EXPLORATION

F&R advanced three (3) soil test borings, C-1 through C-3, each to a depth of 30 feet below the existing ground surface. The approximate boring locations are shown on the Boring Location Plan presented as Figure 2, and the Storm Plan and Profile presented as Figures 4 and 5, in Appendix I. The test boring locations were established in the field by F&R using a hand-held GPS unit with reported sub-meter accuracy. Ground surface elevations at the boring locations were obtained from Cumberland County GIS topographic data and the provided plans. Given these methods of determination, the boring locations and ground surface elevations should only be considered approximate.

The test borings were advanced by a track-mounted drill rig using 2-1/4" inside diameter (I.D.) hollow stem augers for borehole stabilization. Representative soil samples were obtained using a standard two-inch outside diameter (O.D.) split-barrel sampler in general accordance with ASTM D1586, Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. The number of blows required to drive the split-barrel sampler three consecutive 6-inch increments with an automatic hammer is recorded and the blows of the last two 6-inch increments are summed to obtain the Standard Penetration Test (SPT) N-value representing the penetration resistance of the soil. Five (5) SPT samples were collected in the top 10 feet and then at a nominal interval of 5 feet thereafter.

A representative portion of soil was obtained from each SPT sample, sealed in a glass jar, labeled, and transported to our laboratory for classification and analysis by a geotechnical engineer. The soil samples were classified in general accordance with the Unified Soil Classification System (USCS) using visual-manual identification procedures (ASTM D2488). A Boring Log for each test boring is presented in Appendix II.

Groundwater level measurements were attempted immediately after drilling in each of the borings. After a stabilization period of approximately 24-hours following the completion of drilling, groundwater level measurements were attempted in borings C-1 and C-2; boring C-3 was backfilled immediately after drilling. Temporary piezometers were installed in borings C-1 and C-2 to facilitate the measurement of stabilized groundwater levels. The temporary piezometers consisted of 1-inch diameter, hand-slotted PVC pipe installed into the completed borings.

Following the collection of the stabilized groundwater readings, the temporary piezometers were removed from the borings and all of the boreholes were backfilled with soil cuttings.

3.2 LABORATORY TESTING

F&R selected three (3) soil samples and subjected them to geotechnical index testing consisting of natural moisture content, sieve analysis (% passing #200 sieve only), and Atterberg Limits determinations. The purpose of the index testing was to aid in classification of the soil samples and development of engineering recommendations. The laboratory testing was performed in general accordance with applicable ASTM standards. The laboratory test results are presented in Appendix III of this report.

In addition to the index testing, F&R selected three (3) samples for corrosivity testing. The samples were selected to cover the depth range of soil strata anticipated during the installation of sheet piling. These samples were submitted to Waypoint Analytical for corrosivity testing, including pH, chloride ions, soluble sulfates, electrical resistivity, redox potential, and sulfides. Details related to test samples and results are presented in Section 4.4 of this report, and all laboratory test results are presented in Appendix III of this report.

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The referenced site is located within the Coastal Plain Province of North Carolina. The Coastal Plain Province is a broad, flat plain with widely-spaced and low-rolling hills where the near-surface soils have their origin from the deposition of sediments several million years ago during the period that the ocean receded from this area to its present location along the Atlantic coast. It is noted that the coastal plain soils vary in thickness from only a few feet along the western border to over ten thousand feet in some areas along the coast.

According to the *Geologic Map of North Carolina (1985)*, the site is underlain by sedimentary deposits of the Middendorf Formation. The Middendorf Formation consists of sand, sandstone, and mudstone, with clay balls and iron-cemented concretions. The formation is described to be cross-bedded, and exhibits lateral discontinuity.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached boring logs represent an estimate of the subsurface conditions based on interpretation of the boring

data using normally-accepted geotechnical engineering judgments. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Data from the specific soil test borings are shown on the boring logs presented in Appendix II of this report.

A subsurface profile has been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site. The subsurface profile for each boring has been overlaid on sheets 13 and 14 of the provided "Tryon Drive Drainage Improvements 100% Design Drawings," which are included in Appendix I as Figures 4 and 5. Strata breaks designated on the boring logs and subsurface profiles represent approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples. This section of the report provides a general discussion of subsurface conditions encountered within areas of proposed construction at the project site. More-detailed descriptions of the subsurface conditions at the individual boring locations are presented on the boring logs provided in Appendix II.

4.2.2 Surficial Materials

Surficial Organic Soils were encountered at the existing ground surface of each of the borings, with thicknesses ranging from 4 to 5 inches. The Surficial Organic Soils generally consisted of dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed Surficial Organic Soil materials. Therefore, the term Surficial Organic Soil is not intended to indicate suitability for landscaping and/or other purposes. The Surficial Organic Soil thicknesses provided in this report are based on driller observations and should be considered approximate. We note that the transition from Surficial Organic Soil to underlying materials may be gradual, and therefore the observation and measurement of Surficial Organic Soil thickness is subjective. Actual Surficial Organic Soil thicknesses should be expected to vary.

4.2.3 Fill Soils

Below the surficial organic soils, fill soils were encountered in each of the borings and extended to depths ranging from 2 to 3.5 feet below the existing ground surface. The presence of this fill is likely a result of the original stormwater line construction and residential development of the area. The fill soils consisted of very loose to loose silty and clayey sands (USCS – SM and SC) with SPT N-values ranging from 4 to 7 blows per foot (bpf). N-values of less than 4 bpf are generally indicative of fill with poor compaction while N-values of 5 to 8 bpf are generally indicative of fill with moderate compaction. Well-compacted structural fill would generally be expected to exhibit

N-values of 9 bpf or greater. As such, it appears the fill soils were placed with poor to moderate compactive effort.

A layer of very loose fill soil (USCS – SM) was encountered in boring C-2 below the surficial organic soil, and extended to an approximate depth of 1.5 feet below the existing ground surface.

4.2.4 Coastal Plain Soils

Coastal Plain soils were encountered below the fill soils and extended to the termination depths of each boring. The Coastal Plain soils generally consisted of very loose to dense silty and clayey sands (USCS - SM and SC) with SPT N-values ranging from 3 to 31 bpf; firm low-plasticity clays (USCS – CL) with SPT N-values ranging from 6 to 8 bpf; and soft to very stiff highly plastic clays (USCS – CH) with SPT N-values ranging from 4 to 20 bpf.

Highly plastic silty clays (USCS – CH) were encountered in each boring at variable depths: in boring C-1 from 18.5 to 30 feet; in boring C-2 from 28.5 to 30 feet; and in boring C-3 from 13.5 to 18.5 feet below the existing ground surface.

Layers of very loose or soft Coastal Plain soil were encountered in boring C-1 at depths of 2 to 3.5 feet (USCS – SM) and 18.5 to 20 feet (USCS – CH), and in boring C-2 at a depth of 23.5 to 25 feet (USCS – SM) below the existing ground surface.

4.3 Soil Moisture and Groundwater Conditions

The majority of soil samples recovered from the borings were described as moist (*i.e.*, within 3 to 5 percent of the estimated optimum moisture content). Wet and/or saturated soil conditions (5 to 6 percent or greater above the estimated optimum moisture content) were encountered in borings C-1, C-2, and C-3 at depths of 18.5, 23.5, and 13.5 feet, respectively. In borings C-1 and C-2, once wet or saturated soils were encountered, these conditions extended to the termination depth of the borings.

Groundwater level measurements were attempted at the termination of drilling in all borings, and groundwater was encountered in borings C-1 and C-2 at depths of 24 and 27.3 feet, respectively. After a stabilization period of approximately 24 hours following the completion of drilling, groundwater was encountered in borings C-1 and C-2 at depths of 22.2 and 24.3 feet.

It should be noted that groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report. F&R notes that due to the presence of relatively impervious clayey soils noted on the project site, trapped or perched water conditions may be encountered during periods of inclement weather and during seasonally wet periods.

4.4 SOIL CORROSIVITY EVALUATION

Corrosivity potential of soils for the sheet pile walls is dependent upon several factors, including moisture, pH, Chlorides, Sulfates, Sulfide concentrations, Electrical Resistivity, and Oxidation Reduction Potential (REDOX), in addition to the location of the water table and any Bi-Metallic considerations during placement. Based on input from Kimley-Horn, laboratory testing was performed on 3 soil samples within the range of subsurface strata where sheet piles will be installed to determine their potential corrosive characteristics. The completed corrosivity testing results are presented in the table below, and are also included in Appendix III.

Boring	Sample Depth (ft)	pH	Chlorides (mg/kg)[1]	Sulfates (mg/kg)[1]	Sulfides (mg/kg)[1]	Electrical Resistivity (ohm-cm)	Oxidation Reduction Potential (mV)	Moisture Content (%)
C-1	8.5-10	5.62	<274	<384	<27.4	8130	380	8.83
C-2	13.5-15	4.73	<265	<371	<26.5	7810	400	5.75
C-3	18.5-20	5.13	<269	<377	<26.8	9620	411	7.04

[1]BELOW INDICATED REPORTING LIMITS

From our review of available literature regarding corrosivity of soils relative to the proposed construction, and the results of the above corrosion analyses, the soils at the project site generally present a low potential for corrosion. According to the North American Steel Sheet Piling Association publication T.02 “Guidance on Corrosion”, and the US Army Corps of Engineers publication EM 1110-2-2504 “Design of Sheet Pile Walls”, sheet piles driven into undisturbed natural soils will not require supplemental corrosion protection due to the deficiency of oxygen below the ground surface. However, increased corrosion rates should be anticipated for sheet piles driven into freshly-placed fill soils due to oxygen replenishment.

Based on AASHTO LRFD Bridge Design Specifications, *Fifth Edition*, the tested soils are not considered indicative of a potential pile deterioration or corrosion situation due to the high resistivity and low sulfate values.

According to USDOT Publication No. FHWA-NHI-16-009, the high resistivity values are indicative of a non-aggressive soils environment regarding corrosion or deterioration.

Based on the Ductile Iron Pipe Research Association (DIPRA) AWWA C105/A21.5 (Polyethylene Encasement for Ductile-Iron Pipe Systems), the soils at the locations tested have a low corrosion potential based on the high resistivity and redox values.

Other corrosive factors such as coal, cinders, peat, mine wastes, and/or landfills are not known and were not observed during the subsurface exploration.

5.0 GEOTECHNICAL ENGINEERING EVALUATION AND RECOMMENDATIONS

5.1 GENERAL

The conclusions and recommendations contained in this section of the report are based upon the results of the three (3) soil test borings performed by F&R, our experience with similar projects and subsurface conditions, and the information provided to us regarding the proposed construction. From a geotechnical engineering perspective, it is our opinion that the subsurface conditions encountered at the project site are generally suitable for the proposed construction, provided the recommendations presented in subsequent sections of this report are followed throughout the design and construction phases of this project.

- The predominant soil types encountered in the borings consisted of silty and clayey sands (SM & SC), and highly plastic clays (CH). Very loose silty sands were encountered in the upper 3.5 feet of the soil profile in borings C-1 and C-2. Deeper in the soil profile, a layer of soft clay was encountered in boring C-1 at a depth of 18.5 feet, and a layer of very loose sand was encountered in boring C-2 at a depth of 23.5 feet below the existing ground surface.

- Highly plastic clays (CH) were encountered in each boring, at variable depths and thicknesses as follows: in boring C-1 from a depth of 18.5 to 30 feet below the existing ground surface; in boring C-2 from a depth of 28.5 to 30 feet; and in boring C-3 from a depth of 13.5 to 18.5 feet. These soils are moisture sensitive and can be difficult to properly place and compact.

- Wet and/or saturated soils were encountered in each boring, at variable depths as indicated in Section 4.3. Due to the moisture sensitivity of the on-site soils and potential for wet or saturated conditions, it is typically recommended that earthwork operations be performed during the seasonally-drier months (typically May to October) when weather conditions are more conducive to moisture-conditioning of earth fill (*e.g.,* drying of wet soils or wetting of dry soils) and achieving proper compaction of structural fill/backfill. If earthwork is performed during the seasonally wet months, additional repair (*i.e.,* drying of wet soils) will likely be required.

- Stabilized groundwater was encountered in borings C-1 and C-2 at depths of 22.2 and 24.3 feet below the existing ground surface, respectively. Even though groundwater was not measured or encountered in boring C-3, soil moisture and groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. Therefore, wet/saturated soil conditions and/or groundwater should be considered during design. Depending upon the prevailing weather conditions near the time of construction, groundwater levels may vary from what has been described in this report.

5.2 STRUCTURAL FILL PLACEMENT AND COMPACTION

It is expected that the low-plasticity on-site soils (SM, SC, and CL) will be suitable for use as structural fill/backfill material, provided they are at a moisture content suitable to achieve proper compaction and are stable during compaction and at final bearing grade. These low-plasticity soils are generally considered fair to good materials for use as structural earth fill. Highly plastic clays (CH) were encountered in each boring at variable depths. Highly plastic soils are considered poor materials for use as structural fill because they can be difficult to properly place and compact, and have the potential to undergo volume changes (shrink/swell) with varying moisture levels. It is generally recommended that these soils be used in the lower portions of the excavations or wasted.

Based on anticipated excavation depths and site conditions at the time of construction, some soils may require moisture conditioning (*e.g.*, drying of wet soils or wetting of dry soils) prior to use as structural fill. As such, it is recommended that earthwork be performed during the summer months when the weather conditions are more conducive to moisture conditioning of fill materials.

If imported soils are determined to be necessary, F&R recommends that a qualified geotechnical engineer or engineering technician working under the direction of the geotechnical engineer approve the suitability of the imported soils prior to their delivery to the site. Imported structural fill should consist of low plasticity soil (LL<35, PI<20), have a maximum dry density of at least 100 pcf, and be free of organic and other deleterious materials.

Structural earth fill should be compacted at a moisture content within $\pm$3 percentage points of the optimum moisture content and placed in loose lifts not exceeding 8 inches. All structural earth fill (*i.e.,* fill placed in roads and driveways) should be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM D698 and to 100 percent in the top 12 inches. Structural earth fill placed in non-structural/grassy areas should be compacted to at least 92 percent of the standard Proctor maximum dry density.

All structural fill material should be placed and compacted under the full time control and supervision of a qualified geotechnical engineer or engineering technician working under the direction of the geotechnical engineer. The placement and compaction of all fill material should be tested at frequent intervals to confirm the recommended degree of compaction is achieved.

As previously stated, the on-site soils have sufficient silt/clay content to render them moisture sensitive. The on-site soils will become unstable (*i.e.,* pump and rut) during normal construction activities when in the presence of excess moisture. Soils with a moisture content greater than three percentage points above the optimum moisture content are generally considered to have excessive moisture. During earthwork and construction activities, surface-water runoff must be drained away

from construction areas to prevent water from ponding on or saturating the soils within excavations or on subgrades.

Exposure to the environment may weaken the soils at the bearing level if excavations remain open for long periods of time. The bearing surfaces should be level or suitably-benched and free of loose soil, ponded water, and debris. If the bearing soils are softened by surface water intrusion, subsurface seepage, or exposure, the softened soils should be removed from the excavation immediately prior to placement of stone, concrete, or other pipe bedding materials.

5.3 TEMPORARY EXCAVATION AND SHORING RECOMMENDATIONS

Based on our understanding of the project, excavation depths for the stormwater pipe will extend to about 10 feet below the existing ground surface, and it will be necessary to install shoring and/or foundation protection systems for the single family homes located at 1732, 1734, 1735, and 1737 Swann Street, and 1729 and 1733 Daisy Lane. F&R is providing soil parameters for use by Kimley-Horn in their shoring design. The soil parameters provided are for application to the soils encountered at the specified boring location only.

It is the responsibility of the shoring designer to apply the soil parameters to the locations and elevations of the shoring being designed, and to use appropriate factors of safety. Lateral earth pressures arising from surcharge loading (*e.g.,* soil stockpiles, construction supplies, vehicular traffic, etc.) and foundations behind the shoring should also be considered by the designer. In addition, transient loads imposed on the walls by construction equipment should be taken into account. Tables of Soil Parameters are provided in Appendix II. The moist unit weights indicated are the total unit weights. For strata below the design groundwater elevation, F&R recommends the use of the buoyant unit weights. A higher groundwater elevation and/or an unbalanced groundwater condition may be considered by the designer to be conservative.

F&R understands that temporary shoring and/or sheeting will be necessary at each of the boring locations of our recent subsurface exploration. These three locations are described below:

- ***Between 1735 and 1737 Swann Street:*** Boring C-1 was advanced in this area. Based on the boring data, it is expected the stormwater pipe will typically be installed through moist, loose to medium dense silty and clayey sands (SM and SC). As such, it is not anticipated that difficult excavation will be encountered during the excavation and sheeting/shoring activities. Subgrade repairs for the waterline installation are also not anticipated at this location.

  Stabilized groundwater was encountered at a depth of 22.2 feet in the boring performed in this area. As such, wet soil conditions and groundwater will likely not be encountered

during the anticipated 10-foot excavation depths. However, wet soils and groundwater should be considered in shoring design.

- ***Between 1732 and 1734 Swann Street:*** Boring C-2 was advanced in this area. Based on the boring data, it is expected the stormwater pipe will typically be installed through moist, loose to dense silty and clayey sands (SM and SC). As such, it is not anticipated that difficult excavations will be encountered during the excavation and sheeting/shoring activities. Subgrade repairs for the waterline installation are also not anticipated at this location.

  Stabilized groundwater was encountered at a depth of 24.3 feet in the boring performed in this area. As such, groundwater and wet soil conditions will likely not be encountered during the anticipated 10-foot excavation depths. However, wet soils and groundwater should be considered in shoring design.

- ***Between 1729 and 1733 Daisy Lane:*** Boring C-3 was advanced in this area. Based on the boring data, it is expected the stormwater pipe will typically be installed through moist, firm clays (CL) and medium dense silty sands (SM). As such, it is not anticipated that difficult excavation will be encountered during the excavation and sheeting/shoring activities. Subgrade repairs for the waterline installation are also not anticipated at this location.

  Initial groundwater was not encountered in this boring. A stabilized groundwater measurement was not taken at this location as the boring was backfilled immediately after drilling. Groundwater and wet soil conditions will likely not be encountered during the anticipated 10-foot excavation depths. However, given the wet soil conditions at this location, and the possibility of the groundwater table being encountered above the termination depth of our boring, wet soils and groundwater may be considered in shoring design.

Mass excavations and other excavations required for construction of this project must be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations) or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas, and protective systems by a "competent person" for evidence of situations that could result in cave-ins, indications of failure of a protective system, or other hazardous conditions. All excavated soils, equipment, building supplies, etc., should be placed away from the edges of excavations at a distance equaling or exceeding the depth of the excavation. F&R cautions that the actual excavation slopes will need to be evaluated frequently each day by the "competent person" and

flatter slopes or the use of shoring may be required to maintain a safe excavation. The contractor is responsible for providing the "competent person" and all aspects of site excavation safety. F&R can evaluate specific excavation slope situations if we are informed and requested to by the owner, designer, or contractor's "competent person".

6.0 CONTINUATION OF SERVICES

We recommend that site preparation, subgrade evaluation, and structural fill placement and compaction be monitored by the geotechnical engineer of record or engineering technician working under the supervision of the geotechnical engineer. A qualified soils technician should monitor fill placement and perform density tests on each lift of compacted fill and at final subgrades to verify that adequate compaction is being achieved. It should be noted that the actual soil conditions will vary across this site and thus the presence of the geotechnical engineer and/or their representative during construction will serve to validate the subsurface conditions and recommendations presented in this report.

We recommend that F&R be retained to monitor the construction, and to confirm that the recommendations contained in this report are completed in a satisfactory manner. Our continued involvement on the project will aid in the proper implementation of the recommendations discussed herein. The following is a recommended scope of services:

- Review of project plans and construction specifications to verify that the recommendations presented in this report have been properly interpreted and implemented;
- Observe the earthwork process to document that subsurface conditions encountered during construction are consistent with the conditions anticipated in this report;
- Observe the subgrade conditions before placing structural fill; and,
- Observe the placement and compaction of any structural fill and backfill, and perform laboratory and field compaction testing of the fill.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of Kimley-Horn and/or their agents, for specific application to the referenced project in accordance with generally-accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us, the data obtained from the previously-described subsurface exploration program, and generally-accepted geotechnical engineering practice. The evaluations and recommendations do not reflect variations in subsurface conditions, which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our recommendations based upon our on-site observations of the conditions.

There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by the Geoprofessional Business Association (GBA), which is included in the Appendix IV. We ask that you please review this information.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should observe earthwork and foundation construction to confirm that conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the proposed construction, the recommendations presented in this report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report are modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

APPENDIX I

FIGURES



Site Vicinity Map

feet

FROEHLING & ROBERTSON Engineering Stability Since 1881	Client:	City of Fayetteville	
	Project:	Tryon Drive Drainage Improvement	
	Location	Fayetteville, Cumberland County, NC	
	Project Number:	66C-0159	FIGURE No.:
	Data:	Open Street	
	Date:	February 2025	Scale: 1 inch = 600 feet



Boring Location Plan

Feet

FROEHLING & ROBERTSON
Engineering Stability Since 1881

[illegible]

Client:	City of Fayetteville
Project:	Tryon Drive Drainage Improvement
Location	Fayetteville, Cumberland County, NC
Project Number:	66C-0159
Data:	NCOneMap Aerial 2021/Parcels 2024
Date:	February 2025
Scale:	1 inch = 100 feet

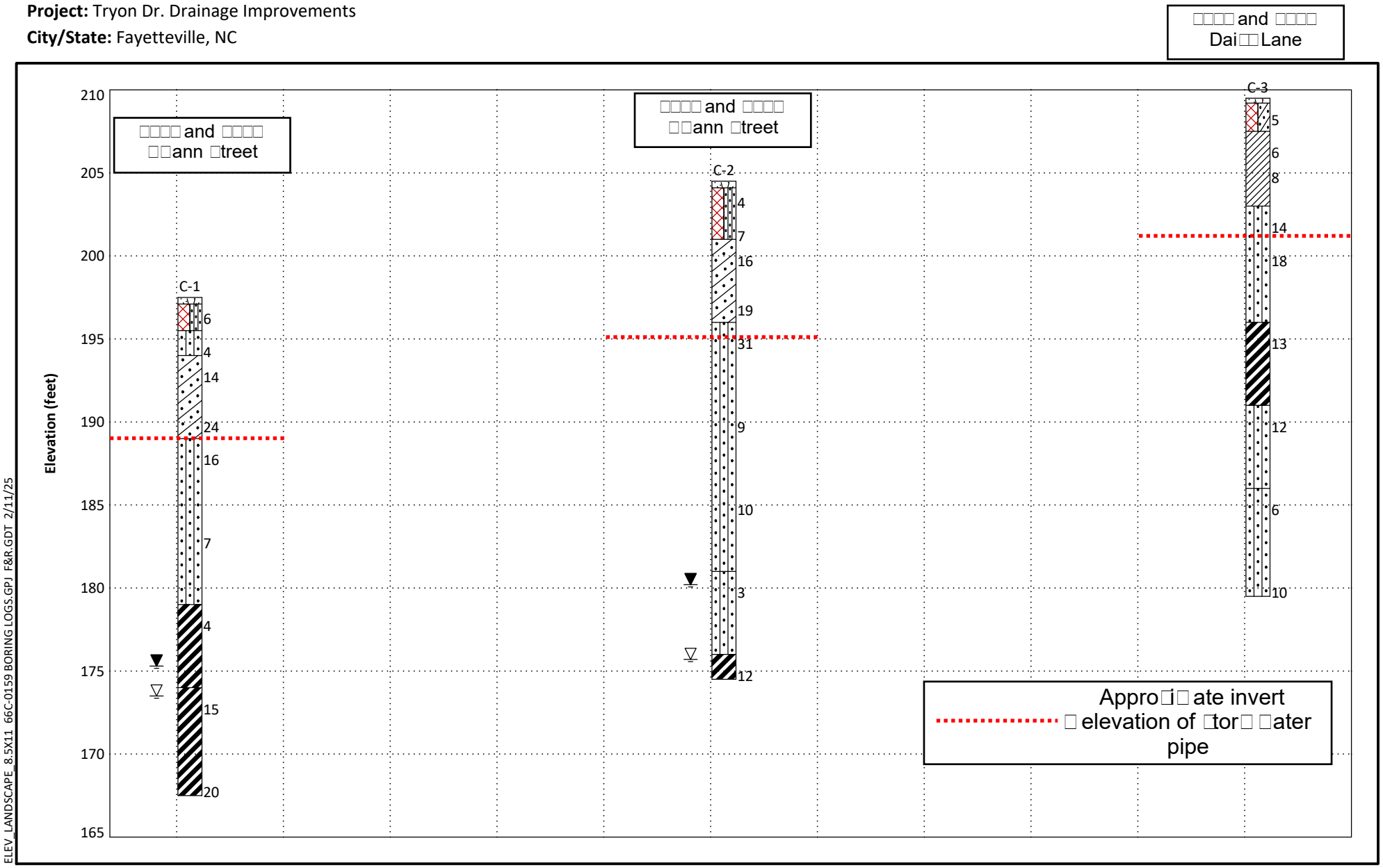
FIGURE No.: [illegible]

FROEHLING & ROBERTSON
Engineering Stability Since 1881

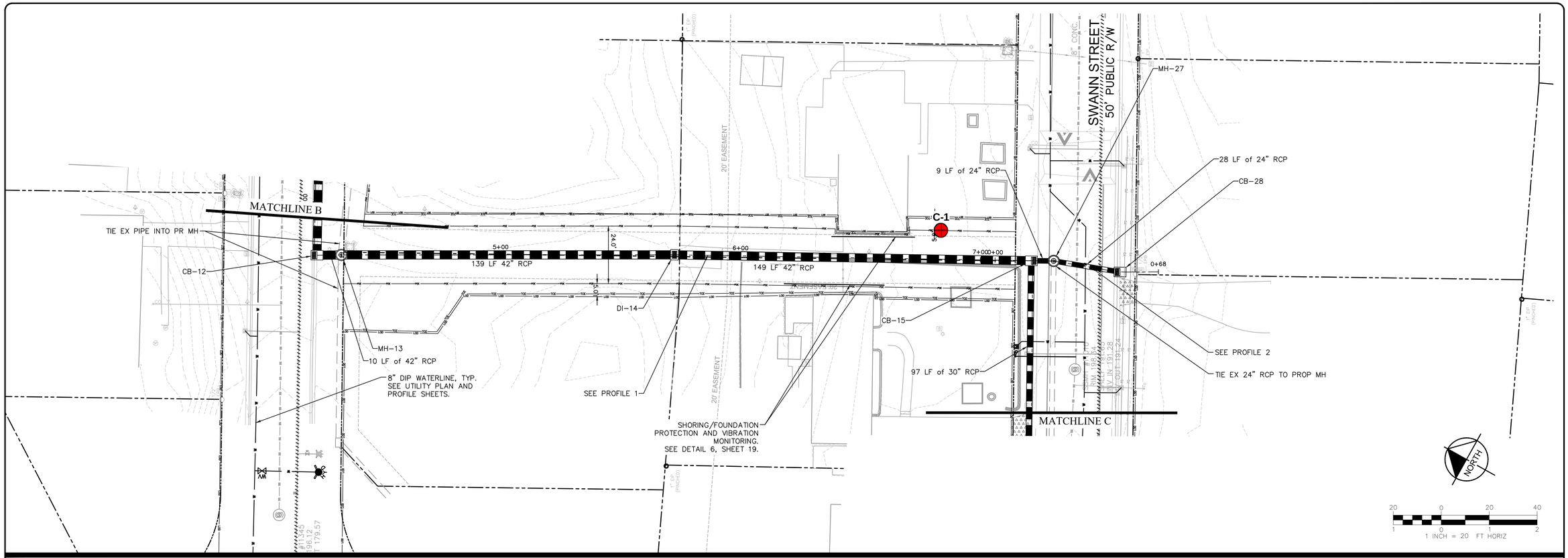
SUBSURFACE PROFILE

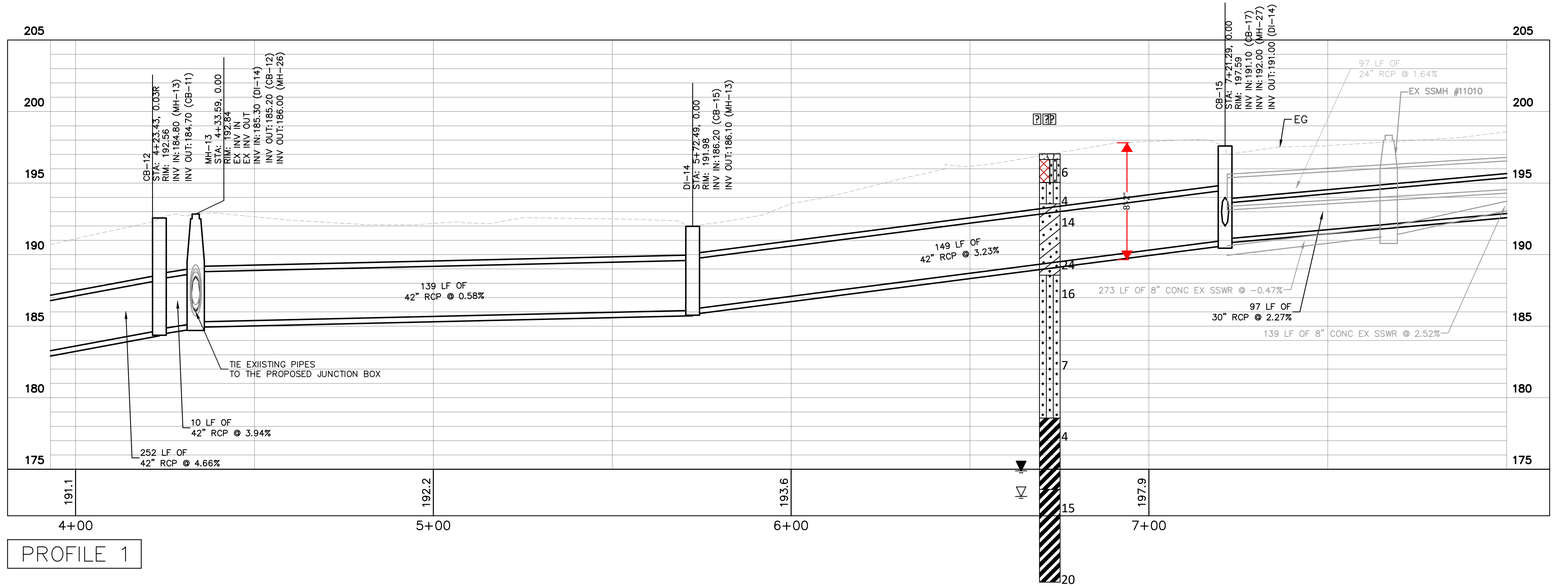
Plot Based on Elevation
Profile Name: Figure No. 3

Project No: 66C-0159
Client: Kimley-Horn
Project: Tryon Dr. Drainage Improvements
City/State: Fayetteville, NC

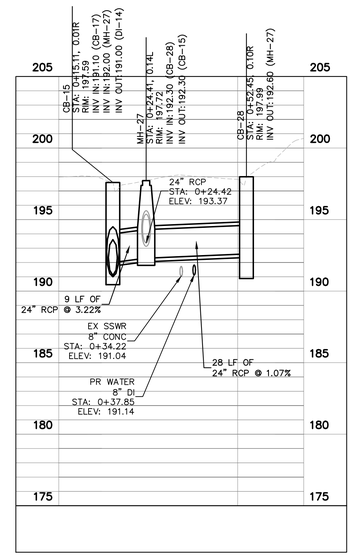


ELEV_LANDSCAPE_8.5X11 66C-0159 BORING LOGS.GPJ F&R.GDT 2/11/25





PROFILE 1



PROFILE 2

Figure No. 4

1 INCH = 20 FT HORIZ
1 INCH = 5 FT VERT

STORM PLAN PROFILE (3)

SHEET NUMBER 13 of 31

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049825 TIS CRISSMAN
PRELIMINARY

REVISIONS

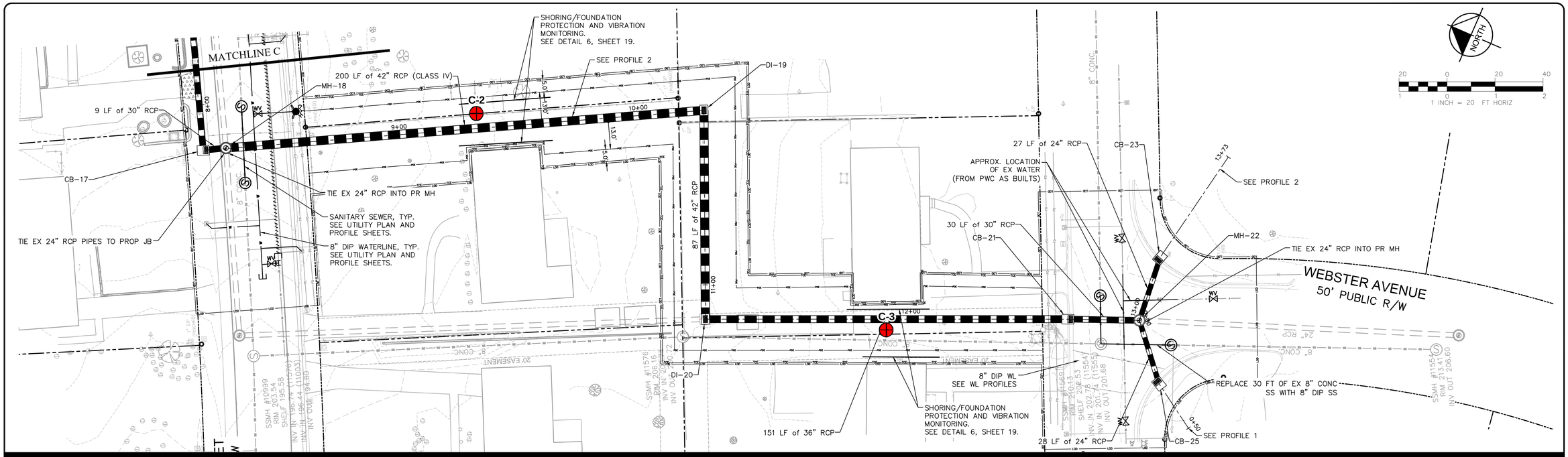
REV. #	DESCRIPTION	REV.BY	DATE

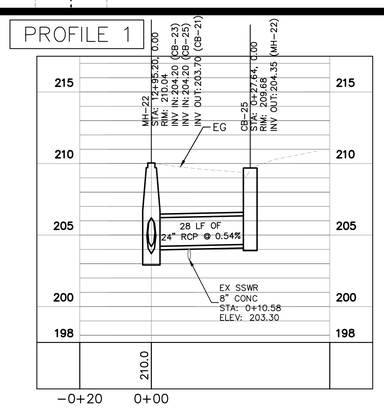
PRELIMINARY
NOT FOR CONSTRUCTION

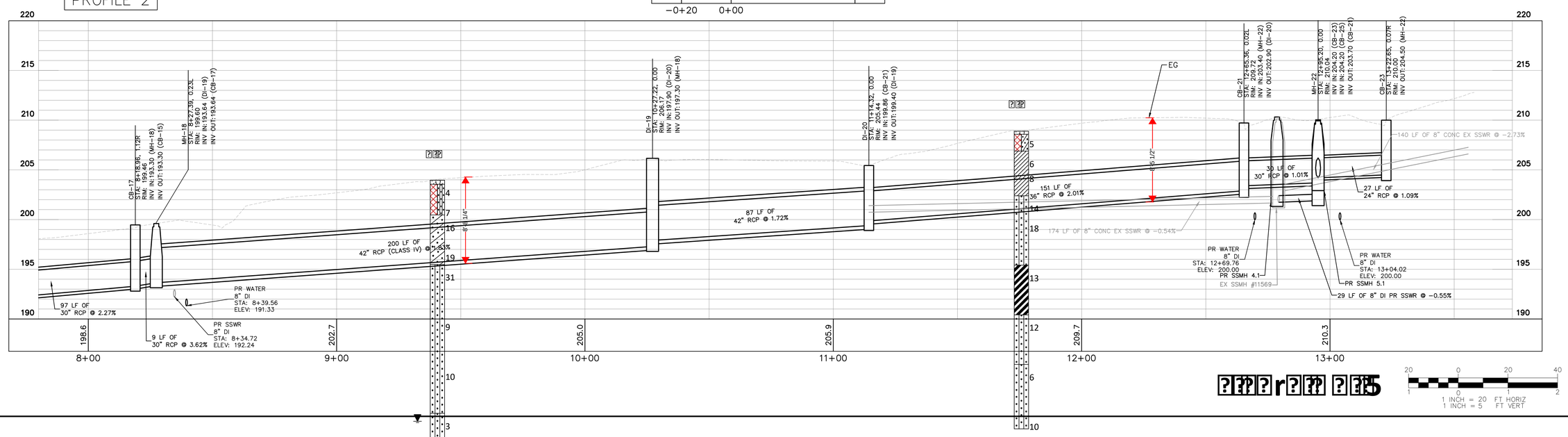
DRAWN :	G. SEITZ	PROJECT NAME :	TRYON DRAINAGE
DESIGN :		SCALE :	SCALE
CHECK :		DATE :	JANUARY 2024
APPROVED :	T. CRISSMAN		

PROJECT NO. KH 011017025

SUB-LEDGER NO.







STORM PLAN PROFILE (4)

SHEET NUMBER 14 of 31

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035125 TIS CRISSMAN
PRELIMINARY

REVISIONS		
REV. #	DESCRIPTION	REV.BY DATE

PRELIMINARY
NOT FOR CONSTRUCTION

DRAWN :	G. SEITZ
DESIGN :	
CHECK :	
APPROVED :	T. CRISSMAN

PROJECT : TRYON DRAINAGE
NAME :
SCALE :
DATE : JANUARY 2024

PROJECT NO. KH 011017025
SUB-LEDGER NO.

APPENDIX II

BORING LOGS

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

Sands and Gravels

No. of Blows, N	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

Silts and Clays

No. of Blows, N	Relative Density
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
31 - 50	Hard
Over 50	Very hard

Particle Size Identification (Unified Classification System)

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

Modifiers

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

Approximate Content	Modifiers
≤ 5%:	Trace
5% to 12%:	Slightly silty, slightly clayey, slightly sandy
12% to 30%:	Silty, clayey, sandy
30% to 50%:	Very silty, very clayey, very sandy

Field Moisture Description	
Saturated:	Usually liquid; very wet, usually from below the groundwater table
Wet:	Semisolid; requires drying to attain optimum moisture
Moist:	Solid; at or near optimum moisture
Dry:	Requires additional water to attain optimum moisture

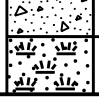
Ground Water

▽ Water Level in Bore Hole Immediately after Drilling

▼ Static Water Level after 24 Hours

SINCE F&R 1881

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION				TYPICAL NAMES
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
			GP	Poorly graded gravels
	GRAVELS with fines		GM	Silty gravels
			GC	Clayey gravels
SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
			SP	Poorly graded sands
	SAND with fines		SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
			CL	Sandy or silty clays of low to medium plasticity
			OL	Organic silts of low plasticity
SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS				PWR (Partially Weathered Rock)
				Rock
				Asphalt
				ABC Stone
				Concrete
				Surficial Organic Soil

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: C-1 (1 of 1)

Project No: 66C-0159
Client: Kimley-Horn
Project: Tryon Dr. Drainage Improvements
City/State: Fayetteville, NC

Elevation: 197.5 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 1/23/25
Driller: S. Davis

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
197.1	0.4	SURFICIAL ORGANIC SOIL	2-2-4	0.0	6	GROUNDWATER DATA:
		FILL: Loose, Brown-Tan, Moist, Silty Fine SAND (SM)		1.5		0 hrs: 24.0' inside PVC
195.5	2.0		2-2-2	2.0		24 hrs: 22.2' inside PVC
		COASTAL PLAIN: Very Loose, Tan, Moist, Silty Fine to Medium SAND (SM)			4	
194.0	3.5		3-6-8	3.5		
		Medium Dense, Orange-Brown, Moist, Clayey Fine to Medium SAND (SC)		5.0	14	
			10-11-13	6.5		
				8.0	24	
189.0	8.5			8.5		
		Loose to Medium Dense, Orange-Tan, Moist, Silty Fine to Medium SAND (SM)	8-8-8	10.0	16	
			4-3-4	13.5		
				15.0	7	
179.0	18.5			18.5		
		Soft, Gray-Tan, Wet, Fine to Coarse Sandy CLAY (CH)	2-1-3	20.0	4	
		▼				
174.0	23.5	▽		23.5		
		Stiff to Very Stiff, Gray to Dark Gray, Wet, Fine to Coarse Sandy CLAY (CH)	6-6-9	25.0	15	
			5-9-11	28.5		
167.5	30.0			30.0	20	
		Boring Terminated at 30 Feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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Engineering Stability Since 1881

BORING LOG

Boring: C-2 (1 of 1)

Project No: 66C-0159
Client: Kimley-Horn
Project: Tryon Dr. Drainage Improvements
City/State: Fayetteville, NC

Elevation: 204.5 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 1/23/25
Driller: S. Davis

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
204.1	0.4	SURFICIAL ORGANIC SOIL	1-1-3	0.0		GROUNDWATER DATA:
		FILL: Very Loose to Loose, Orange-Tan and Brown, Moist, Silty Clayey Fine to Medium SAND (SM) with Trace Roots		1.5	4	0 hrs: 27.3' inside PVC
			3-3-4	2.0		24 hrs: 24.3' inside PVC
201.0	3.5	COASTAL PLAIN: Medium Dense, Orange-Brown, Moist, Clayey Fine to Medium SAND (SM)		3.5	7	
			5-7-9	5.0	16	
				6.5		
			6-7-12	8.0	19	
196.0	8.5	Loose to Dense, Orange-Tan-Gray, Moist, Silty Fine to Medium SAND (SM)	9-14-17	8.5		
				10.0	31	
			6-5-4	13.5		
				15.0	9	
			4-5-5	18.5		
				20.0	10	
181.0	23.5	Very Loose, Orange, Saturated, Clayey Silty Fine to Coarse SAND (SM) with Trace Fine Gravel	1-2-1	23.5		
				25.0	3	
176.0	28.5	Stiff, Dark Gray, Wet, Fine Sandy CLAY (CH) with Trace Mica	3-5-7	28.5		
174.5	30.0	Boring Terminated at 30 Feet		30.0	12	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: C-3 (1 of 1)

Project No: 66C-0159
Client: Kimley-Horn
Project: Tryon Dr. Drainage Improvements
City/State: Fayetteville, NC

Elevation: 209.5 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 1/24/25
Driller: S. Davis

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
209.2	0.3	SURFICIAL ORGANIC SOIL	1-2-3	0.0	5	GROUNDWATER DATA: 0 hrs: Dry, Caved at 24.0' Backfilled Immediately After Drilling
		FILL: Loose, Brown-Orange, Moist, Clayey Fine to Medium SAND (SC) with Trace Roots		1.5		
207.5	2.0	COASTAL PLAIN: Firm, Orange-Brown, Moist, Fine to Medium Sandy CLAY (CL)	2-3-3	2.0	6	
			3-4-4	3.5	8	
				5.0		
203.0	6.5	Medium Dense, Orange-Brown, Moist, Silty Fine to Medium SAND (SM)	5-6-8	6.5	14	
				8.0		
			6-9-9	8.5	18	
				10.0		
196.0	13.5	Stiff, Mottled Gray and Red, Wet, CLAY (CH)	5-6-7	13.5	13	
				15.0		
191.0	18.5	Medium Dense, Gray-Tan-Orange, Moist, Silty Fine SAND (SM)	4-6-6	18.5	12	
				20.0		
186.0	23.5	Loose, Tan-Orange, Wet, Silty Fine to Medium SAND (SM) with Trace Gravel	3-3-3	23.5	6	
				25.0		
			4-4-6	28.5	10	
179.5	30.0	Boring Terminated at 30 Feet		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

Table of Soil Parameters - Boring C-1
Tryon Drive Drainage Improvements - Additional Borings
F&R Project No. 66C-0159
Fayetteville, NC

Depth Below Ground (feet)	Elevation at Top of Stratum (feet)	Soil Description	Cohesion C (psf)	Friction Angle ϕ (degrees)	Moist Unit Weight γ_m (pcf)	Buoyant Unit Weight γ_b (pcf)	Active Earth Pressure k_a	At-Rest Earth Pressure k_o	Passive Earth Pressure k_p
0.0	197.1	Loose Fill and Very Loose CP Sands (SM)	25	27	120	58	0.38	0.55	2.66
3.5	193.6	Loose to Medium Dense Silty and Clayey Sands (SM/SC)	100	32	120	58	0.31	0.47	3.25
18.5	178.6	Soft Wet Clay (CH)	450	18	90	28	0.53	0.69	1.89
23.5	173.6	Stiff to Very Stiff Wet Clay (CH)	1800	22	95	33	0.45	0.63	2.20

*Groundwater assumed at a depth of 22.2-ft below the existing ground surface, for evaluation purposes by others.

** The above parameters are based on geotechnical correlations with SPT N-values and are not derived from laboratory testing. As such, designers should use their engineering judgement as to the applicability of the above parameters for use in design.

Table of Soil Parameters - Boring C-2
Tryon Drive Drainage Improvements - Additional Borings
F&R Project No. 66C-0159
Fayetteville, NC

Depth Below Ground (feet)	Elevation at Top of Stratum (feet)	Soil Description	Cohesion C (psf)	Friction Angle ϕ (degrees)	Moist Unit Weight γ_m (pcf)	Buoyant Unit Weight γ_b (pcf)	Active Earth Pressure k_a	At-Rest Earth Pressure k_o	Passive Earth Pressure k_p
0.0	204.1	Very Loose to Loose Fill Sands (SM)	25	28	120	58	0.36	0.53	2.77
3.5	200.6	Loose to Dense Clayey and Silty Sands (SC/SM)	100	33	120	58	0.29	0.46	3.39
23.5	180.6	Very Loose Saturated Silty Sand (SM)	25	27	110	48	0.38	0.55	2.66
28.5	175.6	Stiff Wet Clay (CH)	1600	21	95	33	0.47	0.64	2.12

*Groundwater assumed at a depth of 24.3-ft below the existing ground surface, for evaluation purposes by others.

** The above parameters are based on geotechnical correlations with SPT N-values and are not derived from laboratory testing. As such, designers should use their engineering judgement as to the applicability of the above parameters for use in design.

Table of Soil Parameters - Boring C-3
Tryon Drive Drainage Improvements - Additional Borings
F&R Project No. 66C-0159
Fayetteville, NC

Depth Below Ground (feet)	Elevation at Top of Stratum (feet)	Soil Description	Cohesion C (psf)	Friction Angle ϕ (degrees)	Moist Unit Weight γ_m (pcf)	Buoyant Unit Weight γ_b (pcf)	Active Earth Pressure k_a	At-Rest Earth Pressure k_o	Passive Earth Pressure k_p
0.0	209.2	Loose Clayey Fill Sand (SC) and Firm CP Clay (CL)	800	28	110	48	0.36	0.53	2.77
6.5	202.7	Medium Dense Silty Sand (SM)	25	32	120	58	0.31	0.47	3.25
13.5	195.7	Stiff Wet Clay (CH)	1600	21	95	33	0.47	0.64	2.12
18.5	190.7	Loose to Medium Dense Wet Silty Sands (SM)	25	30	115	53	0.33	0.50	3.00

*Groundwater assumed at a depth greater than 30-ft below the existing ground surface, for evaluation purposes by others.

** The above parameters are based on geotechnical correlations with SPT N-values and are not derived from laboratory testing. As such, designers should use their engineering judgement as to the applicability of the above parameters for use in design.

APPENDIX III

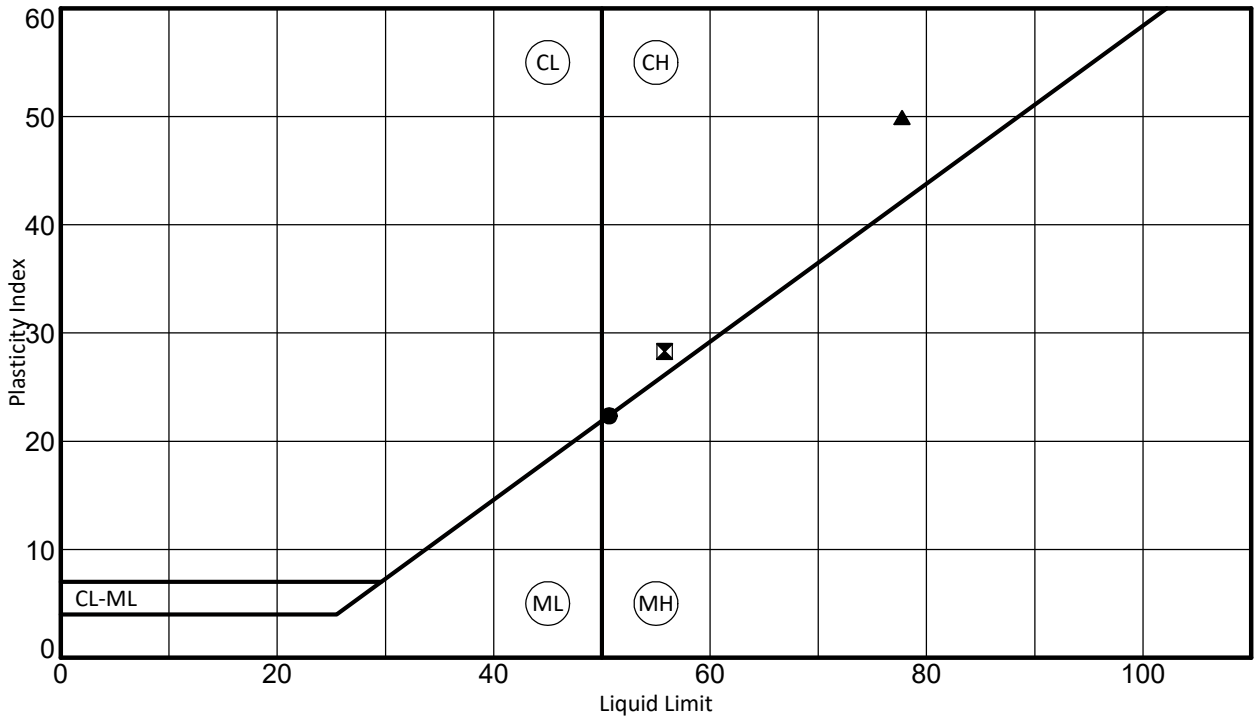
LABORATORY TEST RESULTS

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Engineering Stability Since 1881

ATTERBERG LIMITS

Sheet: 1 of 1

Project No: 66C-0159
Client: Kimley Horn
Project: Tryon Drive Drainage Improvements
City/State: Fayetteville, NC



Boring No.	Depth	LL	PL	PI	% PASSING #200	Classification	% Natural Water Content
● C-1	23.5' - 25.0'	51	28	23	77.9	FAT CLAY with SAND (CH)	23.1
⧓ C-2	3.5' - 5.0'	56	27	29	45.4	CLAYEY SAND (SC)	16.1
▲ C-3	13.5' - 15.0'	78	28	50	93.2	FAT CLAY (CH)	32.4

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2/6/2025

Froehling & Robertson, Inc. (Raleigh)
Dave Morse
310 Hubert St.
Raleigh, NC, 27603

Ref: Analytical Testing
Lab Report Number: 25-028-0006
Client Project Description: Tron Drive Drainage Improvements - Addit
Fayetteville, NC

Dear Dave Morse:

Waypoint Analytical, LLC (Charlotte) received sample(s) on 1/28/2025 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in accordance with the applicable analytical method.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, method validations, instrumentation maintenance and calibration for all parameters were performed in accordance with guidelines established by the USEPA (including 40 CFR 136 Method Update Rule May 2021) unless otherwise indicated.

Certain parameters (chlorine, pH, dissolved oxygen, sulfite...) are required to be analyzed within 15 minutes of sampling. Usually, but not always, any field parameter analyzed at the laboratory is outside of this holding time. Refer to sample analysis time for confirmation of holding time compliance.

The results are shown on the attached Report of Analysis(s). Results for solid matrices are reported on an as-received basis unless otherwise indicated. This report shall not be reproduced except in full and relates only to the samples included in this report.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Angela D Overcash
Senior Project Manager

Laboratory's liability in any claim relating to analyses performed shall be limited to, at laboratory's option, repeating the analysis in question at laboratory's expense, or the refund of the charges paid for performance of said analysis.

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Certification Summary

Laboratory ID: WP CNC: Waypoint Analytical Carolina, Inc. (C), Charlotte, NC

State	Program	Lab ID	Expiration Date
North Carolina	State Program	37735	07/31/2025
North Carolina	State Program	402	12/31/2025
South Carolina	State Program	99012	07/31/2025
South Carolina	State Program	99012	12/31/2024

Laboratory ID: WP MTN: Waypoint Analytical, LLC., Memphis, TN

State	Program	Lab ID	Expiration Date
Alabama	State Program	40750	02/28/2025
Arkansas	State Program	88-0650	02/07/2025
California	State Program	2904	06/30/2025
Florida	State Program - NELAP	E871157	06/30/2025
Georgia	State Program	C044	11/14/2025
Georgia	State Program	04015	06/30/2025
Illinois	State Program - NELAP	200078	10/31/2025
Kentucky	State Program	KY90047	12/31/2025
Kentucky	State Program	80215	06/30/2025
Kentucky	State Program	KY90047	12/31/2025
Louisiana	State Program - NELAP	LA037	12/31/2025
Louisiana	State Program - NELAP	04015	06/30/2025
Mississippi	State Program	MS	11/14/2025
North Carolina	State Program	47701	07/31/2025
North Carolina	State Program	415	12/31/2025
Pennsylvania	State Program - NELAP	68-03195	05/31/2025
South Carolina	State Program	84002	06/30/2025
Tennessee	State Program	02027	11/14/2025
Texas	State Program - NELAP	T104704180	09/30/2025
Virginia	State Program	00106	06/30/2025
Virginia	State Program - NELAP	460181	09/14/2025

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Sample Summary Table

Report Number: **25-028-0006**

Client Project Description: **Tron Drive Drainage Improvements - Addit Fayetteville, NC**

Lab No	Client Sample ID	Matrix	Date Collected	Date Received	Method	Lab ID
91198	C-1, 8.5'-10'	Solids	01/23/2025	01/28/2025 11:00		
91198	C-1, 8.5'-10'	Solids	01/23/2025	01/28/2025 11:00	ASTM-G57-95	WP MTN
91198	C-1, 8.5'-10'	Solids	01/23/2025	01/28/2025 11:00	SM-2580	WP MTN
91198	C-1, 8.5'-10'	Solids	01/23/2025	01/28/2025 11:00	SW-9034	WP MTN
91199	C-2, 13.5-15'	Solids	01/23/2025	01/28/2025 11:00		
91199	C-2, 13.5-15'	Solids	01/23/2025	01/28/2025 11:00	SM-2580	WP MTN
91199	C-2, 13.5-15'	Solids	01/23/2025	01/28/2025 11:00	ASTM-G57-95	WP MTN
91199	C-2, 13.5-15'	Solids	01/23/2025	01/28/2025 11:00	SW-9034	WP MTN
91200	C-3, 18.5-20'	Solids	01/24/2025	01/28/2025 11:00		
91200	C-3, 18.5-20'	Solids	01/24/2025	01/28/2025 11:00	SW-9034	WP MTN
91200	C-3, 18.5-20'	Solids	01/24/2025	01/28/2025 11:00	SM-2580	WP MTN
91200	C-3, 18.5-20'	Solids	01/24/2025	01/28/2025 11:00	ASTM-G57-95	WP MTN

WP MTN - Memphis, TN: Waypoint Analytical - TN, Memphis, TN

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Summary of Detected Analytes

Project: **Tron Drive Drainage Improvements - Addit**

Report Number: **25-028-0006**

Client Sample ID / Method	Lab Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
C-1, 8.5'-10'	**V 91198**					
9045D	pH	5.62	s.u.		01/31/2025 11:57	
ASTM-G57-95	Resistivity (soil)	8130	ohm-cm		02/06/2025 15:05	
SM-2580	Oxidation Reduction Potential	380	mV	-800	02/03/2025 10:00	
SW-DRYWT	Moisture	8.83	%		01/29/2025 10:29	
C-2, 13.5-15'	**V 91199**					
9045D	pH	4.73	s.u.		01/31/2025 11:57	
ASTM-G57-95	Resistivity (soil)	7810	ohm-cm		02/06/2025 15:05	
SM-2580	Oxidation Reduction Potential	400	mV	-800	02/03/2025 10:00	
SW-DRYWT	Moisture	5.75	%		01/29/2025 10:29	
C-3, 18.5-20'	**V 91200**					
9045D	pH	5.13	s.u.		01/31/2025 11:57	
ASTM-G57-95	Resistivity (soil)	9620	ohm-cm		02/06/2025 15:05	
SM-2580	Oxidation Reduction Potential	411	mV	-800	02/03/2025 10:00	
SW-DRYWT	Moisture	7.04	%		01/29/2025 10:29	

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Client: Froehling & Robertson, Inc. (Raleigh) **CASE NARRATIVE**
Project: Tron Drive Drainage Improvements - Addit
Lab Report Number: 25-028-0006
Date: 2/6/2025

Anions by Ion Chromatography Method 9056A
Sample 91198 (C-1, 8.5'-10')
Analyte: Chloride
QC Batch No: V56045/V56027
Matrix spike/matrix spike duplicate recoveries are outside of control limits. Acceptable LCS recovery indicates the system was in control, but the reported result could be affected by matrix interference.

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01083
Froehling & Robertson, Inc. (Raleigh)
Dave Morse
310 Hubert St.
Raleigh , NC 27603

Project Tron Drive Drainage Improvements - Addit
Information :

Report Date : 02/06/2025
Received : 01/28/2025

Report Number : **25-028-0006**

REPORT OF ANALYSIS

Lab No : **91198**
Sample ID : **C-1, 8.5'-10'**

Matrix: **Solids**
Sampled: **1/23/2025 00:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Resistivity (soil)	**8130**	ohm-cm		1	02/06/25 15:05	VVP	ASTM-G57-95
Oxidation Reduction Potential	**380**	mV	-800	1	02/03/25 10:00	TKM	SM-2580
Moisture	**8.83**	%		1	01/29/25 10:29	CJR	SW-DRYWT
Chloride	<274	mg/Kg - dry	274	10	02/05/25 17:06	MLW	9056A
pH	**5.62**	s.u.		1	01/31/25 11:57	GOB	9045D
Sulfate	<384	mg/Kg - dry	384	10	02/05/25 17:06	MLW	9056A
Sulfide	<27.4	mg/Kg - dry	27.4	1	01/31/25 11:55	JAAT	SW-9034

Qualifiers/ Definitions DF Dilution Factor MQL Method Quantitation Limit

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01083
Froehling & Robertson, Inc. (Raleigh)
Dave Morse
310 Hubert St.
Raleigh , NC 27603

Project Tron Drive Drainage Improvements - Addit

Information :

Report Date : 02/06/2025
Received : 01/28/2025

Report Number : **25-028-0006**

REPORT OF ANALYSIS

Lab No : **91199**
Sample ID : **C-2, 13.5-15'**

Matrix: **Solids**
Sampled: **1/23/2025 00:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Resistivity (soil)	**7810**	ohm-cm		1	02/06/25 15:05	VVP	ASTM-G57-95
Oxidation Reduction Potential	**400**	mV	-800	1	02/03/25 10:00	TKM	SM-2580
Moisture	**5.75**	%		1	01/29/25 10:29	CJR	SW-DRYWT
Chloride	<265	mg/Kg - dry	265	10	02/05/25 17:43	MLW	9056A
pH	**4.73**	s.u.		1	01/31/25 11:57	GOB	9045D
Sulfate	<371	mg/Kg - dry	371	10	02/05/25 17:43	MLW	9056A
Sulfide	<26.5	mg/Kg - dry	26.5	1	01/31/25 11:55	JAAT	SW-9034

Qualifiers/ Definitions DF Dilution Factor MQL Method Quantitation Limit

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01083
Froehling & Robertson, Inc. (Raleigh)
Dave Morse
310 Hubert St.
Raleigh , NC 27603

Project Tron Drive Drainage Improvements - Addit
Information :

Report Date : 02/06/2025
Received : 01/28/2025

Report Number : **25-028-0006**

REPORT OF ANALYSIS

Lab No : **91200**
Sample ID : **C-3, 18.5-20'**

Matrix: **Solids**
Sampled: **1/24/2025 00:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Resistivity (soil)	**9620**	ohm-cm		1	02/06/25 15:05	VVP	ASTM-G57-95
Oxidation Reduction Potential	**411**	mV	-800	1	02/03/25 10:00	TKM	SM-2580
Moisture	**7.04**	%		1	01/29/25 10:29	CJR	SW-DRYWT
Chloride	<269	mg/Kg - dry	269	10	02/05/25 17:56	MLW	9056A
pH	**5.13**	s.u.		1	01/31/25 11:57	GOB	9045D
Sulfate	<377	mg/Kg - dry	377	10	02/05/25 17:56	MLW	9056A
Sulfide	<26.8	mg/Kg - dry	26.8	1	01/31/25 11:55	JAAT	SW-9034

Qualifiers/ Definitions DF Dilution Factor MQL Method Quantitation Limit

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Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Tron Drive Drainage Improvements - Additional Bori**
Report No: **25-028-0006**

QC Analytical Batch: V55912
Analysis Method: 9045D
Analysis Description: pH in Solids

Laboratory Control Sample LCS

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
pH	s.u.	6.86	6.86	100	3.54-101.4

Duplicate V 91198-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
pH	s.u.	5.62	5.57	0.8	20.0	01/31/25 11:57

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Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Tron Drive Drainage Improvements - Additional Bori**
Report No: **25-028-0006**

QC Prep: V56027
QC Prep Batch Method: SW-9056A (PREP)
QC Analytical Batch(es): V56045
Analysis Method: 9056A
Analysis Description: Anions by Ion Chromatography

Lab Reagent Blank LRB-V56027 Matrix: SOL
Associated Lab Samples: 91198, 91199, 91200

Parameter	Units	Blank Result	MQL	Analyzed
Chloride	mg/Kg	<250	250	02/05/25 10:41
Sulfate	mg/Kg	<350	350	02/05/25 10:41

Laboratory Control Sample LCS-V56027

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Chloride	mg/Kg	400	381	95.0	80-120
Sulfate	mg/Kg	400	385	96.0	80-120

Matrix Spike & Matrix Spike Duplicate V 91198-MS-V56027 V 91198-MSD-V56027

Parameter	Units	Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS %Rec	MSD %Rec	%Rec Limits	RPD	Max RPD
Chloride	mg/Kg	<250	400	394	605	605	151*	154*	80-120	0.0	15
Sulfate	mg/Kg	<350	400	394	415	423	104	107	80-120	1.9	15

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Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Tron Drive Drainage Improvements - Additional Bori**
Report No: **25-028-0006**

QC Analytical Batch: L798494
Analysis Method: ASTM-G57-95
Analysis Description: Resistivity

Duplicate V 91198-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Resistivity (soil)	ohm-cm	8130	8130	0.0	20.0	02/06/25 15:05

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Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Tron Drive Drainage Improvements - Additional Bori**
Report No: **25-028-0006**

QC Analytical Batch: L797782
Analysis Method: SM-2580
Analysis Description: ORP

Laboratory Control Sample LCS

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Oxidation Reduction Potential	mV	200	195	98.0	90-110

Duplicate L 83856-DUP

Parameter	Units	Result	DUP Result	Criteria	Analyzed
Oxidation Reduction Potential	mV	179	179	+/- 20	02/03/25 10:00

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Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Tron Drive Drainage Improvements - Additional Bori**
Report No: **25-028-0006**

QC Prep: L797552
QC Prep Batch Method: SW-9030B
QC Analytical Batch(es): L797697
Analysis Method: SW-9034
Analysis Description: Sulfide by Titration

Lab Reagent Blank LRB-L797552 Matrix: SOL
Associated Lab Samples: 91198, 91199, 91200

Parameter	Units	Blank Result	MQL	Analyzed
Sulfide	mg/Kg	< 25.0	25.0	01/31/25 11:55

Laboratory Control Sample LCS-L797552

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Sulfide	mg/Kg	262	152	58.0	32-85

Duplicate V 91199-DUP-L797552

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Sulfide	mg/Kg	< 25.0	<25.0	0.0	20.0	01/31/25 11:55

Matrix Spike V 91199-MS-L797552

Parameter	Units	Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS %Rec	%Rec Limits	Max RPD
Sulfide	mg/Kg	< 25.0	105		67.2		64.0	25-75	

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Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Tron Drive Drainage Improvements - Additional Bori**
Report No: **25-028-0006**

QC Analytical Batch: V55845
Analysis Method: SW-DRYWT
Analysis Description: Dry Weight Determination

Duplicate V 91199-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Moisture	%	5.75	6.05	5.0	20.0	01/29/25 10:29

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Shipment Receipt Form

Customer Number: **01083**
Customer Name: **Froehling & Robertson, Inc. (Raleigh)**
Report Number: **25-028-0006**

Shipping Method

○ Fed Ex	○ US Postal	○ Lab	○ Other :	
○ UPS	○ Client	◉ Courier	Thermometer ID:	IRT15 1.9C

Shipping container/cooler uncompromised?	◉ Yes	○ No	
Number of coolers/boxes received	1		
Custody seals intact on shipping container/cooler?	◉ Yes	○ No	○ Not Present
Custody seals intact on sample bottles?	○ Yes	○ No	◉ Not Present
Chain of Custody (COC) present?	◉ Yes	○ No	
COC agrees with sample label(s)?	◉ Yes	○ No	
COC properly completed	◉ Yes	○ No	
Samples in proper containers?	◉ Yes	○ No	
Sample containers intact?	◉ Yes	○ No	
Sufficient sample volume for indicated test(s)?	◉ Yes	○ No	
All samples received within holding time?	◉ Yes	○ No	
Cooler temperature in compliance?	◉ Yes	○ No	○ Not Present
Cooler/Samples arrived at the laboratory on ice. Samples were considered acceptable as cooling process had begun.	◉ Yes	○ No	
Water - Sample containers properly preserved	○ Yes	○ No	◉ N/A
Water - VOA vials free of headspace	○ Yes	○ No	◉ N/A
Trip Blanks received with VOAs	○ Yes	○ No	◉ N/A
Soil VOA method 5035 – compliance criteria met	○ Yes	○ No	◉ N/A

☐ High concentration container (48 hr) ☐ Low concentration EnCore samplers (48 hr)
☐ High concentration pre-weighed (methanol -14 d) ☐ Low conc pre-weighed vials (Sod Bis -14 d)

Special precautions or instructions included?	○ Yes	◉ No

Comments:

Signature: Angelo Norvell Date & Time: 01/28/2025 12:28:01

CHAIN OF CUSTODY RECORD

Waypoint ANALYTICAL

Waypoint Analytical LLC

449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543

Phone: 704/529-6364 • Fax: 704/525-0409

Client Company Name:	Froehling & Robertson, Inc.
Report To / Contact Name:	Dave Morse (D.Morse@FandR.com)
Reporting Address:	310 Hubert Street, Raleigh, NC 27603
Phone:	361.876.2118 (cell) / 704.409.7261 (office)
Fax (yes, no):	no
EDD Type (PDF, Excel, Other):	PDF
Site Location Name:	Fayetteville, NC
Site Location Physical Address:	Swann Street

Project Name:	Tryon Drive Drainage Improvements - Additional Borings
Short Hold Analysis Needed (Yes or No):	No
UST Project (Yes or No):	No
Invoice To:	Froehling & Robertson, Inc.
Address:	310 Hubert Street, Raleigh, NC 27063
Purchase Order No./Billing Reference:	66C-0159-00001
Requested Due Date (days):	1 2 3 4 5
"Working Days" Requested:	6-9 10

Samples Received After 15:00 will be processed the next business day.

Turnaround time is based on business days, excluding weekends and holidays.

Please ATTACH any project specific reporting (QC LEVEL I/I II IV) provisions and/or QC Requirements

LAB USE ONLY		Yes	No	N/A
Samples Intact upon arrival?		X		
Received on WET ICE?	TEMP 1.9	X		
PROPER PRESERVATIVES?		X		
Received WITHIN HOLDING TIMES?		X		
CUSTODY SEALS INTACT?		X		
VOLATILES rec'd W/OUT HEADSPACE?				X
PROPERT CONTAINERS used?		X		

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL

Certification: NELAC ____ USACE ____ FL ____

NC ____ SC ____ Other ____ N/A ____

Water Chlorinated (Yes or No) /N

Sample Iced Upon Collection (Yes or No):

Client Sample Description	Date Collected	Time Collected (Military Time)	Matrix (Soil, Water, Sludge, Other)	Sample Container See Type Below (In Order of Analyses)	No.	Sizes (In Order of Analyses)	Preservatives (In Order of Analyses)	Analyses Requested: Moisture	Chloride	pH	Sulfide	Sulfate	Resistivity	Oxidation				Remarks	Prism Lab ID No.
C-1, 8.5-10'	1/23/2025		soil	G				X	X	X	X	X	X	X					
C-2, 13.5-15'	1/23/2025		soil	G				X	X	X	X	X	X	X					
C-3, 18.5-20'	1/24/2025		soil	G				X	X	X	X	X	X	X					
								X	X	X	X	X	X	X					



25-028-0006
01083
01-28-2025
12:26:02

Froehling & Robertson, Inc. (Raleigh)
Tron Drive Drainage Improvements - Additional Borings

Sampler's Signature	Sampled By (Print Name)	Affiliation

Upon relinquishing, this Chain of Custody is your authorization for Waypoint to proceed with the analyses as requested above. Any changes must

Relinquished By: (Signature)	Received By: (Signature)	Date	Time (Military/Hours)	Additional Comments:
1/27/2025	Philip Paige	1-27-25 13:01		
Relinquished By: (Signature)	Received By: (Signature)	Date		
Philip Paige	Courier Express	1-27-25 15:37		
Relinquished By: (Signature)	Received For Waypoint Analytical By:			
		1/28/25	1100	

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND

FedEx ____ UPS ____ Waypoint FIELD SERVICES X ____ OTHER ____

Site Arrival Time:	
Site Departure Time:	
Field Tech Fee:	
Mileage:	

SEE REVERSE FOR TERMS & CONDITIONS

NPDES:	NC	SC	Other	Drinking Water:	NC	SC	Other	Log-In Group No.	
RCRA:	NC	SC	Other	Other:	NC	SC	Other		
UST:	NC	SC	Other	CERCLA:	NC	SC	Other		
Landfill:	NC	SC	Other	Solid Waste:	NC	SC	Other		

COPY

See reverse for terms and conditions.

G = Glass, P = Plastic, TL = Teflon-Lined Cap, VOA = Volatile Organics Analysis (Zero Head Space)

APPENDIX IV

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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VACUUM EXCAVATION TEST HOLE REPORT

PROJECT NUMBER:	KHAI00222	TEST HOLE NUMBER:	5
CLIENT NAME:	Kimley Horn	SOIL TYPE:	Sandy Clay
PROJECT TITLE:	Tryon St Test Holes	SURFACE MATERIAL:	Pavement
LOCATION:	Swann St & Tryon Rd (Fayetteville, NC)	PAVEMENT TYPE:	Asphalt
DATE:	5/27/2022	PAVEMENT THICKNESS:	0.5'
		SITE PERSONNEL:	CJH, JM, RC
		METHOD USED:	Vacuum Excavation
		OTHER NOTES:	Moved hole closer to intersection for GPR visibility.

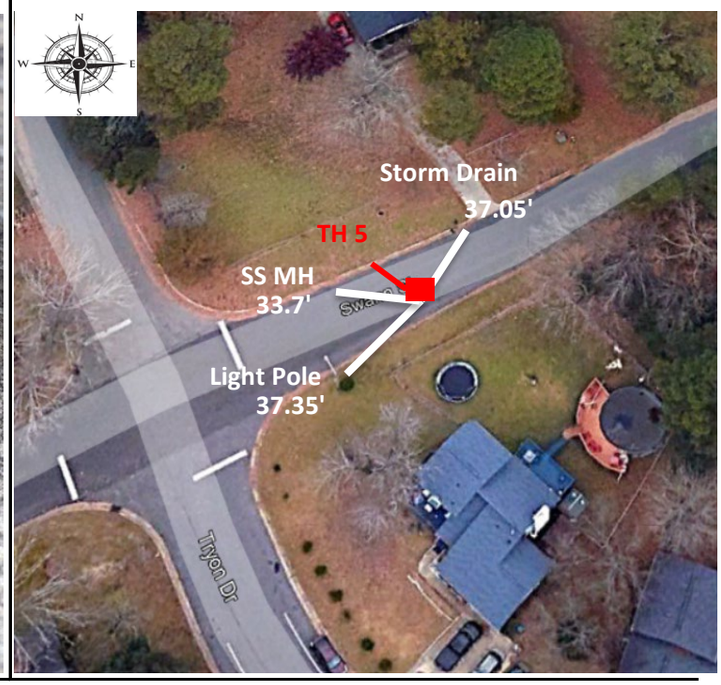
UTILITY #:	1	UTILITY #:	
TYPE:	Water	TYPE:	
SIZE:	9" OD ±	SIZE:	
MATERIAL:	AC	MATERIAL:	
DEPTH:	3.18'	DEPTH:	
DIRECTION:	W	DIRECTION:	
UTILITY #:		UTILITY #:	
TYPE:		TYPE:	
SIZE:		SIZE:	
MATERIAL:		MATERIAL:	
DEPTH:		DEPTH:	
DIRECTION:		DIRECTION:	

SURVEY PROVIDED BY:		
SURVEY COORDINATES:		
ELEVATION:		
NORTH:		
EAST:		

Notes: All measurements obtained from top/center of associated utility unless otherwise noted.



Test Hole Location Map



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VACUUM EXCAVATION TEST HOLE REPORT

PROJECT NUMBER:	KHAI00222	TEST HOLE NUMBER:	6
CLIENT NAME:	Kimley Horn	SOIL TYPE:	Sandy Clay
PROJECT TITLE:	Tryon Rd Test Holes	SURFACE MATERIAL:	Pavement
LOCATION:	Swann & Tryon (Fayetteville, NC)	PAVEMENT TYPE:	Asphalt
DATE:	5/25/2022	PAVEMENT THICKNESS:	0.4'
		SITE PERSONNEL:	CJH, JM, RC, NJ
		METHOD USED:	Vacuum Excavation
		OTHER NOTES:	

UTILITY #:	1	UTILITY #:	
TYPE:	Water	TYPE:	
SIZE:	9" OD ±	SIZE:	
MATERIAL:	AC	MATERIAL:	
DEPTH:	5.92'	DEPTH:	
DIRECTION:	N	DIRECTION:	
UTILITY #:		UTILITY #:	
TYPE:		TYPE:	
SIZE:		SIZE:	
MATERIAL:		MATERIAL:	
DEPTH:		DEPTH:	
DIRECTION:		DIRECTION:	

SURVEY PROVIDED BY:		
SURVEY COORDINATES:		
ELEVATION:		
NORTH:		
EAST:		

Notes: All measurements obtained from top/center of associated utility unless otherwise noted.



Test Hole Location Map



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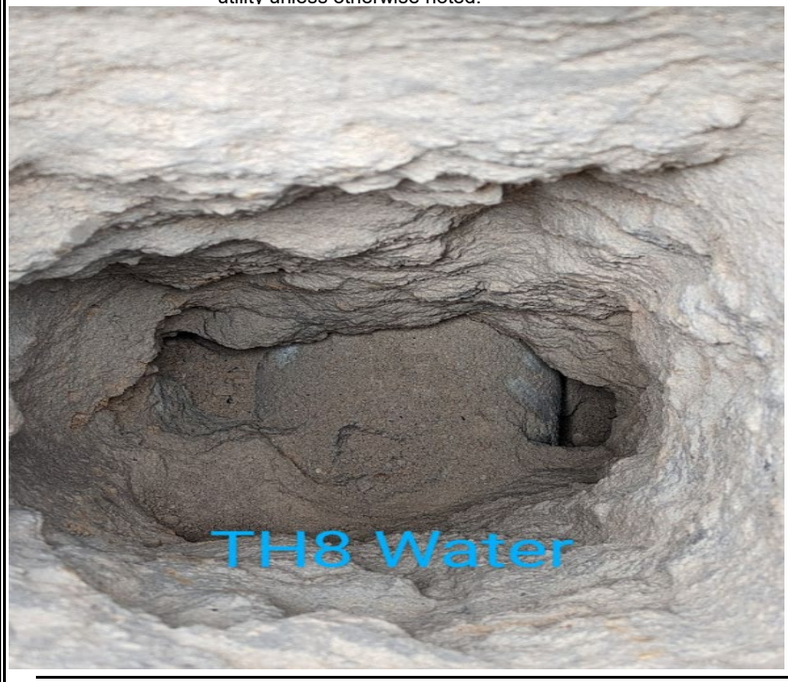
GEL Solutions

VACUUM EXCAVATION TEST HOLE REPORT

PROJECT NUMBER:	KHAI00222	TEST HOLE NUMBER:	8
CLIENT NAME:	Kimley Horn	SOIL TYPE:	Sandy Clay
PROJECT TITLE:	Tryon Dr Test Holes	SURFACE MATERIAL:	Pavement
LOCATION:	Tryon Dr (Fayetteville, NC)	PAVEMENT TYPE:	Asphalt
DATE:	5/24/2022	PAVEMENT THICKNESS:	0.4'

UTILITY #:	1	UTILITY #:		SITE PERSONNEL:	CJH, JM, RC
TYPE:	Water	TYPE:		METHOD USED:	Vacuum Excavation
SIZE:	9" OD ±	SIZE:		OTHER NOTES:	
MATERIAL:	AC	MATERIAL:			
DEPTH:	3.97'	DEPTH:			
DIRECTION:	W	DIRECTION:			
UTILITY #:		UTILITY #:		SURVEY PROVIDED BY:	
TYPE:		TYPE:		SURVEY COORDINATES:	
SIZE:		SIZE:		ELEVATION:	
MATERIAL:		MATERIAL:		NORTH:	
DEPTH:		DEPTH:		EAST:	
DIRECTION:		DIRECTION:			

Notes: All measurements obtained from top/center of associated utility unless otherwise noted.



Test Hole Location Map



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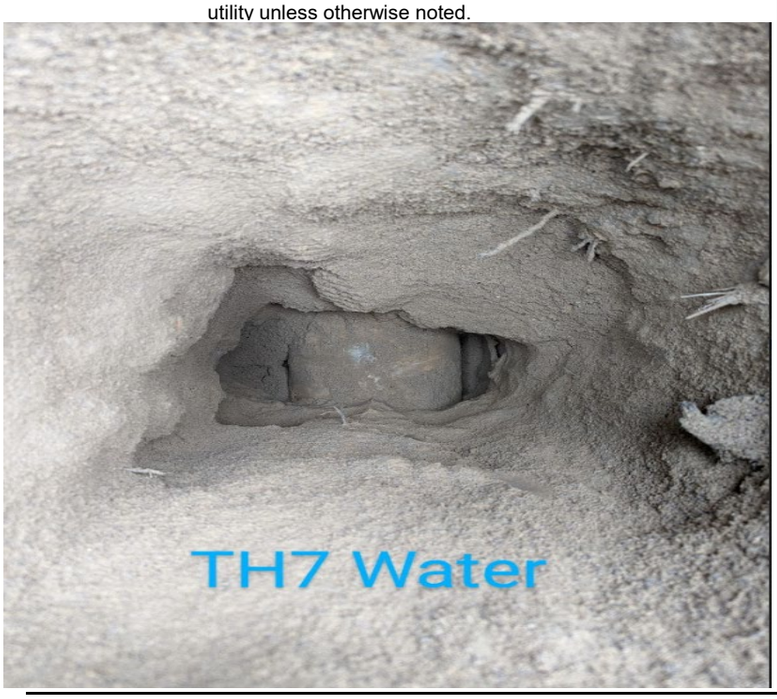
GEL Solutions

VACUUM EXCAVATION TEST HOLE REPORT

PROJECT NUMBER:	KHAI00222	TEST HOLE NUMBER:	7
CLIENT NAME:	Kimley Horn	SOIL TYPE:	Sandy Clay
PROJECT TITLE:	Tryon Dr Test Holes	SURFACE MATERIAL:	Pavement
LOCATION:	Tryon Dr (Fayetteville, NC)	PAVEMENT TYPE:	Asphalt
DATE:	5/25/2022	PAVEMENT THICKNESS:	0.3'

UTILITY #:	1	UTILITY #:		SITE PERSONNEL:	CJH
TYPE:	Water	TYPE:		METHOD USED:	Vacuum Excavation
SIZE:	9" OD ±	SIZE:		OTHER NOTES:	
MATERIAL:	AC	MATERIAL:			
DEPTH:	3.08'	DEPTH:			
DIRECTION:	W	DIRECTION:			
UTILITY #:		UTILITY #:		SURVEY PROVIDED BY:	
TYPE:		TYPE:		SURVEY COORDINATES:	
SIZE:		SIZE:		ELEVATION:	
MATERIAL:		MATERIAL:		NORTH:	
DEPTH:		DEPTH:		EAST:	
DIRECTION:		DIRECTION:			

Notes: All measurements obtained from top/center of associated utility unless otherwise noted.



Test Hole Location Map



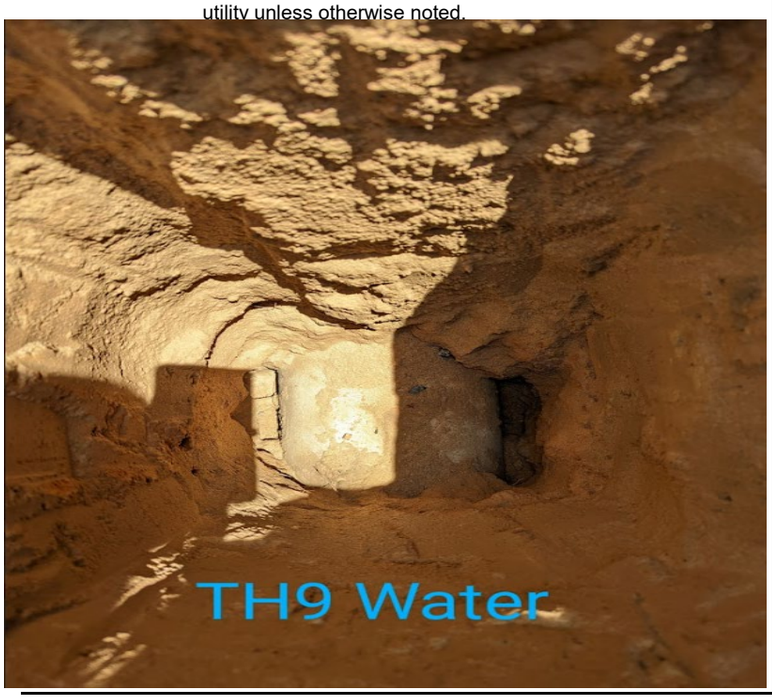
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VACUUM EXCAVATION TEST HOLE REPORT

PROJECT NUMBER:	KHAI00222	TEST HOLE NUMBER:	9
CLIENT NAME:	Kimley Horn	SOIL TYPE:	Sandy Clay
PROJECT TITLE:	Tryon Dr Test Holes	SURFACE MATERIAL:	Pavement
LOCATION:	Swann St (Fayetteville, NC)	PAVEMENT TYPE:	Asphalt
DATE:	5/24/2022	PAVEMENT THICKNESS:	0.4'

UTILITY #:	1	UTILITY #:		SITE PERSONNEL:	CJH, JM, RC
TYPE:	Water	TYPE:		METHOD USED:	
SIZE:	9" OD ±	SIZE:		OTHER NOTES:	
MATERIAL:	AC	MATERIAL:			
DEPTH:	2.33'	DEPTH:			
DIRECTION:	W	DIRECTION:			
UTILITY #:		UTILITY #:		SURVEY PROVIDED BY:	
TYPE:		TYPE:		SURVEY COORDINATES:	
SIZE:		SIZE:		ELEVATION:	
MATERIAL:		MATERIAL:		NORTH:	
DEPTH:		DEPTH:		EAST:	
DIRECTION:		DIRECTION:			

Notes: All measurements obtained from top/center of associated utility unless otherwise noted.



Test Hole Location Map



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VACUUM EXCAVATION TEST HOLE REPORT

PROJECT NUMBER:	KHAI00222	TEST HOLE NUMBER:	10
CLIENT NAME:	Kimley Horn	SOIL TYPE:	Sandy Clay
PROJECT TITLE:	Tryon Dr Test Holes	SURFACE MATERIAL:	Pavement
LOCATION:	Daisy Ln & Webster (Fayetteville, NC)	PAVEMENT TYPE:	Asphalt
DATE:	5/24/2022	PAVEMENT THICKNESS:	0.6'

UTILITY #:	1	UTILITY #:		SITE PERSONNEL:	CJH, JM, RC
TYPE:	Water	TYPE:		METHOD USED:	Vacuum Excavation
SIZE:	9" OD ±	SIZE:		OTHER NOTES:	Moved hole roughly 10 ft to the West.
MATERIAL:	AC	MATERIAL:			
DEPTH:	5.95'	DEPTH:			
DIRECTION:	W	DIRECTION:			
UTILITY #:		UTILITY #:		SURVEY PROVIDED BY:	
TYPE:		TYPE:		SURVEY COORDINATES:	
SIZE:		SIZE:		ELEVATION:	
MATERIAL:		MATERIAL:		NORTH:	
DEPTH:		DEPTH:		EAST:	
DIRECTION:		DIRECTION:			

Notes: All measurements obtained from top/center of associated utility unless otherwise noted.



Test Hole Location Map



GEL SOLUTIONS, LLC
An Affiliate of THE GEL GROUP, INC.
2700 Sumner Boulevard, Suite 106, Raleigh, NC 27616
Phone (919) 544-1100 • www.gel-solutions.com

Electronic Transmittal
U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2023-01308** County: **Cumberland** U.S.G.S. Quad: **NC-Fayetteville**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Permittee: **City of Fayetteville**
Abha Dwivedy
Address: **433 Hay Street**
Fayetteville, NC 28301
Telephone Number: **910-433-1027**
E-mail: **AbdhaDwivedy@FayettevilleNC.gov**

Size (acres) **2.84 acres**
Nearest Waterway **Cross Creek**
USGS HUC **03030004**
Nearest Town **Fayetteville**
River Basin **Cape Fear**
Coordinates Latitude: **35.091891**
Longitude: **-78.935314**

Location description: **The project is located on Tryon Drive near the intersection with Swann Street in Fayetteville, Cumberland County, North Carolina.**

Description of projects area and activity: **This verification authorizes the discharge of fill material within 184 linear feet (736 square feet) of stream for the purpose of improving the existing drainage features to handle higher flows. The improvements include bank stabilization and culvert replacement and extension.**

Applicable Law(s): ☒ Section 404 (Clean Water Act, 33 USC 1344)
☐ Section 10 (Rivers and Harbors Act, 33 USC 403)

Authorization: **Nationwide Permit 3- Maintenance**

SEE ATTACHED NWP GENERAL, REGIONAL, AND/OR SPECIAL CONDITIONS

*Note: These impacts are below the reporting threshold for the NWP 3- a tear sheet is issued upon the request of the agent. Verification under the NWP 3 was communicated by email on 7/11/2023 and the 401 Water Quality Certification was issued on 8/3/2023.

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the attached Conditions, your application signed and dated 6/22/2023, and the enclosed plans Permit Drawings Figure 5, 5.1, 5.2, and 5.3 dated June 2023. Any violation of the attached conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order, a Class I administrative penalty, and/or appropriate legal action.

This verification will remain valid until the expiration date identified below unless the nationwide and/or regional general permit authorization is modified, suspended or revoked. If, prior to the expiration date identified below, the nationwide and/or regional general permit authorization is reissued and/or modified, this verification will remain valid until the expiration date identified below, provided it complies with all requirements of the modified nationwide permit. If the nationwide and/or regional general permit authorization expires or is suspended, revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide and/or regional general permit, will remain authorized provided the activity is completed within twelve months of the date of the nationwide and/or regional general permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.

Activities subject to Section 404 (as indicated above) may also require an individual Section 401 Water Quality Certification. You should contact the NC Division of Water Resources (telephone 919-807-6300) to determine Section 401 requirements.

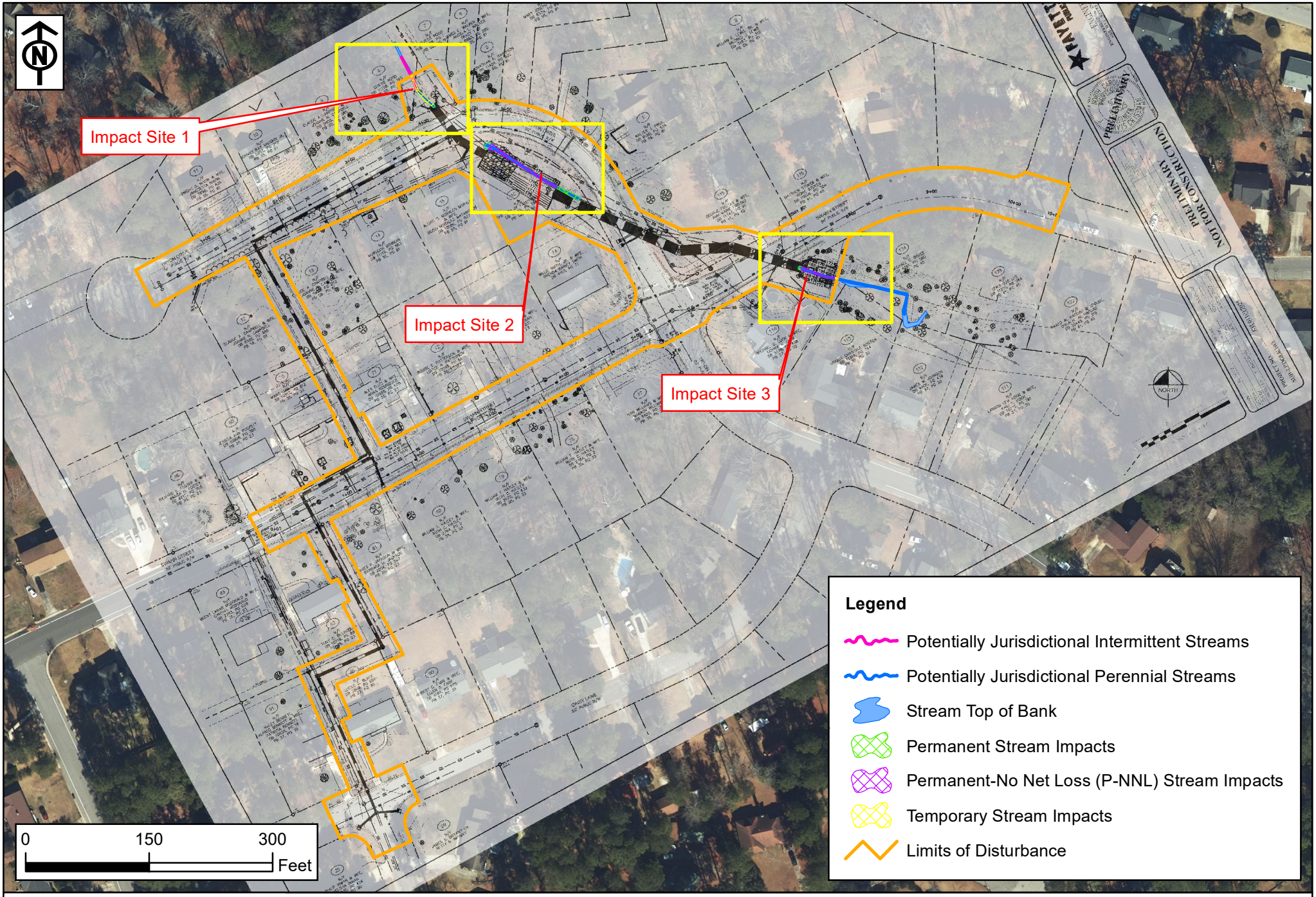
For activities occurring within the twenty coastal counties subject to regulation under the Coastal Area Management Act (CAMA), prior to beginning work you must contact the N.C. Division of Coastal Management **Morehead City, NC, at (252) 808-2808.**

This Department of the Army verification does not relieve the permittee of the responsibility to obtain any other required Federal, State or local approvals/permits. If there are any questions regarding this verification, any of the conditions of the Permit, or the Corps of Engineers regulatory program, please contact **Katharine Elks at (910) 251-4567or katharine.b.elks@usace.army.mil**.

Corps Regulatory Official: _____Date: **09/18/2023**
Expiration Date of Verification: **3/14/2026**

Email copies furnished:

Emma Radford, Kimley-Horn (agent)



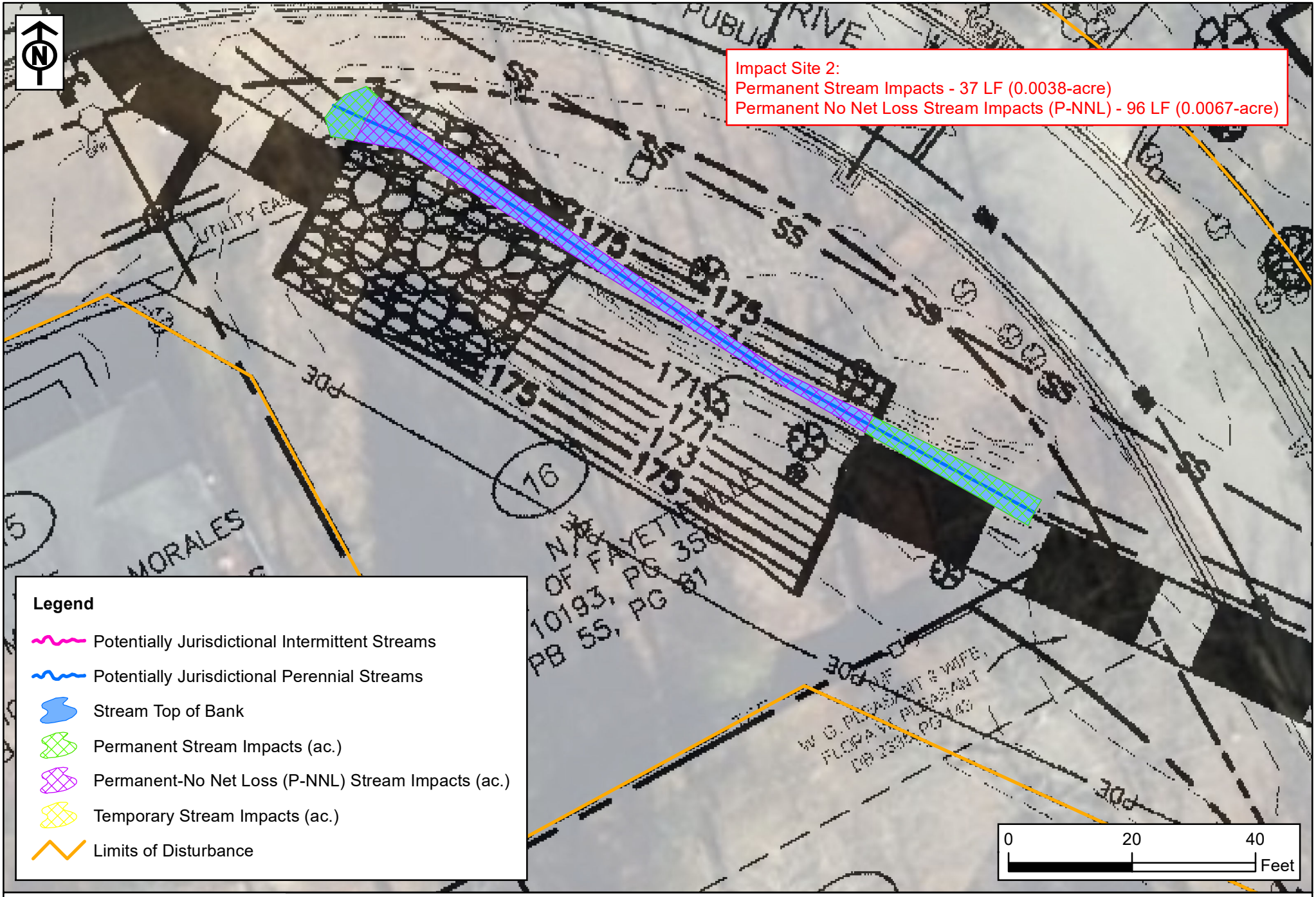
Kimley»Horn

Figure 5: Permit Drawings - Overview Map
Tryon Road Drainage Improvements
Fayetteville, Cumberland County, NC
June 2023



Kimley»Horn

Figure 5.1: Permit Drawings - Site 1 Map
Tryon Road Drainage Improvements
Fayetteville, Cumberland County, NC
June 2023



Kimley»Horn

Figure 5.2: Permit Drawings - Site 2 Map
Tryon Road Drainage Improvements
Fayetteville, Cumberland County, NC
June 2023



Kimley»Horn

Figure 5.3: Permit Drawings - Site 3 Map
Tryon Road Drainage Improvements
Fayetteville, Cumberland County, NC
June 2023

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
RICHARD E. ROGERS, JR.
Director

NORTH CAROLINA
Environmental Quality

August 3, 2023

DWR # 20230909
Cumberland County

City of Fayetteville
Attn: Abha Dwivedy
433 Hay Street
Fayetteville, NC 28301

Subject: Approval of Individual 401 Water Quality Certification
Tryon Drive Drainage Improvements
USACE Action ID. No. SAW-2023-01308

Delivered via email to: AbhaDwivedy@FayettvilleNC.gov

Dear Ms. Dwivedy:

Attached hereto is a copy of Certification No. WQC006153 issued to the City of Fayetteville and Abha Dwivedy, dated August 3, 2023. This approval is for the purpose and design described in your application. The plans and specifications for this project are incorporated by reference as part of this Water Quality Certification. If you change your project, you must notify the Division and you may be required to submit a new application package with the appropriate fee. If the property is sold, the new owner must be given a copy of this Certification and is responsible for complying with all conditions. [15A NCAC 02H .0507(d)(2)].

This Water Quality Certification does not relieve the permittee of the responsibility to obtain all other required Federal, State, or Local approvals before proceeding with the project, including those required by, but not limited to, Sediment and Erosion Control, Non-Discharge, Water Supply Watershed, and Trout Buffer regulations.

This Water Quality Certification neither grants nor affirms any property right, license, or privilege in any lands or waters, or any right of use in any waters. This Water Quality Certification does not authorize any person to interfere with the riparian rights, littoral rights, or water use rights of any other person and does not create any prescriptive right or any right of priority regarding any usage of water. This Water Quality Certification shall not be interposed as a defense in any action respecting the determination of riparian or littoral rights or other rights to water use. No consumptive user is deemed by virtue of this Water Quality Certification to possess any prescriptive or other right of priority with respect to any other consumptive user.

Upon the presentation of proper credentials, the Division may inspect the property.

This Water Quality Certification shall expire on the same day as the expiration date of the corresponding Section 404 Permit. The conditions shall remain in effect for the life of the project, regardless of the expiration date of this Water Quality Certification.

Non-compliance with or violation of the conditions herein set forth may result in revocation of this Water Quality Certification for the project and may also result in criminal and/or civil penalties.

If you are unable to comply with any of the conditions of this Water Quality Certification you must notify the Fayetteville Regional Office within 24 hours (or the next business day if a weekend or holiday) from the time the permittee becomes aware of the circumstances.

The permittee shall report to the Fayetteville Regional Office any noncompliance with, and/or any violation of, stream or wetland standards [15A NCAC 02B .0200] including but not limited to sediment impacts to streams or wetlands. Information shall be provided orally within 24 hours (or the next business day if a weekend or holiday) from the time the permittee became aware of the non-compliance circumstances.

This approval and its conditions are final and binding unless contested [G.S. 143-215.5].

This Certification can be contested as provided in Chapter 150B of the North Carolina General Statutes by filing a Petition for a Contested Case Hearing (Petition) with the North Carolina Office of Administrative Hearings (OAH) **within sixty (60) calendar days**. Requirements for filing a Petition are set forth in Chapter 150B of the North Carolina General Statutes and Title 26 of the North Carolina Administrative Code. Additional information regarding requirements for filing a Petition and Petition forms may be accessed at http://www.ncoah.com/ or by calling the OAH Clerk's Office at (919) 431-3000.

A party filing a Petition must serve a copy of the Petition on:

William F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center
Raleigh, NC 27699-1601

If the party filing the Petition is not the permittee, then the party must also serve the recipient of the Certification in accordance with N.C.G.S 150B-23(a).

This letter completes the Division's review under section 401 of the Clean Water Act and 15A NCAC 02H .0500. Please contact Chad Turlington at (910) 433-3320 or chad.turlington@ncdenr.gov if you have any questions or concerns.

Sincerely,

DocuSigned by:
Trent Allen
5189C2D3DD5C42B...

Trent Allen
Regional Supervisor
Division of Water Resources
Water Quality Regional Operations Section

Electronic cc: Emma Radford, WPIT, CA – Kimley-Horn (via email)
Katherine Elks - USACE Wilmington Regulatory Field Office (via email)
DWR 401 & Buffer Permitting Branch Electronic file

NORTH CAROLINA 401 WATER QUALITY CERTIFICATION

CERTIFICATION #WQC006153 is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to North Carolina's Regulations in 15 NCAC 02H .0500 and 15A NCAC 02B .0200, to Abha Dwivedy and the City of Fayetteville, who have authorization for the impacts listed below, as described within your application received by the N.C. Division of Water Resources (Division) on June 22, 2023 and by Public Notice issued by the Division on June 27, 2023 .

The State of North Carolina certifies that this activity will comply with water quality requirements and the applicable portions of Sections 301, 302, 303, 306, 307 of the Public Laws 92-500 and PL 95-217 if conducted in accordance with the application, the supporting documentation, and conditions hereinafter set forth.

The following impacts are hereby approved. No other impacts are approved, including incidental impacts. [15A NCAC 02H .0506(b)]

Type of Impact	Amount Approved (units) Permanent	Amount Approved (units) Temporary
Perennial Stream		
S1 – culvert extension	3 (linear feet)	(linear feet)
S2 – temp. const. access	(linear feet)	26 (linear feet)
S4 – culvert extension	37 (linear feet)	(linear feet)
S5 – channel realignment	96 (linear feet)	(linear feet)
S6 – culvert extension	4 (linear feet)	(linear feet)
S7 – bank stabilization	44 (linear feet)	(linear feet)
S8 – temp. const. access	(linear feet)	3 (linear feet)
Intermittent Stream		
S3 - temp. const. access	(linear feet)	20 (linear feet)

This approval requires you to follow the conditions listed in the certification below.

CONDITIONS OF CERTIFICATION [15A NCAC 02H .0507(c)]:

1. The permittee shall report to the DWR Fayetteville Regional Office any noncompliance with, and/or any violation of, stream or wetland standards [15A NCAC 02B .0200], including but not limited to sediment impacts to streams or wetlands. Information shall be provided orally within 24 hours (or the next business day if a weekend or holiday) from the time the permittee became aware of the non-compliance circumstances.

   Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c)

   Justification: Timely reporting of non-compliance is important in identifying and minimizing

detrimental impacts to water quality and avoiding impacts due to water pollution that precludes any best use on a short-term or long-term basis.

2. No waste, spoil, solids, or fill of any kind shall occur in wetlands or waters beyond the footprint of the approved impacts (including temporary impacts).

   Citation: 15A NCAC 02H .0506; 15A NCAC 02H .0507(c)

   Justification: Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule (including, at minimum: aquatic life propagation, survival, and maintenance of biological integrity; wildlife; secondary contact recreation; agriculture); and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis.

3. When applicable, all construction activities shall be performed and maintained in full compliance with G.S. Chapter 113A Article 4 (Sediment and Pollution Control Act of 1973). Regardless of applicability of the Sediment and Pollution Control Act, all projects shall incorporate appropriate Best Management Practices for the control of sediment and erosion so that no violations of state water quality standards, statutes, or rules occur.

   Design, installation, operation, and maintenance of all sediment and erosion control measures shall be equal to or exceed the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*, or for linear transportation projects, the *North Caroline Department of Transportation Sediment and Erosion Control Manual*.

   All devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) sites, including contractor-owned or leased borrow pits associated with the project. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.

   For borrow pit sites, the erosion and sediment control measures shall be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*. Reclamation measures and implementation shall comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.

   Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC02B .0200; 15A NCAC 02B .0231

   Justification: A project that affects waters shall not be permitted unless the existing uses, and the water quality to protect such uses, are protected. Activities must not cause water pollution that precludes any best use on a short-term or long-term basis. As cited in Stream Standards: (12) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses; and (21) turbidity in the receiving water shall not exceed 50 Nephelometric Turbidity Units

(NTU) in streams not designated as trout waters and 10 NTU in streams, lakes, or reservoirs designated as trout waters; for lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTU; if turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased. As cited in Wetland Standards: (c)(1) Liquids, fill or other solids, or dissolved gases shall not be present in amounts that may cause adverse impacts on existing wetland uses; and (3) Materials producing color or odor shall not be present in amounts that may cause adverse impacts on existing wetland uses.

4. Sediment and erosion control measures shall not be installed in wetland or waters except within the footprint of temporary or permanent impacts otherwise authorized by this Certification. If placed within authorized impact areas, then placement of such measures shall not be conducted in a manner that results in dis-equilibrium of any wetlands, streambeds, or streambanks. Any silt fence installed within wetlands shall be removed from wetlands and the natural grade restored within two (2) months of the date that DEMLR or locally delegated program has released the specific area within the project to ensure wetland standards are maintained upon completion of the project.

   Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC 02B .0200; 15A NCAC 02B .0231

   Justification: A project that affects waters shall not be permitted unless the existing uses, and the water quality to protect such uses, are protected. Activities must not cause water pollution that precludes any best use on a short-term or long-term basis. As cited in Stream Standards: (12) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses; and (21) turbidity in the receiving water shall not exceed 50 Nephelometric Turbidity Units (NTU) in streams not designated as trout waters and 10 NTU in streams, lakes, or reservoirs designated as trout waters; for lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTU; if turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased. As cited in Wetland Standards: (c)(1) Liquids, fill or other solids, or dissolved gases shall not be present in amounts that may cause adverse impacts on existing wetland uses; and (3) Materials producing color or odor shall not be present in amounts that may cause adverse impacts on existing wetland uses.

5. Erosion control matting that incorporates plastic mesh and/or plastic twine shall not be used along streambanks or within wetlands.

   Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c)

   Justification: A project that affects waters shall not be permitted unless the existing uses (including aquatic life propagation and biological integrity), and the water quality to protect such uses, are protected. Protections are necessary to ensure any remaining surface waters or wetlands, and any surface waters or wetlands downstream, continue to support existing uses during and after project completion. The Division must evaluate if the activity has avoided and

minimized impacts to waters, would cause or contribute to a violation of standards, or would result in secondary or cumulative impacts.

6. If the project is covered by NPDES Construction Stormwater Permit Number NCG010000 or NPDES Construction Stormwater Permit Number NCG250000, full compliance with permit conditions including the erosion & sedimentation control plan, inspections and maintenance, self-monitoring, record keeping and reporting requirements is required.

   Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC 02B .0200; 15A NCAC 02B .0231

   Justification: A project that affects waters shall not be permitted unless the existing uses, and the water quality to protect such uses, are protected. Activities must not cause water pollution that precludes any best use on a short-term or long-term basis. As cited in Stream Standards: (12) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses; and (21) turbidity in the receiving water shall not exceed 50 Nephelometric Turbidity Units (NTU) in streams not designated as trout waters and 10 NTU in streams, lakes, or reservoirs designated as trout waters; for lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTU; if turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased. As cited in Wetland Standards: (c)(1) Liquids, fill or other solids, or dissolved gases shall not be present in amounts that may cause adverse impacts on existing wetland uses; and (3) Materials producing color or odor shall not be present in amounts that may cause adverse impacts on existing wetland uses.

7. All work in or adjacent to streams shall be conducted so that the flowing stream does not come in contact with the disturbed area. Approved best management practices from the most current version of the NC Sediment and Erosion Control Manual, or the NC Department of Transportation Construction and Maintenance Activities Manual, such as sandbags, rock berms, cofferdams, and other diversion structures shall be used to minimize excavation in flowing water.

   Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC 02B .0200

   Justification: Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule, and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis. As cited in Stream Standards: (12) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses; and (21) turbidity in the receiving water shall not exceed 50 Nephelometric Turbidity Units (NTU) in streams not designated as trout waters and 10 NTU in streams, lakes, or reservoirs designated as trout waters; for lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTU; if turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased.

8. Culverts shall be designed and installed in such a manner that the original stream profiles are not altered and allow for aquatic life movement during low flows. The dimension, pattern, and profile of the stream above and below a pipe or culvert shall not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed culvert shall be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. If the width of the culvert is wider than the stream channel, the culvert shall include multiple boxes/pipes, baffles, benches and/or sills to maintain the natural width of the stream channel. If multiple culverts/pipes/barrels are used, low flows shall be accommodated in one culvert/pipe and additional culverts/pipes shall be installed such that they receive only flows above bankfull.

   Placement of culverts and other structures in streams shall be below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20% of the culvert diameter for culverts having a diameter less than or equal to 48 inches, to allow low flow passage of water and aquatic life. If the culvert outlet is submerged within a pool or scour hole and designed to provide for aquatic passage, then culvert burial into the streambed is not required.

   For structures less than 72” in diameter/width, and topographic constraints indicate culvert slopes of greater than 2.5% culvert burial is not required, provided that all alternative options for flattening the slope have been investigated and aquatic life movement/connectivity has been provided when possible (e.g. rock ladders, cross-vanes, sills, baffles etc.). Notification, including supporting documentation to include a location map of the culvert, culvert profile drawings, and slope calculations, shall be provided to DWR 30 calendar days prior to the installation of the culvert.

   When bedrock is present in culvert locations, culvert burial is not required, provided that there is sufficient documentation of the presence of bedrock. Notification, including supporting documentation such as a location map of the culvert, geotechnical reports, photographs, etc. shall be provided to DWR a minimum of 30 calendar days prior to the installation of the culvert. If bedrock is discovered during construction, then DWR shall be notified by phone or email within 24 hours of discovery.

   Installation of culverts in wetlands shall ensure continuity of water movement and be designed to adequately accommodate high water or flood conditions. When roadways, causeways, or other fill projects are constructed across FEMA-designated floodways or wetlands, openings such as culverts or bridges shall be provided to maintain the natural hydrology of the system as well as prevent constriction of the floodway that may result in destabilization of streams or wetlands.

   The establishment of native woody vegetation and other soft stream bank stabilization techniques shall be used where practicable instead of rip-rap or other bank hardening methods.

   Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c)

   Justification: Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule, and that activities must not cause water pollution that

precludes any best use on a short-term or long-term basis. Ensuring that structures are installed properly in waters will ensure that surface water quality standards are met and conditions of waters are suitable for all best uses.

9. Application of fertilizer to establish planted/seeded vegetation within disturbed riparian areas and/or wetlands shall be conducted at agronomic rates and shall comply with all other Federal, State and Local regulations. Fertilizer application shall be accomplished in a manner that minimizes the risk of contact between the fertilizer and surface waters.

   Citation: 15A 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC 02B .0200; 15A NCAC 02B .0231

   Justification: A project that affects waters shall not be permitted unless the existing uses, and the water quality to protect such uses, are protected. Activities must not cause water pollution that precludes any best use on a short-term or long-term basis. As cited in Stream Standards: (12) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses. As cited in Wetland Standards: (c)(1) Liquids, fill or other solids, or dissolved gases shall not be present in amounts that may cause adverse impacts on existing wetland uses; and (3) Materials producing color or odor shall not be present in amounts that may cause adverse impacts on existing wetland uses.

10. If concrete is used during construction, then all necessary measures shall be taken to prevent direct contact between uncured or curing concrete and waters of the state. Water that inadvertently contacts uncured concrete shall not be discharged to waters of the state.

    Citation: 15A 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC 02B .0200; 15A NCAC 02B .0231

    Justification: A project that affects waters shall not be permitted unless the existing uses, and the water quality to protect such uses, are protected. Activities must not cause water pollution that precludes any best use on a short-term or long-term basis. As cited in Stream Standards: (12) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses. As cited in Wetland Standards: (c)(1) Liquids, fill or other solids, or dissolved gases shall not be present in amounts that may cause adverse impacts on existing wetland uses; and (3) Materials producing color or odor shall not be present in amounts that may cause adverse impacts on existing wetland uses.

11. All proposed and approved temporary fill and culverts shall be removed and the impacted area shall be returned to natural conditions within 60 calendar days after the temporary impact is no longer necessary. The impacted areas shall be restored to original grade, including each stream's original cross-sectional dimensions, planform pattern, and longitudinal bed profile. All temporarily impacted sites shall be restored and stabilized with native vegetation.

    Citation: 15A NCAC 02H.0506(b); 15A NCAC 02H .0507(c)

Justification: A project that affects waters shall not be permitted unless the existing uses, and the water quality to protect such uses, are protected. Protections are necessary to ensure any remaining surface waters or wetlands, and any surface waters or wetlands downstream, continue to support existing uses after project completion.

12. All proposed and approved temporary pipes/culverts/rip-rap pads etc. in streams or wetlands shall be installed as outlined in the most recent edition of the *North Carolina Sediment and Erosion Control Planning and Design Manual* or the *North Carolina Surface Mining Manual* or the *North Carolina Department of Transportation Best Management Practices for Construction and Maintenance Activities* so as not to restrict stream flow or cause dis-equilibrium during use of this Certification.

    Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c)

    Justification: Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule, and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis. Ensuring that structures are installed properly in waters will ensure that surface water quality standards are met and conditions of waters are suitable for all best uses.

13. Any rip-rap required for proper culvert placement, stream stabilization, or restoration of temporarily disturbed areas shall be restricted to the area directly impacted by the approved construction activity. All rip-rap shall be placed such that the original streambed elevation and streambank contours are restored and maintained and shall consist of clean rock or masonry material free of debris or toxic pollutants. Placement of rip-rap or other approved materials shall not result in de-stabilization of the stream bed or banks upstream or downstream of the area or be installed in a manner that precludes aquatic life passage.

    Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c)

    Justification: Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule, and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis. The Division must evaluate if the activity has avoided and minimized impacts to waters, would cause or contribute to a violation of standards, or would result in secondary or cumulative impacts.

14. Any rip-rap used for stream or shoreline stabilization shall be of a size and density to prevent movement by wave, current action, or stream flows, and shall consist of clean rock or masonry material free of debris or toxic pollutants. Rip-rap shall not be installed in the streambed except in specific areas required for velocity control and to ensure structural integrity of bank stabilization measures.

    Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC 02B .0201

    Justification: Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule, and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis. The Division must evaluate if the

activity has avoided and minimized impacts to waters, would cause or contribute to a violation of standards, or would result in secondary or cumulative impacts.

15. All mechanized equipment operated near surface waters shall be inspected and maintained regularly to prevent contamination of surface waters from fuels, lubricants, hydraulic fluids, or other toxic materials. Construction shall be staged in order to minimize the exposure of equipment to surface waters to the maximum extent practicable. Fueling, lubrication, and general equipment maintenance shall be performed in a manner to prevent, to the maximum extent practicable, contamination of surface waters by fuels and oils.

    Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC 02B .0200; 15A NCAC 02B .0231

    Justification: A project that affects waters shall not be permitted unless the existing uses, and the water quality to protect such uses, are protected. Activities must not cause water pollution that precludes any best use on a short-term or long-term basis. As cited in Stream Standards: (12) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses. As cited in Wetland Standards: (c)(1) Liquids, fill or other solids, or dissolved gases shall not be present in amounts that may cause adverse impacts on existing wetland uses; and (3) Materials producing color or odor shall not be present in amounts that may cause adverse impacts on existing wetland uses.

16. In accordance with 143-215.85(b), the permittee shall report any petroleum spill of 25 gallons or more; any spill regardless of amount that causes a sheen on surface waters; any petroleum spill regardless of amount occurring within 100 feet of surface waters; and any petroleum spill less than 25 gallons that cannot be cleaned up within 24 hours.

    Citation: 15A NCAC 02H .0507(c); N.C.G.S 143-215.85(b)

    Justification: Person(s) owning or having control over oil or other substances upon notice of discharge must immediately notify the Department, or any of its agents or employees, of the nature, location, and time of the discharge and of the measures which are being taken or are proposed to be taken to contain and remove the discharge. This action is required in order to contain or divert the substances to prevent entry into the surface waters. Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule (including, at minimum: aquatic life propagation, survival, and maintenance of biological integrity; wildlife; secondary contact recreation; agriculture); and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis.

17. The permittee and their authorized agents shall conduct all activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act), and any other appropriate requirements of State and Federal Law.

    Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c)

Justification: Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule, and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis. The Division must evaluate if the activity has avoided and minimized impacts to waters, would cause or contribute to a violation of standards, or would result in secondary or cumulative impacts.

18. The permittee shall require its contractors and/or agents to comply with the terms and conditions of this certification in the construction and maintenance of this project, and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this Water Quality Certification. A copy of this Water Quality Certification shall be available at the project site during the construction and maintenance of this project.

    Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c)

    Justification: Those actually performing the work should be aware of the requirements of this 401 Water Quality Certification to minimize water quality impacts.

This approval to proceed with your proposed impacts or to conduct impacts to waters as depicted in your application shall expire upon expiration of the 404 Permit. The conditions in effect on the date of issuance shall remain in effect for the life of the project, regardless of the expiration date of this Certification. [15A NCAC 02H .0507(c)]

This, the 3rd day of August, 2023

DocuSigned by:
Trent Allen
5189C2D3DD5C42B...

Trent Allen
Regional Supervisor
Division of Water Resources
Water Quality Regional Operations Section

Tryon Drive Drainage Improvements

APPENDIX E

City Standard Forms

FAYETTEVILLE NC

AMERICA'S CAN DO CITY

RELEASE OF CLAIMS

Contract/Purchase Order Number:_____

Title: _____

Project Number: _____

To the best of my knowledge and belief, I certify that all items, units, quantities, prices of work and materials and NC Sales taxes shown on the attached final invoice are correct; that all work has been performed and materials supplied in accordance with the terms and conditions of the above stated contract, including any and all change orders, between the City of Fayetteville, and (Contractor)_____. I further certify that all subcontracting obligations have been met. Below is a true and correct statement of the contract amount up to and including the last day of the period covered by the attached final invoice, and that no part of the "total amount clue" has been received.

(a) Total Contract Cost (Including Change Orders) $_____
(b) Total Amount Previously Paid $_____
(c) Total Amount Due (Including retainage) $_____

In consideration of the above stated sum to be paid by the City of Fayetteville for the noted contract, the undersigned contractor does release and discharge the City of Fayetteville, its officers, agents and employees, of and from all liabilities, obligations and claims whatsoever in law and equity arising out of or by virtue of said contract, except specified claims in stated amounts, or in estimated amounts when the amounts are not susceptible of exact statement by the contractor, as follows:

_____

_____

_____

_____

_____

IN WITNESS WHEREOF, this release has been executed this,_____day of,_____ 2022
(Imprint Corporate Seal below this line)

(CONTRACTOR) BY:_____

TITLE:_____

ATTEST:

_____
(Secretary)

NOTICE OF AWARD

Date of Issuance:	[Date]	
Owner:	City of Fayetteville, NC	Owner's Project No.:
Engineer:	[Engineer of Record]	Engineer's Project No.:
Project:	[Project Title]	
Contract Name:	Contract for the Construction of [Project]	
Bidder:		
Bidder's Address:		

You are notified that Owner has accepted your Bid dated **[date]** for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

[Describe Work, alternates, or sections of Work awarded]

The Contract Price of the awarded Contract is $**[Contract Price]**. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, and Unit Price Work.

[Number of copies sent] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically.

☐ Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within **15 days** of the date of receipt of this Notice of Award:

1. Deliver to Owner **[number of copies sent]** counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): **[Describe other conditions that require Successful Bidder's compliance]**

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within 15 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions and modified by Supplementary Conditions

Owner:	**The City of Fayetteville, North Carolina**
By *(signature)*:	_____
Name *(printed)*:	_____
Title:	_____

Contractor: _____

By *(signature)*: _____

Name
(printed): _____

Title: _____

Copy: Engineer

NOTICE TO PROCEED

Owner:	City of Fayetteville, North Carolina	Owner's Project No.:	
Engineer:		Engineer's Project No.:	
Contractor:		Contractor's Project No.:	
Project:			
Contract Name:			
Effective Date of Contract:			

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on **[date Contract Times are to start]** pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement: **[Select one of the following two alternatives, insert dates or number of days, and delete the other alternative.]**

The date by which Substantial Completion must be achieved is **[date for Substantial Completion, from Agreement]**, and the date by which readiness for final payment must be achieved is **[date for readiness, from Agreement]**.

[or]

The number of days to achieve Substantial Completion is **[number of days, from Agreement]** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **[number of days, from Agreement]** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

Before starting any Work at the Site, Contractor must comply with the following:

[Note any access limitations, security procedures, or other restrictions]

Owner:	City of Fayetteville, North Carolina
By *(signature)*:	
Name *(printed)*:	
Title:	
Date Issued:	

Contractor: _____

By *(signature)*: _____

Name *(printed)*: _____

Copy: Engineer

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

APPLICATION FOR PAYMENT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

NSPE®
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GUIDELINES FOR THE INTENDED USE OF EJCDC C-620, APPLICATION FOR PAYMENT

1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

The Application for Payment is used to facilitate periodic progress payments to the Contractor for Work completed and for stored materials and equipment (referred to in this document as "Stored Materials").

For additional information regarding the Application for Payment, see EJCDC® C–700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.01, and EJCDC® C–001, Commentary on the 2018 EJCDC Construction Documents (2018).

2.0 APPLICATION FOR PAYMENT OVERVIEW

This document was prepared in Microsoft Excel due to the number of calculations involved in the preparation of the Application for Payment. The application consists of a Summary worksheet, and 3 supporting worksheets: Lump Sum worksheet, Unit Price worksheet, and Stored Materials worksheet.

2.1 *Summary Worksheet* — calculates the amount to be paid to the Contractor at the end of each Application for Payment period. This calculation imports numbers from the supporting worksheets to determine the value of the Work completed and Stored Materials, calculate retainage, and deduct amounts previously paid to determine the amount the Contractor should be paid for the current application period. Application periods are typically one month; however these periods may be extended when Contractor's efforts do not result in the billable completion of Work or storage of materials and equipment during the payment period.

2.2 *Lump Sum Worksheet* — calculates the total value for completed Work for which compensation is paid on a Lump Sum basis. The schedule of values included in this worksheet reflects a breakdown of lump sum Work items to which Contractor and Engineer have agreed, pursuant to Article 2 of the General Conditions. Costs for Stored Materials associated with lump sum items are included on this worksheet to calculate the total value for completed lump sum Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for materials currently stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.

2.3 *Unit Price Worksheet* — calculates the total value for completed Work for which compensation is paid on a Unit Price basis. The schedule of values included in this spreadsheet is typically a tabulation of Unit Price items from the Agreement. Costs for Stored Materials associated with unit price items are included in this worksheet to calculate the total value for completed Unit Price Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for Materials Currently Stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.

2.4 *Stored Materials Worksheet* — calculates the total value for materials and equipment that have been purchased and are being stored until they are incorporated into the Work. This worksheet adds materials and equipment to the worksheet as they are brought to the site and stored; such Stored Materials are then deducted from the Stored Materials worksheet total as they are incorporated into the Work, providing a running net value for the materials and equipment remaining in storage. The values of Stored Materials must be manually added to the Lump Sum or Unit Price line items. These do not automatically update when changes are made. The amount of materials remaining in storage is eligible for payment but must be tracked separately from Work completed since different retainage rates may apply to Work completed and Stored Materials.

3.0 Instructions for filling out the Payment Application form

3.1 Project-specific information is to be entered in the top portion (header) of the Summary worksheet. This same information will automatically be copied to the other worksheets to complete the headers on all other worksheets.

3.2 Outside of the header, data can be entered in non-shaded cells when the sheet is protected. Cells shaded light blue contain equations that will automatically transfer data from other cells or make calculations to complete the worksheet. Altering any of these cells can result in errors in the Application for Payment. It is recommended that the worksheets be protected at all times unless alterations are deliberately being made to the Application for Payment form other than to enter data. See Paragraph 4.0 below for information on Protection of Worksheets.

3.3 Enter information regarding each item in the Lump Sum and/or Unit Price worksheets. For Lump Sum projects, each item should represent an item in the schedule of values prepared by the Contractor and approved by the Engineer/Owner, breaking down the Lump Sum amount into measurable components. For Unit Price contracts, use numbers from the Agreement as the schedule of values. Specific information on the data to be entered into each column may be seen by clicking on the header description for that column. Similar comments may be seen for cells in the "Totals" row that indicates how the number is calculated and where this number is exported to another part of the spreadsheet. See the Commentary for additional information.

3.4 The equations in the Summary worksheet use numbers imported from both the Lump Sum and Unit Price worksheets. Projects will typically either use the Lump Sum or the Unit Price worksheet, but some projects may use both. If one of the worksheets is not used, it should be hidden and not deleted. If it is deleted, Users will need to correct the equations in the Summary worksheet by unprotecting the worksheet and editing the equations. To hide a worksheet, right click on the worksheet tab at the bottom of the worksheet and select "Hide." To unhide a worksheet, right click on any worksheet tab and select "Unhide," and then select the worksheet to unhide and click "Okay." This same process may be used to hide these Guidelines for Use.

4.0 Protection of Worksheets

4.1 The cells in this Workbook that create the forms or contain equations have been coded to "lock" the cells that should not be altered. It is recommended that the Workbook be Protected (cells locked) at all times unless it is necessary to add or delete rows. Directions for adding and deleting rows are provided in the next section. Passwords can be used to lock the Protect / Unprotect settings on spreadsheets, however the worksheets in this workbook do not require a password.

4.2 To unprotect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Unprotect Sheet." To protect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Protect Sheet." This will open a dialog box in which the User is allowed to select protection options. It is recommended that only the top two checkboxes for "Select Locked Cells" and "Select Unlocked Cells" be checked. This will reset the protection for the Worksheet.

5.0 Adding and Deleting Rows

5.1 A limited number of blank rows are provided in the Lump Sum, Unit Price, and Stored Material worksheets. Additional rows may be added to these worksheets by the User. The first step in this process is to unprotect the worksheet as previously discussed. After the sheet is unprotected, move with caution to prevent inadvertently deleting any cells that contain equations. To insert a row, right click in the row heading at the left of the spreadsheet and select "Insert." A new row will be inserted at the location where the cursor was placed in the row heading. If more than one new row is desired, left click and drag the cursor to include the desired number of rows, right click in the selected row headings and then select "Insert." It is important that the line immediately above the "Totals" row not be included in the rows selected. Doing so will require that equations in the "Totals" row be adjusted. When rows are inserted, Excel automatically adjusts the equations to include the new rows, unless the row directly above the "Totals" row is also selected.

5.2 After new rows are inserted, it is important to copy a line from one of the original rows so correct formatting and equations are copied into each new row. To do this, select the row to be copied by clicking the cell in Column A and dragging the cursor to the last column in the table. Then select "Copy" from the menu or type CTRL+C to copy the cells. Excel will show that this row has been copied by showing a moving dashed line around the cells that are to be copied. Then select the new rows into which the information is to be copied as before and select Paste from the menu or type CTRL+V.

5.3 To delete an unused row, right click in the row heading on the left of the spreadsheet for the row to be deleted and select "Delete." The selected row will be deleted. If more than one row is to be deleted, left click and drag the cursor to the desired number of rows to be deleted and then right click to open the menu and select "Delete." Unlike the admonition on adding new rows, it is okay to delete the row just above the "Totals" row.

5.4 After rows have been added or deleted, it is important reset the worksheet protection.

6.0 Saving Files

This file is provided as a Microsoft ® Excel Open XML workbook template (.xltx) to prevent this file from being inadvertently changed. When an application for payment is created for a specific project it should be saved as an Excel workbook (.xlxs) file. To do this, select Save As (F12), type in a new file name and select Excel Workbook (.xlxs) from the drop down Save As Type menu.

7.0 License Agreement

This document is subject to the terms and conditions of the License Agreement, 2018 EJCDC® Construction Series Documents. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at www.ejcdc.org and the websites of EJCDC's sponsoring organizations.

Contractor's Application for Payment

Owner:		**Owner's Project No.:**	
Engineer:		**Engineer's Project No.:**	
Contractor:		**Contractor's Project No.:**	
Project:			
Contract:			
Application No.:		**Application Date:**	
Application Period:	**From**	**to**	

1. Original Contract Price		$ -
2. Net change by Change Orders		$ -
3. Current Contract Price (Line 1 + Line 2)		$ -
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)		$ -
5. Retainage		
a. _____ X	$ - Work Completed	$ -
b. _____ X	$ - Stored Materials	$ -
c. Total Retainage (Line 5.a + Line 5.b)		$ -
6. Amount eligible to date (Line 4 - Line 5.c)		$ -
7. Less previous payments (Line 6 from prior application)		
8. Amount due this application		$ -
9. Balance to finish, including retainage (Line 3 - Line 4)		$ -

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and
(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____

Signature: _____ **Date:** _____

Recommended by Engineer	**Approved by Owner**
By:	**By:**
Title:	**Title:**
Date:	**Date:**
Approved by Funding Agency	
By:	**By:**
Title:	**Title:**
Date:	**Date:**

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Progress Estimate - Lump Sum Work **Contractor's Application for Payment**

Owner:		**Owner's Project No.:**	
Engineer:		**Engineer's Project No.:**	
Contractor:		**Contractor's Project No.:**	
Project:			
Contract:			

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
Original Contract								
			-			-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Original Contract Totals	$ -	$ -	$ -	$ -	$ -		$ -

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Progress Estimate - Lump Sum Work **Contractor's Application for Payment**

Owner:		**Owner's Project No.:**	
Engineer:		**Engineer's Project No.:**	
Contractor:		**Contractor's Project No.:**	
Project:			
Contract:			

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
Change Orders								
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Change Order Totals	$ -	$ -	$ -	$ -	$ -		$ -
Original Contract and Change Orders								
	Project Totals	$ -	$ -	$ -	$ -	$ -		$ -

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Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: _____ **Owner's Project No.:** _____
Engineer: _____ **Engineer's Project No.:** _____
Contractor: _____ **Contractor's Project No.:** _____
Project: _____
Contract: _____

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Original Contract											
					-		-		-		-
					-		-		-		-
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					-		-		-		-
					-		-		-		-
				Original Contract Totals	$ -		$ -	$ -	$ -		$ -

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Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: _____
Engineer: _____
Contractor: _____
Project: _____
Contract: _____

Owner's Project No.: _____
Engineer's Project No.: _____
Contractor's Project No.: _____

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Change Orders											
					-		-		-		-
					-		-		-		-
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					-		-		-		-
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					-		-		-		-
				Change Order Totals	$ -		$ -	$ -	$ -		$ -
Original Contract and Change Orders											
				Project Totals	$ -		$ -	$ -	$ -		$ -

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Stored Materials Summary

Contractor's Application for Payment

Owner: _____
Engineer: _____
Contractor: _____
Project: _____
Contract: _____

Owner's Project No.: _____
Engineer's Project No.: _____
Contractor's Project No.: _____

Application No.: _____ **Application Period:** From _____ to _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I	J	K	L	M
						Materials Stored			Incorporated in Work			
Item No. (Lump Sum Tab) or Bid Item No. (Unit Price Tab)	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Description of Materials or Equipment Stored	Storage Location	Application No. When Materials Placed in Storage	Previous Amount Stored ($)	Amount Stored this Period ($)	Amount Stored to Date (G+H) ($)	Amount Previously Incorporated in the Work ($)	Amount Incorporated in the Work this Period ($)	Total Amount Incorporated in the Work (J+K) ($)	Materials Remaining in Storage (I-L) ($)
								-			-	-
								-			-	-
								-			-	-
								-			-	-
								-			-	-
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								-			-	-
								-			-	-
								-			-	-
								-			-	-
								-			-	-
					Totals	$ -	$ -	$ -	$ -	$ -	$ -	$ -

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CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	City of Fayetteville, North Carolina	Owner's Project No.:
Engineer:		Engineer's Project No.:
Contractor:		Contractor's Project No.:
Project:		
Contract Name:		

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

[Describe the portion of the work for which Certificate of Substantial Completion is issued]

Date of Substantial Completion: **[Enter date, as determined by Engineer]**

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☐ None ☐ As follows:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: ☐ None ☐ As follows:

[List amendments to Contractor's Responsibilities]

The following documents are attached to and made a part of this Certificate:

[List attachments such as punch list; other documents]

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

NOTICE OF ACCEPTABILITY OF WORK

Owner:	City of Fayetteville, North Carolina	Owner's Project No.:
Engineer:		Engineer's Project No.:
Contractor:		Contractor's Project No.:
Project:		
Contract Name:		
Notice Date:	Effective Date of the Construction Contract:	

The Engineer hereby gives notice to the Owner and Contractor that Engineer recommends final payment to Contractor, and that the Work furnished and performed by Contractor under the Construction Contract is acceptable, expressly subject to the provisions of the Construction Contract's Contract Documents ("Contract Documents") and of the Agreement between Owner and Engineer for Professional Services dated **[date of professional services agreement]** ("Owner-Engineer Agreement"). This Notice of Acceptability of Work (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree:

1. This Notice has been prepared with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice has been prepared to the best of Engineer's knowledge, information, and belief as of the Notice Date.
4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's Work) under the Owner-Engineer Agreement, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Owner-Engineer Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Contract Documents, or to otherwise comply with the Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]

Owner:	Owner's Project No.:
Engineer:	Engineer's Project No.:
Contractor:	Contractor's Project No.:
Project:	
Contract Name:	
Date Issued:	Effective Date of Work Change Directive:

Contractor is directed to proceed promptly with the following change(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—Check one or both of the following

☐ Non-agreement on pricing of proposed change. ☐ Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: $ _____ **[increase] [decrease] [not yet estimated]**.

Contract Time: _____ days **[increase] [decrease] [not yet estimated]**.

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price ☐ Cost of the Work ☐ Other

	Recommended by Engineer	Authorized by Owner
By:	_____	_____
Title:	_____	_____
Date:	_____	_____

CITY OF FAYETTEVILLE
CONTRACT CHANGE ORDER

City of Fayetteville
Purchasing Department
433 Hay Street
Fayetteville, NC 28301
(910) 433-1942/4332
(910) 483-1680 (Fax)

Project Name: Click here to enter text.

Contractor: Click here to enter text.

Address:

Effective Date: Click here to enter text.	**Previous Total:** Click here to enter text.
Contract No.: Click here to enter text.	**Total Change:** Click here to enter text.
Change Order No.: Click here to enter text.	**Revised Total:** Click here to enter text.
Account No.: Click here to enter text.	**Time Change:** Click here to enter text.

This change order is being written to:

Except as provided herein, all terms and conditions of the contract referenced above, as heretofore changed remains unchanged and in full force and effect.

Contractor Acceptance:	**City Acceptance:**
I certify that my bonding company will be notified forth-with that my contract has been changed by the amount of this change order, and that a copy of the approved change order will be mailed upon receipt by me to my surety. **By:**_____ **(Signature/Date)** **Title:**_____ **Date:**_____	**This instrument has been pre-audited in the manner required by the Local Government and Budget Fiscal Control Act.** _____ **Chief Financial Officer (Signature/Date)** _____ **Contracting Officer (Signature/Date)** _____ **Authorized City Representative (Signature/Date)**

FIELD ORDER NO.: [Number of Field Order]

Owner:	Owner's Project No.:
Engineer:	Engineer's Project No.:
Contractor:	Contractor's Project No.:
Project:	
Contract Name:	
Date Issued:	Effective Date of Field Order:

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference:

Specification Section(s):

Drawing(s) / Details (s):

Description:

[Description of the change to the Work]

Attachments:

[List documents supporting change]

Issued by Engineer

By: _____

Title: _____

Date: _____

STANDARD FORM FOR PAYMENT REQUESTS

Company Name: Project Name:

Company Address: Project Number:

Company Phone:

Pay Request#

PART A

TOTAL		SCHEDULED	UNIT	SCHEDULED	PREVIOUS	CURRENT
!TEM# VALUE	DESCRIPTION	QUANTITY	PRICE	VALUE	QTY	QTY
1.						
2.						
3.						
4.						
		SUB-TO"I AL			SUB-TOTAL	

PARTB

TOTAL		SCHEDULED	UNIT	SCHEDULED	PREVIOUS	CURRENT
ITEM# VALUE	DESCRIPTION	QUANT!TY	PRICE	VALUE	QTY	QTY
1.						
2.						
3.						
4.						
		SUB-TOTAL			SUB-TOTAL	

TOTAL EARNINGS $

CONTRACT SUMMARY

Original Contract Value	$
Change Orders Approved	$
Current Contract Value	$
Total Earnings	$
Less Retainage	$
Less Previous Payments	$
Due this estimate	$
Balance to finish (+ retainage)	$

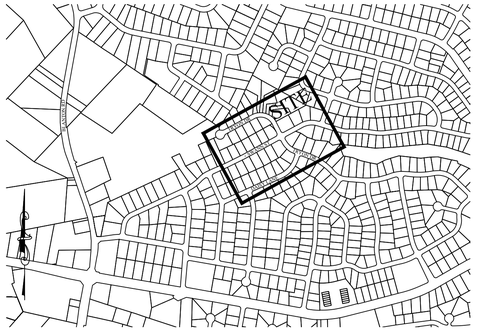
Tryon Drive Drainage Improvements

APPENDIX F

Construction Drawings

FAYETTEVILLE NC

AMERICA'S CAN DO CITY



VICINITY MAP

Sheet List Table	
Sheet Number	Sheet Title
1	COVER
2	LEGEND
3	NOTES
4	TRAFFIC CONTROL NOTES
5	TRAFFIC CONTROL PHASING
6	EXISTING CONDITIONS EROSION CONTROL PHASE 1 AND DEMOLITION PLAN
7	PHASE 2 EROSION AND SEDIMENT CONTROL PLAN
8	IMPROVEMENTS PLAN
9	TRAFFIC CONTROL PLAN
10	TRAFFIC CONTROL PLAN
11	STORM PLAN PROFILE (1)
12	STORM PLAN PROFILE (2)
13	STORM PLAN PROFILE (3)
14	STORM PLAN PROFILE (4)
15	STANDARD DETAILS
16	STANDARD DETAILS
17	STANDARD DETAILS
18	STANDARD DETAILS
19	STANDARD DETAILS
20	UTILITY OVERALL PLAN
21	TRYON DR – WATER LINE 1 10+00 TO 16+00
22	TRYON DR – WATER LINE 1 16+00 TO 18+78
23	SWANN ST – WATER LINE 2 10+00 TO 15+50
24	SWANN ST – WATER LINE 2 15+50 TO 20+87
25	SANITARY SEWER – RELOCATION (–SS1–, –SS1A, –SS2–, –SS3–)
26	PWC WATER DETAILS
27	PWC WATER DETAILS
28	PWC WATER DETAILS
29	PWC SANITARY SEWER DETAILS
30	PWC SANITARY SEWER DETAILS
S–100	RETAINING WALL NOTES
S–101	SCHEDULE OF SPECIAL INSPECTIONS
S–102	RETAINING WALL LAYOUT (1 OF 2)
S–103	RETAINING WALL LAYOUT (2 OF 2)
S–104	RETAINING WALL DETAILS
S–105	EW–01 REINFORCEMENT DETAIL
S–106	EW–07 REINFORCEMENT DETAIL
S–107	EW–08 REINFORCEMENT DETAIL
S–108	EW–09 REINFORCEMENT DETAIL
S–109	EW BILL OF MATERIALS (1 OF 2)
S–110	EW BILL OF MATERIALS (2 OF 2)
S–201	CATCH BASIN 11
S–301	SHEET PILE WALL LAYOUT (WALL 1 & 2)
S–302	SHEET PILE WALL LAYOUT (WALL 3 & 4)
S–303	SHEET PILE WALL LAYOUT (WALL 5 & 6)

FAYETTEVILLE NC
PUBLIC SERVICES

TRYON DRIVE DRAINAGE IMPROVEMENTS
100% DESIGN DRAWINGS



LOCATION MAP

PROJECT SCOPE

THIS PROJECT CONSISTS OF: REPLACEMENT OF EXISTING DRAINAGE PIPING, REPLACEMENT OF EXISTING ASBESTOS CEMENT WATERLINE, PAVEMENT, GRADING, ETC.

NORTH CAROLINA PROFESSIONAL SEAL 045249 ENGINEER DANIEL L MAY 11/24/25
WATER/SEWER UTILITY DESIGN

NORTH CAROLINA PROFESSIONAL SEAL 045140 ENGINEER PATRICK D. COONEY 11/24/25
STRUCTURAL DESIGN: WALLS AND SHORING

Know what's **below.**
Call before you dig.

PROJECT CONTACTS
CITY OF FAYETTEVILLE

Engineering	Byron Reeves, PE, CFM Deputy Director of Public Services 433 Hay Street, Fayetteville, NC 28301 (910) 433-1301 byronreeves@fayettevillenc.gov
Construction Management	Jeff Riddle, PLS Construction Manager 339 Alexander Street, Fayetteville, NC 28301 (910) 433-1661 jeffreyriddle@fayettevillenc.gov
Traffic Services	Brian McGill Interim Assistant Public Services Director - Traffic Services 339 Alexander Street, Fayetteville, NC 28301 (910) 433-1170 brianmcgill@fayettevillenc.gov

COVER

SHEET NUMBER 1 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE NC
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL SEAL 030525 ENGINEER TRAVIS CRISSMAN 11/24/25

REVISIONS

REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

PROJECT TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025
DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :

PROJECT NO. KH 011017025
SUB-LEDGER NO.

ABBREVIATIONS

AC - ASBESTOS CEMENT
ASPH - ASPHALT
B/C - BACK OF CURB
BM - BENCHMARK
CB - CATCH BASIN
CP - CABLEVISION PEDESTAL
C&G - CURB AND GUTTER
C/L - CHAIN LINK
CMP - CORRUGATED METAL PIPE
CO - CLEANOUT
COF - CITY OF FAYETTEVILLE
CONC - CONCRETE
CONST - CONSTRUCTION
CP - CONTROL POINT
CTR - CENTER
DB - DEED BOOK
DEPT - DEPARTMENT
DI - DROP INLET
DIP - DUCTILE IRON PIPE
DWA - DRIVEWAY ASPHALT
DWB - DRIVEWAY BRICK
DWC - DRIVEWAY CONCRETE
DWD - DRIVEWAY DIRT
DWG - DRIVEWAY GRAVEL
E - EAST/EASTING
EOP - EDGE OF PAVEMENT
ESMT - EASEMENT
EV - ELECTRICAL VAULT
F/C - FACE OF CURB
FES - FLARED END SECTION
FH - FIRE HYDRANT
FOB - FIBER OPTIC BURIED
FP - FLAG POLE
GV - GAS VALVE
GW - GUY WIRE
GWV - GATE WATER VALVE
HDPE - HIGH DENSITY POLYETHYLENE
INV - INVERT
JB - JUNCTION BOX
LF - LINEAR FOOT
LOD - LIMITS OF DISTURBANCE
LP - LIGHT POLE
MAX - MAXIMUM
MB - MAILBOX
MHEL - MANHOLE ELECTRIC
MHSD - MANHOLE STORM DRAIN
MHSS - MANHOLE SANITARY SEWER
MHTP - MANHOLE TELEPHONE
N - NORTH/NORTHING
O.C. - ON CENTER
O/H - OVERHEAD
PVMT - PAVEMENT
PC - POINT OF CURVATURE
PERM -PERMANENT
PG - PAGE
PI - POINT OF INTERSECTION
PVC - POLYVINYL CHLORIDE
PP - POWER POLE
RCBC - REINFORCED CONCRETE BOX CULVERT
RCP - REINFORCED CONCRETE PIPE
R/W - RIGHT OF WAY
S- SOUTH
SC - SAWCUT
SD - STORM DRAIN
S/R - SPLIT RAIL
SS - SANITARY SEWER
STA - STATION
STB - SIGNAL TRAFFIC BOX
STD - STANDARD
SWA - SIDEWALK ASPHALT
SWB - SIDEWALK BRICK
SWC - SIDEWALK CONCRETE
SY - SQUARE YARD
TC - TRASH CAN
TD - TRUNCATED DOME
TCE - TEMPORARY CONSTRUCTION EASEMENT
TCP - TERRA COTTA PIPE
TP - TELEPHONE PEDISTAL
TVP - TRAVERSE POINT
TYP - TYPICAL
U.O.N. - UNLESS OTHERWISE NOTED
UP - UTILITY POLE
W - WEST
WCR - WHEELCHAIR RAMP
WL - WATERLINE
WM - WATER METER
WV - WATER VAULT

LEGEND

PROPOSED RIGHT-OF-WAY
PROPOSED FENCE
PROPOSED UNDERGROUND GAS
PROPOSED TEMPORARY CONSTRUCTION EASEMENT
PROPOSED UNDERGROUND WATER
PROPOSED EASEMENT
PROPOSED SANITARY SEWER
PROPOSED STORM DRAIN
PROPOSED SWALE
PROPOSED SANITARY SEWER MAN HOLE
PROPOSED STORM SEWER MAN HOLE
PROPOSED CATCH BASIN
PROPOSED DROP INLET
PROPOSED ELECTRICAL VAULT
PROPOSED ELECTRICAL MAN HOLE
PROPOSED WATER METER
PROPOSED WATER VAULT
PROPOSED SANITARY SEWER CLEAN OUT
PROPOSED TREE
PROPOSED SHRUB
PROPOSED CONCRETE CURB AND GUTTER
PROPOSED SIDEWALK
PROPOSED CONCRETE
PROPOSED POWER POLE
INLET PROTECTION
PROPOSED FLAIRED END SECTION
PROPOSED HEADWALL
PROPOSED GATE WATER VALVE
PROPOSED GAS VALVE
PROPOSED FIRE HYDRANT
PROPOSED LIGHT POLE
PROPOSED ABANDON PIPE
PROPOSED PERMANENT DRAINAGE EASEMENT
REMOVE AND REPLACE DRIVEWAY
PERMANENT DRAINAGE EASEMENT, LIMITS OF DISTURBANCE, AND SILT FENCE
TEMPORARY CONSTRUCTION EASEMENT, LIMITS OF DISTURBANCE, AND TEMPORARY CHAIN LINK FENCE
TEMPORARY CONSTRUCTION EASEMENT, LIMITS OF DISTURBANCE, AND SILT FENCE

EXISTING RIGHT-OF-WAY
EXISTING OVERHEAD ELECTRIC
EXISTING UNDERGROUND ELECTRIC
EXISTING FIBER OPTIC BURIED
EXISTING FENCE
EXISTING UNDERGROUND GAS
EXISTING UNDERGROUND WATER
EXISTING TELEPHONE CABLE
EXISTING CABLEVISION
EXISTING EASEMENT
EXISTING SANITARY SEWER
EXISTING TRAIN TRACKS
EXISTING STORM SEWER
EXISTING SWALE
EXISTING SANITARY SEWER MAN HOLE
EXISTING STORM SEWER MAN HOLE
EXISTING TELEPHONE MAN HOLE
EXISTING CATCH BASIN
EXISTING DROP INLET
EXISTING ELECTRICAL VAULT
EXISTING ELECTRICAL MAN HOLE
EXISTING WATER METER
EXISTING CONCRETE MONUMENT
SURVEY CONTROL MARKER
PROPERTY CORNER (EIR/ERBR/SIR/EIP)
EXISTING WATER VALVE
EXISTING FIBER OPTIC MARKER
EXISTING SANITARY SEWER CLEAN OUT
EXISTING MAILBOX
EXISTING CONCRETE CURB AND GUTTER
EXISTING CONCRETE/SIDEWALK
WETLANDS
EXISTING POWER POLE
EXISTING MAILBOX

EXISTING FLAIRED END SECTION
EXISTING HEADWALL
EXISTING GATE WATER VALVE
EXISTING GAS VALVE
EXISTING FIRE HYDRANT
EXISTING LIGHT POLE
EXISTING TREE
EXISTING SHRUB

LEGEND

SHEET NUMBER 2 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/24/25

REVISIONS

REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :
PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

GENERAL NOTES:

ACCESS TO SITES SHALL BE BY PUBLIC RIGHT-OF-WAYS AND UTILITY EASEMENTS. OTHER ACCESS LOCATIONS REQUIRED SHALL BE SECURED BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO THE OWNER. SUPPLEMENTAL EROSION CONTROL MEASURES SHALL BE REQUIRED TO INCLUDE CONSTRUCTION ENTRANCES, SILT FENCING, RESTORATION, ETC.

THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE THE CONSTRUCTION STAGING AREA AT IT'S EXPENSE. A TEMPORARY USE PERMIT IS REQUIRED FOR THE STAGING AREA (ZONING 433-1705).

THE CONTRACTOR IS EXPECTED AND REQUIRED TO COOPERATE WITH THE PROPERTY OWNERS AFFECTED BY THE WORK. PRIVATE AGREEMENTS WITH PROPERTY OWNERS MUST BE IN WRITING ON A FORM APPROVED BY THE ENGINEER AND A COPY SHALL BE PROVIDED TO THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION ACTIVITIES AFFECTED BY SAID AGREEMENT. THE AGREEMENT MUST SPECIFY THAT THE CITY AND THE ENGINEER SHALL BE HELD HARMLESS AGAINST ALL CLAIMS ARISING FROM THE AGREEMENT. THE OWNER DISCOURAGES PRIVATE AGREEMENTS. BEFORE FINAL ACCEPTANCE, A RELEASE FROM EACH PROPERTY OWNER THAT THE CONTRACTOR MADE AN AGREEMENT WITH SHALL BE REQUIRED. THE PROPERTY OWNER'S RELEASE IS A CONDITION OF FINAL ACCEPTANCE.

CONTRACTOR SHALL MAINTAIN A NEAT AND CLEAN JOB-SITE TO INCLUDE STAGING/STORAGE AREAS AS FOLLOWS:

- PERFORM DUST CONTROL BY WATERING DAILY OR AS DIRECTED BY THE ENGINEER.
- SWEEP STREETS A MINIMUM OF ONCE WEEKLY (FRIDAY) OR AS DIRECTED BY THE ENGINEER.
- BLADE, LEVEL AND RE-COMPACT ALL EXPOSED TRENCHES WEEKLY (OR AS DIRECTED BY THE ENGINEER) TO PRODUCE A SMOOTH “RIDE”.
- PERFORM DAILY CLEAN-UP OF ALL DIRT, DEBRIS AND SCRAP MATERIALS.
- REMOVE EXCESS EQUIPMENT, MATERIALS, TOOLS, ETC. NOT NEEDED.

CONTRACTOR SHALL PROVIDE MEASURES DURING CONSTRUCTION TO SECURE THE SITE AND EXCAVATION FROM THE GENERAL PUBLIC AND COMPLY WITH ALL OSHA REGULATIONS. JOB SITE SAFETY IS THE EXCLUSIVE AND SOLE RESPONSIBILITY OF THE CONTRACTOR. OPEN EXCAVATION LEFT UNATTENDED OR OVER NIGHT IS NOT ACCEPTABLE AND SHALL BE FILLED IMMEDIATELY.

CONTRACTOR SHALL REPAIR OR REPLACE DRIVES DISTURBED BY CONSTRUCTION TO EXISTING OR BETTER CONDITIONS. NO SEPARATE PAYMENT UNLESS OTHERWISE INDICATED.

CONTRACTOR SHALL PROVIDE TEMPORARY FENCING WHERE FENCES ARE REMOVED FOR CONSTRUCTION. CONTRACTOR SHALL COORDINATE REMOVAL OF EXISTING FENCE AND INSTALLATION OF TEMPORARY FENCE WITH PROPERTY OWNER PRIOR TO CONSTRUCTION. REMOVAL OF TEMPORARY FENCE AND INSTALLATION OF PERMANENT FENCE MUST ALSO BE COORDINATED WITH PROPERTY OWNER. ALL REMOVAL, TEMPORARY, AND REPLACEMENT FENCING SHALL BE CONSIDERED INCIDENTAL TO THE CITY INSTALLATION AND NO SEPARATE PAYMENT SHALL BE MADE. CONTRACTOR SHALL REINSTALL ALL SHEDS, FENCES, ETC. TO AS GOOD OR BETTER THAN EXISTING CONDITIONS UNLESS OTHERWISE INDICATED. (NO SEPARATE PAYMENT).

CONTRACTOR SHALL REPLACE ALL DISTURBED MAILBOXES, SIGNS, ETC. DISTURBED DURING CONSTRUCTION WITHIN 24 HOURS OF DISTURBANCE. PERMANENT ROAD SIGNAGE DISTURBED SHALL BE REPLACED IMMEDIATELY AND IF NECESSARY ROADWAY SIGNS SHALL BE TEMPORARILY INSTALLED IN A LOCATION CONSISTENT WITH THE NCMUTCD TO PROVIDE CONTINUOUS TRAFFIC AWARENESS OF ROADWAY CONDITIONS. (NO SEPARATE PAYMENT).

CONTRACTOR SHALL PROVIDE SECURITY FENCING, SECURITY GUARD, AND ANY AND ALL OTHER MEASURES CONTRACTOR DEEMS NECESSARY TO PROTECT EQUIPMENT AND MATERIALS STORED ON THE PROJECT. (NO SEPARATE PAYMENT).

WHERE CONTRACTOR CEASES WORK OPERATION FOR A 72 HOUR PERIOD OR LONGER, SUCH AS HOLIDAYS, ETC., THE FOLLOWING SHALL BE ACCOMPLISHED PRIOR TO THE WORK STOPPAGE.

- CONTRACTOR WILL STORE ALL EQUIPMENT IN THE CONTRACTOR STAGING AREA OR OFF SITE.
- THE CONTRACTOR SHALL SWEEP ALL STREETS, PERFORM GENERAL CLEANUP AND SHALL PERFORM MAINTENANCE ON ALL EXPOSED PATCHES.
- CONTRACTOR SHALL RETURN SERVICES AND ACCESS TO PROPERTY OWNER.

CONTRACTOR SHALL SCHEDULE WORK AND MATERIAL DELIVERIES SO THAT STORED MATERIAL QUANTITIES ON THE JOB SITE SHALL BE MINIMIZED.

CONTRACTOR SHALL STORE ALL MATERIALS IN THE CONTRACTOR STAGING AREA 72 HOURS PRIOR TO INCORPORATING INTO THE WORK TO REDUCE OBSTRUCTIONS TO TRAFFIC AND INCONVENIENCE TO RESIDENTS.

GENERAL NOTES FOR RESIDENT RELATIONS (MANDATORY):

THE CONTRACTOR IS REQUIRED TO DEVELOP GOOD RELATIONS WITH THE RESIDENTS WHICH INCLUDE THE FOLLOWING MANDATORY MINIMUM REQUREMENTS:

- NO SPEEDING WITH EQUIPMENT AND/OR VEHICLES (25 MPH MAX.)
- DO NOT BLOCK DRIVEWAYS AT ANY TIME
- DO NOT LITTER AT ANY TIME
- DO NOT USE RESIDENT'S WATER WITHOUT THEIR PERMISSION (SIGNED AGREEMENT REQUIRED)
- ALL PLUMBING CODE REQUIREMENTS FOR BACK FLOW PREVENTION WILL BE ADHERED TO
- RESPOND TO RESIDENT'S COMPLAINTS WITHIN 24 HOURS
- DO NOT USE ABUSIVE LANGUAGE, PROFANITY OR CAT-CALLING
- WEAR PROPER PROTECTIVE CLOTHING (HARD HATS, PROPER SHOES, SHIRTS, ETC.) AT ALL TIMES.
- MAINTAIN PROPER SAFETY MEASURES, PARTICULARLY ALONG OPEN TRENCHES, PLACING CONES ON RAISED MANHOLES AND BACK FILLING OPEN TRENCHES IF CONSTRUCTION IS STOPPED AND THE OPEN TRENCH IS NOT MANNED.
- PERSONNEL MUST WEAR CITY APPROVED SAFETY VEST AT ALL TIMES WHILE WORKING IN THE CITY AND/OR NCDOT RIGHT-OF-WAY
- ALL TRAFFIC CONTROL FLAG PERSONS AND AT LEAST ONE PERSON ON EACH WORK CREW MUST BE FLUENT IN THE ENGLISH LANGUAGE

IF THE CONTRACTOR AND/OR SUBCONTRACTORS CANNOT ADQUATELY PERFORM AND/OR COMPLY WITH THESE REQUIREMENTS, THE INDIVIDUAL, SUBCONTRACTOR, OR EMPLOYEES MAY BE DIRECTED TO LEAVE THE PROJECT PERMANENTLY. INCONSIDERATE, NON-COOPERATIVE ATTITUDES AND ACTIONS WILL NOT BE TOLERATED.

UTILITIES:

UTILITIES ARE ILLUSTRATED FOR INFORMATION PURPOSES ONLY. THE CITY OR ENGINEER WILL NOT BE HELD RESPONSIBLE FOR THE ACCURACY OF UTILITY LOCATIONS, SIZES, DEPTHS, OR FOR COMPLETENESS OF UTILITY INFORMATION SHOWN.

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY AND MEET WITH ALL UTILITY OWNERS. THE CONTRACTOR SHALL PROTECT ALL UTILITIES FROM DAMAGE CAUSED BY HIS OPERATIONS OR THOSE OF HIS AGENTS. THE CONTRACTOR SHALL HOLD THE CITY HARMLESS FOR ANY THIRD-PARTY INCONVENIENCE CREATED BY WORK OF HIS OWN FORCES OR THAT OF HIS AGENTS. ANY DAMAGES INCURRED SHALL BE THE CONTRACTORS FINANCIAL RESPONSIBILITY.

ADJUSTMENTS/RELOCATIONS WILL BE PERFORMED BY THE VARIOUS UTILITY OWNERS. THE CONTRACTOR SHALL COORDINATE WORK WITH UTILITY OWNERS SO AS NOT TO ADVERSELY AFFECT THE PROJECT SCHEDULE. THE CITY WILL NOT BE HELD RESPONSIBLE FOR ANY DELAYS OR DISRUPTIONS TO THE WORK SCHEDULE OF OTHER UTILITY OWNERS.

- FOR UTILITY LOCATES CALL NORTH CAROLINA ONE-CALL @ 811.
- FOR LOCATES OF UTILITIES NOT MEMBERS OF NORTH CAROLINA ONE-CALL CONTACT PROJECT MANAGER OR UTILITY COORDINATOR.

THE CONTRACTOR SHALL ADJUST ALL WATER VALVES, WATER METER BOXES AND WATER VAULTS TO FINISHED GRADE. WATER METERS, MANHOLES, AND CLEANOUTS LOCATED IN SIDEWALKS OR CONCRETE DRIVEWAYS SHALL BE INSTALLED IN ACCORDANCE WITH PWC REQUIREMENTS. NO ABOVE GROUND UTILITY BOXES, POWER POLE, OR OTHER STRUCTURES ARE TO BE LOCATED WITHIN THE SIDEWALK AREA. THE SIDEWALK AREA IS TO BE FREE OF OBSTACLES.

PRIOR TO COMMENCEMENT OF ANY WORK WITHIN EASEMENTS OR RIGHT-OF-WAYS, THE CONTRACTOR IS REQUIRED TO NOTIFY CONCERNED UTILITY COMPANIES IN ACCORDANCE WITH GS 87-102. CONTRACTOR SHALL VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. NO SEPARATE PAYMENT. EXISTING UTILITIES SHOWN ARE TAKEN FROM MAPS FURNISHED BY VARIOUS UTILITY COMPANIES AND HAVE NOT BEEN PHYSICALLY LOCATED (i.e. GAS, FIBER OPTIC, ETC.).

THE CONTRACTOR SHALL LOCATE EACH UTILITY WHICH MAY CONFLICT WITH CONSTRUCTION 14 DAYS IN ADVANCE TO VERIFY LOCATIONS (HORIZONTALLY AND VERTICALLY) TO ALLOW THE ENGINEER AN OPPORTUNITY TO ADJUST THE DESIGN TO AVOID CONFLICTS (NO SEPARATE PAYMENT).

WHERE DEEMED NECESSARY BY THE ENGINEER THAT A SUBSURFACE DRAINAGE SYSTEM IS REQUIRED, THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, TOOLS, LABOR, EQUIPMENT, TIE-IN'S TO EXISTING DRAINAGE STRUCTURES AND ALL OTHER INCIDENTALS NECESSARY TO PROVIDE COMPLETE INSTALLATION IN ACCORDANCE WITH CITY OF FAYETTEVILLE STANDARDS. IMPROPERLY INSTALLED AND NON-FUNCTIONING DRAINAGE SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE. EXISTING FRENCH DRAINAGE DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AND/OR REPAIRED AT NO ADDITIONAL EXPENSE TO THE OWNER.

STORM DRAINAGE REPAIRS BY CONTRACTOR DUE TO CONSTRUCTION DAMAGE AND JOINTS EXPOSED DURING CONSTRUCTION SHALL BE INSPECTED BY THE OWNER PRIOR TO BACKFILLING.

MAIL BOXES:

THE CONTRACTOR SHALL RELOCATE ALL MAIL BOXES AS REQUIRED BY SECTION 107-12 OF THE NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES. COORDINATE THIS WORK WITH THE U.S. POSTAL SERVICE.

TREES, SHRUBS, AND HEDGES:

ALL TREES THAT ARE TO REMAIN ARE TO BE PROTECTED WITH TREE PROTECTION BARRIERS ACCEPTABLE TO THE CITY ARBORIST OR LANDSCAPE ARCHITECT. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE CITY ARBORIST OR LANDSCAPE ARCHITECT PRIOR TO ROOT PRUNING. WHEN ROOT PRUNING IS ABSOLUTELY NECESSARY, CUT ROOTS CLEANLY USING A DISC TRENCHER OR OTHER APPROVED METHOD.

CONTRACTOR SHALL OBTAIN APPROVAL FROM THE CITY PRIOR TO REMOVING ANY TREES. ALL TREES LOCATED WITHIN THE LOT THAT ARE TO REMAIN AFTER CONSTRUCTION SHALL BE INSPECTED BY THE CITY TO VERIFY THEY ARE SUITABLE TO REMAIN.

GRADING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL BORROW MATERIAL REQUIRED TO CONSTRUCT PROJECT AS SHOWN ON THE CONTRACT DOCUMENTS.

ALL EXCAVATED MATERIALS THAT ARE NOT REQUIRED OR ARE UNSUITABLE FOR THE PROJECT SHALL BE CONSIDERED WASTE AND SHALL BE HAULED OFF SITE AND DISPOSED IN A SAFE AND LEGAL MANNER AT THE CONTRACTOR'S EXPENSE.

EROSION CONTROL:

CONTRACTOR SHALL NOT DISTURB ANY AREAS OUTSIDE OF THE DESIGNATED EASEMENT AREAS.

THE CONTRACTOR SHALL MAINTAIN EROSION CONTROL DEVICES IN ACCORDANCE WIH THE APPROPRIATE CITY AND STATE EROSION AND SEDIMENT CONTROL ORDINANCES. THE CONTRACTOR SHALL PREVENT STANDING WATER DUE TO CONSTRUCTION.

SAWCUTS:

THE CONTRACTOR SHALL SAWCUT EXISTING ASPHALT AND/OR CONCRETE SURFACES PRIOR TO REMOVAL UNLESS OTHERWISE DIRECTED BY THE ENGINEER. SAW CUT WIDTH SHALL BE 1 FOOT MINIMUM FOR THE EXISTING EDGE OF PAVEMENT. SAWCUT PAVEMENT SHALL BE REPLACED AS WELL AS ADDITIONAL PAVEMENT REQUIRED TO TIE-IN TO FACE OF PROPOSED CURB OR GUTTER.

STORM DRAINAGE STRUCTURE, PIPE & GRADING NOTES:

PIPE INVERT ELEVATIONS HAVE PRECEDENCE OVER SLOPES. HOWEVER, SLOPES SHALL NOT BE DECREASED FROM THOSE SHOWN ON PLAN WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

ALL STORM DRAINAGE PIPE TO BE CLASS III REINFORCED CONCRETE UNLESS OTHERWISE NOTED. PIPE LENGTHS INDICATED ON PLAN ARE APPROXIMATE ONLY.

NO SOIL DISTURBANCE OR COMPACTION, CONSTRUCTION MATERIALS, TRAFFIC, TRENCHING, OR OTHER LAND DISTURBING ACTIVITY SHALL BE PERMITTED BEYOND LIMITS OF GRADING WITHOUT PRIOR APPROVAL FROM THE OWNER AND CITY ENGINEERING DEPT.

THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER OF RECORD (EOR) ANY DISCREPANCIES FOUND BETWEEN ACTUAL CONDITION AND CONSTRUCTION DOCUMENTS AND SHALL WAIT FOR INSTRUCTION FROM THE EOR PRIOR TO PROCEEDING.

MANHOLE RIM ELEVATIONS SHOWN ON THE PLANS ARE APPROXIMATE. NEW MANHOLE RING AND COVERS SHALL BE INSTALLED FLUSH WITH THE SURROUNDING GRADE SO AS TO AVOID DAMAGE TO MOTOR VEHICLES DURING CONSTRUCTION. THEY ARE TO BE ADJUSTED TO MATCH THE SURROUNDING PROPOSED GRADE PRIOR TO PLACING THE NEW SURFACE COURSE.

THE CONTRACTOR SHALL DESIGN, FURNISH, AND INSTALL ANY TRENCH STABILIZATION NECESSARY TO MAINTAIN EXCAVATION FOR PIPE AND DRAINAGE STRUCTURE INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND REMOVAL OF ANY TRENCH STABILIZATION. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR ANY DAMAGE TO ADJACENT STRUCTURES RESULTING FROM THE INSTALLATION, REMOVAL OR ABSENCE OF TRENCH STABILIZATION.

GRADES, ELEVATIONS AND LOCATIONS SHOWN ARE APPROXIMATE, AS DIRECTED BY THE ENGINEER. THEY MAY BE ADJUSTED TO ACCOMMODATE UNFORESEEN CONDITIONS. ALL PROPOSED GRADES ARE FINISH GRADES.

THE CONTRACTOR SHALL BACKFILL OPEN EXCAVATIONS AT THE END OF EACH WORKING DAY. AT DRAINAGE STRUCTURE LOCATIONS, THE EXCAVATION SHALL BE COVERED WITH METAL PLATES WHEN PRACTICAL OR COMPLETELY ENCLOSED WITH SAFETY NETTING.

ALL STRUCTURES (JUNCTION BOXES, MANHOLES, ENDWALLS, HEADWALLS, CATCH BASINS, DROP INLETS, ETC.) DESIGNATED HEREIN AS BEING DESIGNED BY THE CONTRACTOR REQUIRE SUBMITTAL OF NC PROFESSIONAL ENGINEER SEALED SHOP DRAWINGS TO THE OWNER FOR REVIEW AND APPROVAL.

STOCKPILING NOTE:

ANY ONSITE STOCKPILING IS TO BE COORDINATED AND APPROVED BY A CITY INSPECTOR. THE STOCKPILE WILL BE PROVIDED WITH GROUND COVER WITHIN 15 WORKING DAYS OF PROJECT COMPLETION.

EXCESS SUITABLE SOIL EXCAVATED DURING CONSTRUCTION SHALL BE STOCKPILED FOR USE ON THE PROJECT OR DISPOSED OF OFF-SITE AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL NOT BE ALLOWED TO STOCKPILE MATERIALS OR EXCESS MATERIALS IN THE STREET RIGHT-OF-WAYS AT ANY TIME UNLESS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL PROVIDE A SUFFICIENT AND SUITABLE STOCKPILE AREA AND LOCATION AT THE CONTRACTOR'S EXPENSE.

ORDER OF PRECEDENCE GENERAL NOTES/TECHNICAL SPECIFICATIONS/PHOTOS:

THE NOTES CONTAINED HEREIN ARE INTENDED TO SUPPLEMENT THE TECHNICAL SPECIFICATIONS AND PROVIDE EASY REFERENCE FOR THE CONTRACTOR. IN NO CASE SHALL THESE NOTES VOID ANY PART, SECTION OR REQUIREMENT OUTLINED IN THE TECHNICAL SPECIFICATIONS CONTAINED IN THE CONTRACT DOCUMENTS. IF CONFLICTS OCCUR BETWEEN THE TECHNICAL SPECIFICATIONS AND THE NOTES CONTAINED HEREIN, THE TECHNICAL SPECIFICATIONS SHALL SUPERSEDE.

TRAFFIC CONTROL

CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLANS FOR WORK ZONE TRAFFIC CONTROL TO CITY TRAFFIC SERVICES DEPARTMENT (910-433-1660) FOR CITY STREETS AND TO MR. TROY BAKER (910-364-0601) FOR NCDOT STREETS. CONTRACTOR SHALL NOT PLACE ANY TRAFFIC CONTROL DEVICES WITHOUT HAVING APPROVAL FROM APPLICABLE TRANSPORTATION DEPARTMENT EITHER NCDOT OR THE CITY OF FAYETTEVILLE.

CONTRACTOR SHALL INSURE ACCESS TO ALL PROPERTIES BY PROPERTY OWNERS AT ALL TIMES.

CONTRACTOR SHALL NOTIFY CITY ENGINEERING OFFICE ONE WEEK IN ADVANCE OF ANY ROAD CLOSING AND COORDINATE ALL ROAD CLOSINGS/UTILITY INTERRUPTIONS WITH PROPERTY OWNERS AFFECTED 48 HOURS PRIOR TO CLOSING/INTERRUPTING SERVICES.

MINIMUM ONE WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES UNLESS ROAD CLOSURE IS APPROVED BY CITY OF FAYETTEVILLE TRAFFIC SERVICES DEPARTMENT IN WRITING, 5 DAYS IN ADVANCE OF ROAD CLOSURE. AN APPROVED DETOUR PLAN PREPARED BY THE CONTRACTOR SHALL BE REQUIRED AND THE MEASURES INSTALLED PRIOR TO CLOSURE.

CONTRACTOR SHALL COORDINATE/NOTIFY TRAFFIC SERVICES DAILY (BEFORE 2:00 P.M.) AS TO WHICH STREETS WILL BE UNDER CONSTRUCTION IMPEDING TRAFFIC FLOW THE FOLLOWING DAY.

THE CONTRACTOR SHALL NOT IMPEDE TRAFFIC AT ANY TIME UNTIL THE APPROVED TRAFFIC CONTROL DEVICES ARE IN PLACE.

ALL TRAFFIC CONTROL MEASURES, DEVICES, INSTALLATION, METHODS, SEQUENCING AND PLANS SHALL BE IN STRICT ACCORDANCE WITH MUTCD, NCDOT, AND CITY OF FAYETTEVILLE TRAFFIC SERVICES.

NOTES

SHEET NUMBER 3 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 ENGINEER TRAVIS CRISSMAN 11/24/25

REVISIONS

REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS SHOWN IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2012 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1101.01	WORK ZONE ADVANCE WARNING SIGNS
1101.02	TEMPORARY LANE CLOSURES
1101.03	TEMPORARY ROAD CLOSURES
1101.04	TEMPORARY SHOULDER CLOSURES
1101.05	WORK ZONE VEHICLE ACCESSES
1101.06	WARNING SIGNS FOR BLASTING ZONES
1101.11	TRAFFIC CONTROL DESIGN TABLES
1110.01	STATIONARY WORK ZONE SIGNS
1110.02	PORTABLE WORK ZONE SIGNS
1115.01	FLASHING ARROW BOARDS
1130.01	DRUM
1135.01	CONES
1145.01	BARRICADES
1150.01	FLAGGING DEVICES
1160.01	TEMPORARY CRASH CUSHION
1165.01	WORK VEHICLE LIGHTING SYSTEMS AND TMA DELINEATION
1170.01	POSITIVE PROTECTION
1180.01	SKINNY-DRUM
1205.01	PAVEMENT MARKINGS - LINE TYPES AND OFFSETS
1205.02	PAVEMENT MARKINGS - TWO-LANE AND MULTI-LANE ROADWAYS
1205.03	PAVEMENT MARKINGS - EXITS AND ENTRANCE RAMPS
1205.04	PAVEMENT MARKINGS - INTERSECTIONS
1205.05	PAVEMENT MARKINGS - TURN LANES
1205.06	PAVEMENT MARKINGS - LANE DROPS
1205.07	PAVEMENT MARKINGS - PEDESTRIAN CROSSWALKS
1205.08	PAVEMENT MARKINGS - SYMBOLS AND WORD MESSAGES
1205.09	PAVEMENT MARKINGS - PAINTED ISLANDS
1205.10	PAVEMENT MARKINGS - SCHOOL AREAS
1205.11	PAVEMENT MARKINGS - RAILROAD CROSSINGS
1205.12	PAVEMENT MARKINGS - BRIDGES
1205.13	PAVEMENT MARKINGS - LANE REDUCTIONS
1250.01	RAISED PAVEMENT MARKERS - INSTALLATION SPACING
1251.01	RAISED PAVEMENT MARKERS - PERMANENT AND TEMPORARY
1261.01	GUARDRAIL AND BARRIER DELINEATORS - INSTALLATION SPACING
1261.02	GUARDRAIL AND BARRIER DELINEATORS - TYPES AND MOUNTING
1262.01	GUARDRAIL END DELINEATION
1264.01	OBJECT MARKERS - TYPES
1264.02	OBJECT MARKERS - INSTALLATION

Because traffic signal equipment is not located through the 811 utility locate process, the contractor shall contact Mr. Bob Gardner, Traffic Signal Maintenance Supervisor, (910) 433-1660, 72 hours prior to performing any work within 500' of a signalized intersection.

LEGEND

GENERAL

- DIRECTION OF TRAFFIC FLOW
- DIRECTION OF PEDESTRIAN TRAFFIC FLOW
- EXIST. PVMT.
- NORTH ARROW
- PROPOSED PVMT.
- TEMP. SHORING (LOCATION PURPOSES ONLY)
- WORK AREA
- REMOVAL
- USER DEFINED (IF NEEDED)
- USER DEFINED (IF NEEDED)

SIGNALS

EXISTING PROPOSED TEMP TEMPORARY

PAVEMENT MARKINGS

——EXISTING LINES

——TEMPORARY LINES

TRAFFIC CONTROL DEVICES

- BARRICADE (TYPE III)
- CONE
- DRUM SKINNY DRUM TUBULAR MARKER
- TEMPORARY CRASH CUSHION
- FLASHING ARROW BOARD
- FLAGGER
- LAW ENFORCEMENT
- TRUCK MOUNTED ATTENUATOR (TMA)
- CHANGEABLE MESSAGE SIGN

TEMPORARY SIGNING

- PORTABLE SIGN
- STATIONARY SIGN
- STATIONARY OR PORTABLE SIGN

PAVEMENT MARKERS

- CRYSTAL/CRYSTAL
- CRYSTAL/RED
- YELLOW/YELLOW

PAVEMENT MARKING SYMBOLS

PAVEMENT MARKING SYMBOLS

TRAFFIC CONTROL NOTES

SHEET NUMBER 4 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 ENGINEER TRAVIS CRISSMAN 11/24/25

REVISIONS

REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

TRYON DRIVE GENERAL TRAFFIC CONTROL NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE MOST RECENT EDITIONS OF THE NCDOT STANDARD SPECIFICATIONS, STANDARD DRAWINGS, MUTCD AND CITY ORDINANCES.
2. ALL TRAFFIC CONTROL DEVICES SHALL BE IN ACCEPTABLE CONDITION AND SHALL BE MAINTAINED IN ACCEPTABLE CONDITION DURING THE DURATION OF THE PROJECT.
3. ROAD CLOSURES SHOULD BE AVOIDED BUT REQUESTS FOR CLOSURES MUST BE APPROVED BY THE CITY TRAFFIC ENGINEER AND BE REQUESTED A MINIMUM OF 10 WORKING DAYS PRIOR TO THE CLOSURE.
4. TWO-LANE, TWO-WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES OF CONSTRUCTION INACTIVITY.
5. TIME RESTRICTIONS: DO NOT CLOSE OR NARROW TRAVEL LANES AS FOLLOWS (REDUCE FROM TWO-LANE, TWO-WAY TRAFFIC) AS FOLLOWS:
   a. SWANN STREET (CROSSING 4) 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
   b. DAISY LANE (CROSSING 5) 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
   c. ALL OTHER CROSSINGS - MINIMIZE DURATION OF FULL CLOSURES
6. THE WORK ZONE MUST BE SECURED TO VEHICULAR AND PEDESTRIAN TRAFFIC DURING THE DURATION OF THE PROJECT.
7. HOLIDAY TIME RESTRICTIONS:
   a. FOR ANY UNEXPECTED OCCURRENCE THAT CREATES UNUSUALLY HIGH TRAFFIC VOLUMES, AS DIRECTED BY THE ENGINEER.
   b. FOR NEW YEAR'S BETWEEN THE HOURS OF 4:00 PM DECEMBER 31ST TO 9:00 AM JANUARY 2ND. IF NEW YEAR'S DAY IS ON A FRIDAY, SATURDAY, SUNDAY, OR MONDAY, THEN UNTIL (TIME) THE FOLLOWING TUESDAY.
   c. FOR EASTER BETWEEN THE HOURS OF 4:00 PM THURSDAY AND 9:00 AM MONDAY.
   d. FOR MEMORIAL DAY BETWEEN THE HOURS OF 4:00 PM FRIDAY TO 9:00 AM TUESDAY.
   e. FOR INDEPENDENCE DAY BETWEEN THE HOURS OF 4:00 PM THE DAY BEFORE INDEPENDENCE DAY AND 9:00 AM THE DAY AFTER INDEPENDENCE DAY.
   f. IF INDEPENDENCE DAY IS ON A FRIDAY, SATURDAY, SUNDAY OR MONDAY, THEN BETWEEN THE HOURS OF 4:00 PM THE THURSDAY BEFORE INDEPENDENCE DAY AND 9:00 AM THE TUESDAY AFTER INDEPENDENCE DAY.
   g. FOR LABOR DAY BETWEEN THE HOURS OF 4:00 AM FRIDAY TO 9:00 AM THE FOLLOWING TUESDAY.
   h. FOR THANKSGIVING DAY BETWEEN THE HOURS OF 4:00 PM TUESDAY TO 9:00 AM MONDAY.
   i. FOR CHRISTMAS BETWEEN THE HOURS OF 4:00 PM THE FRIDAY BEFORE THE WEEK OF CHRISTMAS DAY AND 9:00 AM THE FOLLOWING TUESDAY AFTER THE WEEK OF CHRISTMAS.
   j. FOR THE INTERNATIONAL FOLK FESTIVAL BETWEEN THE HOURS OF 4:00 PM THE THURSDAY BEFORE THE FESTIVAL UNTIL 9:00 AM THE MONDAY FOLLOWING THE FESTIVAL.
   k. FOR DOGWOOD FESTIVAL BETWEEN THE HOURS OF 4:00 PM THE THURSDAY BEFORE THE FESTIVAL UNTIL 9:00 AM THE MONDAY FOLLOWING THE FESTIVAL.
   l. NO WORK SHALL OCCUR ON WEEKENDS (BEGINNING AT 4:00 PM ON FRIDAY) UNLESS APPROVED BY THE ENGINEER.
8. PLACEMENT OF INTERIM PAVEMENT MARKINGS WILL NOT BE A DIRECT LINE ITEM AND WILL BE CONSIDERED TO INSTALLATION OF THERMOPLASTIC PAVEMENT MARKINGS.

CONSTRUCTION PHASING

SUBMIT TRAFFIC CONTROL PLAN TO OWNER FOR APPROVAL.

TRAFFIC CONTROL PLAN PHASING

1. INSTALL ALL REQUIRED SIGNAGE AS NEEDED FOR CROSSINGS.
2. OBTAIN OWNER APPROVAL FOR SIGNAGE BEFORE ROAD OR LANE CLOSURE.
3. UPON OWNER APPROVAL, BEGIN CONSTRUCTION ON CROSSING.
4. PROVIDE FLAGGERS, SIGNAGE, CONES, BARRELS, BARRICADES, AND ALL OTHER APPURTENANCES REQUIRED FOR MUTCD COMPLIANT TRAFFIC CONTROL.
5. COMPLETE STORM PIPE AND UTILITY WORK IN AN EXPEDITIOUS MANNER.
6. RESURFACE ROADWAY. INSTALL FINAL PAVEMENT MARKINGS AND MARKERS.

TRAFFIC CONTROL PHASING

SHEET NUMBER 5 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/24/25

REVISIONS			
REV. #	DESCRIPTION	REV.BY	DATE
1	BID SET		NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : G. SETZ
APPROVED : T. CRISSMAN
SCALE :
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

REMOVE ASPHALT AND PROVIDE TEMPORARY PAVEMENT PATCH, TYP. LEAVE PATCH FINISHED GRADE 1.5" BELOW ORIGINAL GRADE, FLUSH WITH MILLED AREAS.

TRYON DRIVE
50' PUBLIC R/W

1.5" THICK MILLING, TYP.

CLEAR AND GRUB EASEMENT AREA: 1759 AND 1763 TRYON DRIVE.

DROP INLET PROTECTION. SEE COF DETAIL EC-1.3

SILT FENCE, LOD, AND TCE COMBINED, TYP. FOR SILT FENCE SEE COF DETAIL EC-5.

REMOVE AND REPLACE 4' CHAIN LINK FENCE

REMOVE AND REPLACE 4' WOOD LATTICE FENCE

SHORING/FOUNDATION PROTECTION AND VIBRATION MONITORING. SEE DETAIL 7, SHEET 19.

REMOVE AND REPLACE EXISTING FENCE AND GATES

REMOVE, STORE, AND RESET EXISTING BLOCK WALL

REMOVE EXISTING RCP, INLETS, ENDWALLS, AND OTHER DRAINAGE STRUCTURES

REMOVE EXISTING SPEED HUMP. RECONSTRUCTION OF SPEED HUMP BY OTHERS.

REMOVE EX 30" ROLL CURB, TYP.

REMOVE AND REPLACE EXISTING 30" ROLL CURB, TYP

CLEAR AND GRUB 1743 TRYON DRIVE

REMOVE AND REPLACE EXISTING 30" ROLL CURB, TYP.

REMOVE AND REPLACE 6' WOOD PRIVACY FENCE

EX BRICK WALL

REMOVE AND REPLACE 10 LF OF BRICK RETAINING WALL. REUSE BACKS TO MATCH EXISTING.

SHORING/FOUNDATION PROTECTION AND VIBRATION MONITORING. SEE DETAIL 7, SHEET 19.

REMOVE EXISTING RCP, INLETS, AND OTHER DRAINAGE STRUCTURES.

REMOVE AND REPLACE 4' CAST IRON FENCE

REMOVE AND REPLACE 6' POLYMER PRIVACY FENCE

TEMPORARY 4' CHAIN LINK FENCE/TCE/LOD COMBINATION, TYP.

RELOCATE 6'X8' SHED WITHIN BACKYARD DURING CONSTRUCTION AND REPLACE AFTER COMPLETION WITH OWNER APPROVAL

REMOVE AND REPLACE 6' POLYMER PRIVACY FENCE

SHORING/FOUNDATION PROTECTION AND VIBRATION MONITORING. SEE DETAIL 7, SHEET 19.

REMOVE AND REPLACE 4' CHAIN LINK FENCE

SILT SACK TYPE B, TYP. SEE DETAIL 2, SHEET 19

REMOVE AND REPLACE EXISTING 30" VERTICAL CURB

REMOVE AND REPLACE 30" ROLL CURB, TYP

REMOVE EXISTING RCP, INLETS, ENDWALLS, AND OTHER DRAINAGE STRUCTURES.

FAYPWC 20' SANITARY SEWER UTILITY EASEMENT DB 12132 PG 404

REMOVE AND REPLACE WOOD FENCE

REMOVE AND REPLACE EXISTING 30" VERTICAL CURB

ROCK CHECK DAM, TYP. SEE COF DETAIL EC-6.

REMOVE AND REPLACE EXISTING 30" VERTICAL CURB

REMOVE INDIVIDUAL TREES > 10" DIAMETER FROM OUTLET AREA. CLEAR AND GRUB REMAINING VEGETATION.

1.5" THICKNESS MILLING, TYP

SWANN STREET
50' PUBLIC R/W

DAISY LANE
50' PUBLIC R/W

WEISKOPF COURT
50' PUBLIC R/W

11 N/F DWIGHT D. NIXON & WIFE, JAMESETTA NIXON DB 3898, PG 636 PB 55, PG 81

10 N/F JOHNNY RAY VAUGHN JR. DB 9262, PG 212 PB 55, PG 81

9 N/F CLAUDE A CAMPBELL & WIFE, JOANNE N. CAMPBELL DB 5505, PG 585 PB 55, PG 81

8 N/F CURTIS WOOD DB 11156, PG 165 PB 55, PG 81

7 N/F CURTIS WOOD DB 11156, PG 165 PB 55, PG

6 N/F JAMES E. WALKER & WIFE, ANGELA L. WALKER TRACT 1 OF DB 6863, PG 285 PB 55, PG 81

5 N/F JONATHAN R. HARRISON DB 11454, PG 605 PB 55, PG 81

4 N/F MARY JOSEPH GAMBLE DB 6339, PG 891 PB 55, PG 81

3 N/F WAYNE HAYWOOD JORDAN, JR. & WIFE, CHERI ANNE JORDAN DB 4531, PG 104 PB 55, PG 81

2 N/F WILLIAM E. LEWIS, SR. & WIFE, MILDRED J. LEWIS DB 3163, PG 312 PB 55, PG 81

1 N/F WALTER J. PIKUL DB 9190, PG 534 PB 55, PG 81

12 N/F CLAUDE A. CAMPBELL & WIFE, JOANNE N. CAMPBELL DB 5505, PG 585 PB 55, PG 81

13 N/F CLAUDE A. CAMPBELL & WIFE, JOANNE N. CAMPBELL DB 5432, PG 252 PB 55, PG 81

14 N/F MURDOCK BOWMAN DB 11119, PG 563 PB 55, PG 81

15 N/F ALEXIS O. MORALES MORALES & WIFE, ROCIO MORALES MATAMOROS DB 10086, PG 827 PB 55, PG 81

16 N/F THE CITY OF FAYETTEVILLE DB 10193, PG 350 PB 55, PG 81

N/F W. G. PLEASANT & WIFE, FLORA W. PLEASANT DB 2335, PG 143

70 N/F MARC LUIS CACERES DB 10812, PG 812 PB 35, PG 23

69 N/F JESSICA ANN PUCKETT DB 10908, PG 368 PB 35, PG 23

68 N/F RICHARD D. FOSTER & WIFE, WANDA H. FOSTER DB 4717, PG 700 PB 35, PG 23

71 N/F ALEX ELLIS & WIFE, ANNA RODRIGUEZ DB 10868, PG 608 PB 35, PG 23

72 N/F ROBBIE E. PATTERSON & WIFE, LOUISE A. PATTERSON DB 10095, PG 84 PB 35, PG 23

73 N/F RICHARD W. TILLMAN & WIFE, MAUREEN S. TILLMAN DB 3388, PG 371 PB 35, PG 23

74 N/F WILLIE SMITH, JR. & WIFE, BRENDA RAINEY SMITH DB 4163, PG 71

115 N/F GEORGE FREITAS & WIFE, ANN MARIE FREITAS DB 11347, PG 91 PB 41, PG 45

116 N/F MATTHEW STOKES & WIFE, VICKIE STOKES DB 10026, PG 354 PB 41, PG 45

117 N/F DAYANE MICHELLE AYALA TORRES DB 10827, PG 276 PB 41, PG 45

118 N/F SHIHLUNG HUANG & WIFE, CHIU JUNG CHANG DB 6916, PG 314 PB 41, PG 45

83 N/F BRENT LAMAR MCDONALD & WIFE, CYNTHIA MCDONALD DB 2783, PG 658 PB 35, PG 23

82 N/F TONY C. BILLINGSLEA DB 10719, PG 894 PB 35, PG 23

81 N/F JAMES P. JACKSON & WIFE, BARBARA U. JACKSON DB 2254, PG 567 PB 35, PG 23

80 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2764, PG 2 PB 35, PG 23

79 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2672, PG 632 PB 35, PG 23

78 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2764, PG 2 PB 35, PG 23

77 N/F IVAN WILLIAMS & WIFE, SHARON WILLIAMS DB 5400, PG 387 PB 35, PG 23

114 N/F MICHAEL G. LUCK & WIFE, CONNIE W. LUCK DB 5178, PG 458 PB 37, PG 30

113 N/F UNIQUA CHARTALE BOSTICK DB 11318, PG 764 PB 37, PG 30

124 N/F MICHAEL C. BOOSE DB 4261, PG 560 PB 41, PG 45

123 N/F SFR3-020 LLC DB 11215, PG 284 PB 41, PG 45

112 N/F JAMES W. JOHNSON DB 9408, PG 439 PB 37, PG 30

122 N/F RAAED AL HADDAD & SPOUSE, DOHA H. AL HADDAD DB 10445, PG 319 PB 41, PG 45

111 N/F LANDON LEVI HOOK & WIFE, KAILI S. HOOK DB 10775, PG 781 PB 37, PG 30

91 N/F HALEY BENNETT, ALFRED BENNETT & WIFE, PATRICIA BENNETT DB 10835, PG 16 PB 37, PG 30

92 N/F LUCILE G. BLACK DB 3589, PG 866 PB 37, PG 30

93 N/F ROBERT C. FARR & WIFE, ELLEN D. FARR DB 4184, PG 675 PB 37, PG 30

29 N/F PHILIP INMAN & WIFE, MELISSA INMAN DB 3335, PG 426 PB 37, PG 30

99 N/F JAMES S. BRYANT OR BETTY S. BRYANT.

NORTH

40 0 40 80

1 INCH = 40 FT

EROSION CONTROL PHASE 1 CONSTRUCTION SEQUENCE

1. COMPLETE AND SUBMIT AN ELECTRONIC NOTICE OF INTENT (e-NOI)FORM WITH NCDEMLR REQUESTING A CERTIFICATE OF COVERAGE (COC) UNDER THE NCG01 CONSTRUCTION STORMWATER GENERAL PERMIT. VISIT THE FOLLOWING WEBSITE: https://deq.nc.gov/about/divisions/ energy-mineral-land-resources /energy-mineral-land-permits/stormwater-permits/construction-sw. THE COC MUST BE SUBMITTED TO THE CITY PRIOR TO THE COMMENCEMENT OF ANY LAND DISTURBING ACTIVITY.
2. MAINTAIN DOCUMENTATION REQUIRED UNDER THE SITE NPDES STORMWATER PERMIT FOR CONSTRUCTION ACTIVITY (NCG010000) AND PROVIDE TO CITY UPON REQUEST THROUGHOUT THE PROJECT.
3. PRIOR TO BEGINNING CONSTRUCTION, CALL THE FAYETTEVILLE REGIONAL OFFICE OF NCDEQ AT (910) 433-3300 TO SCHEDULE AN ON-SITE PRE-CONSTRUCTION MEETING.
4. INSTALL ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES INCLUDING INLET PROTECTION, STONE CONSTRUCTION ENTRANCES, SILT FENCE, CHECK DAMS, AND ACTIVE FLOW BYPASS / DEWATERING SYSTEMS. LIMIT CLEARING AND LAND DISTURBING ACTIVITY TO ONLY THE AREA NECESSARY TO INSTALL THE PERMITTED MEASURES.
5. CALL THE FAYETTEVILLE REGIONAL OFFICE OF NCDEQ AT (910) 433-3300 TO SCHEDULE INSPECTION OF TEMPORARY MEASURES. UPON APPROVAL OF TEMPORARY MEASURES, COMMENCE PERMITTED LAND DISTURBING ACTIVITY , DEMOLITION, CLEARING AND GRUBBING, PIPE INSTALLATION, ETC.
6. ALL EROSION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED, IF NEEDED, AT LEAST ONCE PER WEEK AND AFTER EVERY RAINFALL EVENT.
7. CONTRACTOR SHALL PROVIDE FOUNDATION PROTECTION DESIGN SEALED BY A NORTH CAROLINA PROFESSIONAL ENGINEER. DESIGN SHALL INCLUDE PLANS AND DETAILS FOR PROPOSED FOUNDATION PROTECTION. LOCATION SHOWN IS APPROXIMATE. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING EXACT TIMING OF INSTALLATION, DIMENSIONS, AND LOCATION OF SHEET PILES IN RELATION TO DEMOLITION, IMPROVEMENTS, AND EXISTING STRUCTURES IN ORDER TO ENSURE NO DAMAGE OCCURS.
8. CONTRACTOR SHALL PROVIDE 4' TEMPORARY CHAIN LINK FENCE FOR ALL ENCLOSED YARDS SUCH THAT THEY REMAIN ENCLOSED DURING CONSTRUCTION.
9. ALL NEW ASPHALT SHALL BE RESTRIPED WITH THERMOSTRIPING IN THE SAME COLOR, LOCATION, WIDTH, AND CONFIGURATION AS THE EXISTING STRIPING.
10. AREAS SHOWN FOR MILLING AND FOR TEMPORARY PATCH SHALL RECEIVE 1.5" THICK S9.5B ASPHALT OVERLAY AT END OF CONSTRUCTION WHEN APPROVED BY THE OWNER.

EXISTING CONDITIONS EROSION CONTROL PHASE 1 AND DEMOLITION PLAN

SHEET NUMBER 6 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/21/25

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

PROJECT	TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :	
DATE :	NOV 2025
DRAWN :	G. SEITZ
APPROVED :	T. CRISSMAN
SCALE :	

PROJECT NO. KH 011017025

SUB-LEDGER NO.

INSTALL TEMPORARY CONSTRUCTION ENTRANCE OFF EXISTING DRIVEWAY.

IMPERVIOUS DIKE, TYP. SEE DETAIL 3/SHEET 22

STREAM BYPASS PUMPING DISCHARGE. SEE DETAIL 1, SHEET 19

24" THICK CLASS 1 STONE. 48' LONG BY 30' WIDE. SEE COF DETAIL DR-26.

APPROXIMATE LOCATION OF STREAM BYPASS PUMP. SEE DETAIL 1, SHEET 19

MH-26
RIM: 178.89
INV IN: 174.33
(INV IN. ASSUMED, CONTRACTOR TO FIELD VERIFY)
INV OUT: 173.89

GEOTEXTILE DEWATERING DIRT BAG. SEE DETAIL 5, SHEET 22.

STONE CONSTRUCTION ENTRANCE, TYP. SEE COF DETAIL EC-2.

FAYPWC 20' SANITARY SEWER UTILITY EASEMENT DB 12132 PG 404

GRAVEL CONSTRUCTION ENTRANCE, TYP. SEE COF DETAIL EC-2

ROCK CHECK DAM, TYP. SEE COF DETAIL EC-6.

24" THICK CLASS 1 STONE. 56' LONG BY 36' WIDE. SEE COF DETAIL DR-26.

DROP INLET PROTECTION. SEE COF DETAIL EC-1.3

TRYON DRIVE
50' PUBLIC R/W

SWANN STREET
50' PUBLIC R/W

DAISY LANE
50' PUBLIC R/W

WEISKOPF COURT
50' PUBLIC R/W

MH-06, MH-05, MH-18, MH-27, MH-29

CB-12, CB-11, CB-24, CB-06, CB-03, CB-02, CB-29, CB-28, CB-21

DI-14, DI-04, DI-20, DI-19

EW-09, EW-08, EW-07, EW-01

1 N/F WALTER J. PIKUL DB 9190, PG 534 PB 55, PG 81

2 N/F WILLIAM E. LEWIS, SR. & WIFE, MILDRED J. LEWIS DB 3163, PG 312 PB 55, PG 81

3 N/F WAYNE HAYWOOD JORDAN, JR. & WIFE, CHERI ANNE JORDAN DB 4531, PG 104 PB 55, PG 81

4 N/F MARY JOSEPH GAMBLE DB 6339, PG 891 PB 55, PG 81

5 N/F JONATHAN R. HARRISON DB 11454, PG 605 PB 55, PG 81

6 N/F JAMES E. WALKER & WIFE, ANGELA L. WALKER TRACT 1 OF DB 6863, PG 285 PB 55, PG 81

7 N/F CURTIS WOOD DB 11156, PG 165 PB 55, PG

8 N/F CURTIS WOOD DB 11156, PG 165 PB 55, PG 81

9 N/F CLAUDE A CAMPBELL & WIFE, JOANNE N. CAMPBELL DB 5505, PG 585 PB 55, PG 81

10 N/F JOHNNY RAY VAUGHN JR. DB 9262, PG 212 PB 55, PG 81

11 N/F DWIGHT D. NIXON & WIFE, JAMESETTA NIXON DB 3898, PG 636 PB 55, PG 81

12 N/F CLAUDE A. CAMPBELL & WIFE, JOANNE N. CAMPBELL DB 5505, PG 585 PB 55, PG 81

13 N/F CLAUDE A. CAMPBELL & WIFE JOANNE N. CAMPBELL DB 5432, PG 252 PB 55, PG 81

14 N/F MURDOCK BOWMAN DB 11119, PG 563 PB 55, PG 81

15 N/F ALEXIS O. MORALES MORALES & WIFE, ROCIO MORALES MATAMOROS DB 10086, PG 827 PB 55, PG 81

16 N/F THE CITY OF FAYETTEVILLE DB 10193, PG 350 PB 55, PG 81

N/F W. G. PLEASANT & WIFE, FLORA W. PLEASANT DB 2335, PG 143

68 N/F RICHARD D. FOSTER & WIFE, WANDA H. FOSTER DB 4717, PG 700 PB 35, PG 23

69 N/F JESSICA ANN PUCKETT DB 10908, PG 368 PB 35, PG 23

70 N/F MARC LUIS CACERES DB 10812, PG 812 PB 35, PG 23

71 N/F ALEX ELLIS & WIFE, ANNA RODRIGUEZ DB 10868, PG 608 PB 35, PG 23

72 N/F ROBBIE E. PATTERSON & WIFE, LOUISE A. PATTERSON DB 10095, PG 84 PB 35, PG 23

73 N/F RICHARD W. TILLMAN & WIFE, MAUREEN S. TILLMAN DB 3388, PG 371 PB 35, PG 23

74 N/F WILLIE SMITH, JR. & WIFE, BRENDA RAINEY SMITH DB 4163, PG 71

77 N/F IVAN WILLIAMS & WIFE, SHARON WILLIAMS DB 5400, PG 387 PB 35, PG 23

78 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2764, PG 2 PB 35, PG 23

79 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2672, PG 632 PB 35, PG 23

80 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2764, PG 2 PB 35, PG 23

81 N/F JAMES P. JACKSON & WIFE, BARBARA U. JACKSON DB 2254, PG 567 PB 35, PG 23 APPROX STRUCTURE LOCATION BASED ON AERIAL PHOTOGRAPHY

82 N/F TONY C. BILLINGSLEA DB 10719, PG 894 PB 35, PG 23

83 N/F BRENT LAMAR MCDONALD & WIFE, CYNTHIA MCDONALD DB 2783, PG 658 PB 35, PG 23

91 N/F HALEY BENNETT, ALFRED BENNETT & WIFE, PATRICIA BENNETT DB 10835, PG 16 PB 37, PG 30

92 N/F LUCILE G. BLACK DB 3589, PG 866 PB 37, PG 30

93 N/F ROBERT C. FARR & WIFE, ELLEN D. FARR DB 4184, PG 675 PB 37, PG 30

99 N/F JAMES S. BRYANT OR RPTTY S. BRYANT.

29 N/F PHILIP INMAN & WIFE, MELISSA INMAN DB 3335, PG 426 PB 37, PG 30

111 N/F LANDON LEVI HOOK & WIFE, KAILI S. HOOK DB 10775, PG 781 PB 37, PG 30

112 N/F JAMES W. JOHNSON DB 9408, PG 439 PB 37, PG 30

113 N/F UNIQUA CHARTALE BOSTICK DB 11318, PG 764 PB 37, PG 30

114 N/F MICHAEL G. LUCK & WIFE, CONNIE W. LUCK DB 5178, PG 458 PB 37, PG 30

115 N/F GEORGE FREITAS & WIFE, ANN MARIE FREITAS DB 11347, PG 91 PB 41, PG 45

116 N/F MATTHEW STOKES & WIFE, VICKIE STOKES DB 10026, PG 354 PB 41, PG 45

117 N/F DAYANE MICHELLE AYALA TORRES DB 10827, PG 276 PB 41, PG 45

118 N/F SHIHLUNG HUANG & WIFE, CHIU JUNG CHANG DB 6916, PG 314 PB 41, PG 45

122 N/F RAAED AL HADDAD & SPOUSE, DOHA H. AL HADDAD DB 10445, PG 319 PB 41, PG 45

123 N/F SFR3-020 LLC DB 11215, PG 284 PB 41, PG 45

124 N/F MICHAEL C. BOOSE DB 4261, PG 560 PB 41, PG 45

RON. DB 1 PB

NORTH

40 0 40 80

1 INCH = 40 FT

EROSION CONTROL PHASE 2 CONSTRUCTION SEQUENCE

1. STABILIZATION IS REQUIRED WITHIN 14 CALENDAR DAYS OF COMPLETION OF ANY PHASE OF GRADING OR INACTIVITY ON PROJECT SITE.
2. MAINTAIN ALL EROSION CONTROL MEASURES THROUGHOUT CONSTRUCTION AS REQUIRED FOR PROPER FUNCTION. INSTALL ADDITIONAL MEASURES AS NECESSARY TO PREVENT OFFSITE SEDIMENTATION.
3. RELOCATE INLET PROTECTION FROM EXISTING STRUCTURES TO NEW STRUCTURES AS DRAINAGE STRUCTURES ARE DEMOLISHED AND CONSTRUCTED.
4. AS FINAL GRADES ARE ACHIEVED, STABILIZE SITE WITH PAVEMENT, SOD, OR OTHER MEANS AS CALLED FOR ON THE PLANS. SITE STABILIZATION IS REQUIRED PRIOR TO FINAL APPROVAL OF GRADING PERMIT.
5. SOD SHALL BE USED FOR STABILIZATION IN ALL AREAS NOT BEING PAVED OR OTHERWISE COVERED. SOD SHALL MATCH EXISTING GRASS SPECIES IN YARD OR AREA IN WHICH IT IS BEING INSTALLED.
6. CALL THE FAYETTEVILLE REGIONAL OFFICE OF NCDEQ AT (910) 433-3300 TO SCHEDULE AN INSPECTION OF SITE STABILIZATION.
7. IF SITE STABILIZATION IS APPROVED BY NCDEQ, REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES, RESTORE GRADE, AND STABILIZE AREAS DISTURBED DURING MEASURE REMOVAL.
8. CALL THE FAYETTEVILLE REGIONAL OFFICE OF NCDEQ AT (910) 433-3300 TO SCHEDULE A FINAL SITE INSPECTION.

PHASE 2 EROSION AND SEDIMENT CONTROL PLAN

SHEET NUMBER 7 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/24/25

REV. #	DESCRIPTION	REV.BY	DATE
1	BID SET		NOV 2025

REVISIONS.

ISSUED FOR CONSTRUCTION

DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE : 1" = 40'

PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

PROJECT NO. KH 011017025

SUB-LEDGER NO.

NOTES
1. ROAD CROSSING CONSTRUCTION SHALL BE PHASED AS FOLLOWS:
   - CROSSING 1: DOWNSTREAM MOST SWANN STREET CROSSING WITH PROPOSED CONCRETE BOX CULVERT
   - CROSSING 2: DOWNSTREAM MOST TRYON DRIVE CROSSING WITH PROPOSED CONCRETE BOX CULVERT
   - CROSSING 3: SECOND TRYON DRIVE CROSSING WITH PROPOSED CONCRETE BOX CULVERT
   - CROSSING 4: SWANN STREET CROSSING WITH PROPOSED REINFORCED CONCRETE PIPE
2. THE FOLLOWING DETAILS APPLY TO THE VARIOUS STRUCTURE DESIGNATIONS:
   - *MH COF DR-14, DR-14.1
   - *DI COF DR-16
   - *CB COF DR-3, DR-3.1
   - *EW SEE STRUCTURAL DESIGN SHEETS
   - *CB-11 DR-1, DR-3.1 WITH OVERSIZED CATCH BASIN STRUCTURE, SEE STRUCTURAL DESIGN SHEETS.
3. ALL ROADWAY STRIPING SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITION FOLLOWING COMPLETION OF FINAL LIFT OF ASPHALT IN ALL LOCATIONS. STRIPING SHALL BE THERMOPLASTIC.
4. FOOTERS AND DIMENSIONS OF ENDWALLS AND WINGWALLS ARE APPROXIMATE. SEE STRUCTURAL DESIGN SHEETS.

EX FIBER OPTIC TO BE RELOCATED CLEAR OF PROPOSED STORM PIPE BY OTHERS
TIE EX 30" RCP TO PROPOSED JB
CB-12
TRYON DRIVE
50' PUBLIC R/W
CROSSING 3
30" RCP
42" RCP
CB-11
MH-06
10'x4' RCBC
10'x4' RCBC
EW-09
EW-08
REMOVE AND REPLACE CONCRETE DRIVEWAY AT END OF CONSTRUCTION, TYP
30" ROLL CURB, TYP. SEE COF DETAIL SD-1.
RELOCATE AND REGRADE CHANNEL AS SHOWN SEE DETAIL 8, SHEET 19
REMOVE ASPHALT AND PROVIDE TEMPORARY PAVEMENT PATCH, TYP. LEAVE PATCH FINISHED GRADE 1.5" BELOW ORIGINAL GRADE, FLUSH WITH MILLED AREAS.
MH-13
42" RCP
TIE EX 30" RCP TO PROPOSED JB
REMOVE AND REPLACE CONCRETE DRIVEWAYS, TYP.
MH-26
RIM: 178.89
INV IN: 174.33
(INV IN. ASSUMED, CONTRACTOR TO FIELD VERIFY)
INV OUT: 173.89
DI-14
12'x4' RCBC
CROSSING 2
EX FIBER OPTIC TO BE RELOCATED CLEAR OF PROPOSED STORM PIPE BY OTHERS
18" RCP
CB-24
CB-06
MH-05
12'x4' RCBC
12'x4' RCBC
TIE PR 18" RCP INTO PROPOSED RCBC
FAYPWC 20' SANITARY SEWER UTILITY EASEMENT DB 12132 PG 404
DI-04
12'x4' RCBC
CB-03
EX FIBER OPTIC TO BE RELOCATED CLEAR OF PROPOSED STORM PIPE BY OTHERS
12'x4' RCBC
12'x4' RCBC
18" RCP
REPLACE MODULAR BLOCK WALL
CB-17
CB-15
TIE EX 24" RCP PIPES TO PROPOSED JB
30" RCP
30" RCP
24" RCP
9 LF of 24" RCP
CROSSING 4
SWANN STREET
50' PUBLIC R/W
SWANN STREET
50' PUBLIC R/W
SWANN STREET
50' PUBLIC R/W
MH-18
CB-29
MH-27
TIE EX 24" RCP TO PROPOSED JB
18" RCP
CB-28
TIE EX 15" RCP INTO PR MANHOLE
MH-29
CROSSING 1
CB-02
EW-01
WEISKOPF COURT
50' PUBLIC R/W
REMOVE EX CONFLICT BOX
42" RCP
42" RCP
DI-20
DI-19
EX FIBER OPTIC TO BE LOWERED CLEAR OF PROPOSED STORM PIPE BY OTHERS
36" RCP
30" VERTICAL CURB, TYP. SEE COF DETAIL SD-1.
CB-21
CONTRACTOR USE OF RESIDENTIAL DRIVEWAY PROHIBITED EXCEPT FOR TEMPORARY PASSENGER VEHICLE USE WITH OWNER APPROVAL
EW-07
JASON DRIVE
50' PUBLIC R/W
TRYON DRIVE
50' PUBLIC R/W
DAISY LANE
50' PUBLIC R/W
DAISY LANE
50' PUBLIC R/W
NEW WATERLINE, TYP. SEE UTILITY PLAN AND PROFILE SHEETS
1.5" MILL AND OVERLAY WITH S9.5B
TEMPORARILY RELOCATE 14' X 38' MOBILE SHED DURING CONSTRUCTION
1.5" MILL AND OVERLAY WITH S9.5B

1 N/F WALTER J. PIKUL DB 9190, PG 534 PB 55, PG 81
2 N/F WILLIAM E. LEWIS, SR. & WIFE, MILDRED J. LEWIS DB 3163, PG 312 PB 55, PG 81
3 N/F WAYNE HAYWOOD JORDAN, JR. & WIFE, CHERI ANNE JORDAN DB 4531, PG 104 PB 55, PG 81
4 N/F MARY JOSEPH GAMBLE DB 6339, PG 891 PB 55, PG 81
5 N/F JONATHAN R. HARRISON DB 11454, PG 605 PB 55, PG 81
6 N/F JAMES E. WALKER & WIFE, ANGELA L. WALKER TRACT 1 OF DB 6863, PG 285 PB 55, PG 81
7 N/F CURTIS WOOD DB 11156, PG 165 PB 55, PG 81
8 N/F CURTIS WOOD DB 11156, PG 165 PB 55, PG 81
9 N/F CLAUDE A CAMPBELL & WIFE, JOANNE N. CAMPBELL DB 5505, PG 585 PB 55, PG 81
10 N/F JOHNNY RAY VAUGHN JR. DB 9262, PG 212 PB 55, PG 81
11 N/F DWIGHT D. NIXON & WIFE, JAMESETTA NIXON DB 3898, PG 636 PB 55, PG 81
12 N/F CLAUDE A. CAMPBELL & WIFE, JOANNE N. CAMPBELL DB 5505, PG 585 PB 55, PG 81
13 N/F CLAUDE A. CAMPBELL & WIFE JOANNE N. CAMPBELL DB 5432, PG 252 PB 55, PG 81
14 N/F MURDOCK BOWMAN DB 11119, PG 563 PB 55, PG 81
15 N/F ALEXIS O. MORALES MORALES & WIFE, ROCIO MORALES MATAMOROS DB 10086, PG 827 PB 55, PG 81
16 N/F THE CITY OF FAYETTEVILLE DB 10193, PG 350 PB 55, PG 81
N/F W. G. PLEASANT & WIFE, FLORA W. PLEASANT DB 2335, PG 143
68 N/F RICHARD D. FOSTER & WIFE, WANDA H. FOSTER DB 4717, PG 700 PB 35, PG 23
69 N/F JESSICA ANN PUCKETT DB 10908, PG 368 PB 35, PG 23
70 N/F MARC LUIS CACERES DB 10812, PG 812 PB 35, PG 23
71 N/F ALEX ELLIS & WIFE, ANNA RODRIGUEZ DB 10868, PG 608 PB 35, PG 23
72 N/F ROBBIE E. PATTERSON & WIFE, LOUISE A. PATTERSON DB 10095, PG 84 PB 35, PG 23
73 N/F RICHARD W. TILLMAN & WIFE, MAUREEN S. TILLMAN DB 3388, PG 371 PB 35, PG 23
74 N/F WILLIE SMITH, JR. & WIFE, BRENDA RAINEY SMITH DB 4163, PG 71
77 N/F IVAN WILLIAMS & WIFE, SHARON WILLIAMS DB 5400, PG 387 PB 35, PG 23
78 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2764, PG 2 PB 35, PG 23
79 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2672, PG 632 PB 35, PG 23
80 N/F WILLIAM T. HATLEY & WIFE, RUTH C. HATLEY DB 2764, PG 2 PB 35, PG 23
81 N/F JAMES P. JACKSON & WIFE, BARBARA U. JACKSON DB 2254, PG 567 PB 35, PG 23 APPROX STRUCTURE LOCATION BASED ON AERIAL PHOTOGRAPHY
82 N/F TONY C. BILLINGSLEA DB 10719, PG 894 PB 35, PG 23
83 N/F BRENT LAMAR MCDONALD & WIFE, CYNTHIA MCDONALD DB 2783, PG 658 PB 35, PG 23
91 N/F HALEY BENNETT, ALFRED BENNETT & WIFE, PATRICIA BENNETT DB 10835, PG 16 PB 37, PG 30
92 N/F LUCILE G. BLACK DB 3589, PG 866 PB 37, PG 30
93 N/F ROBERT C. FARR & WIFE, ELLEN D. FARR DB 4184, PG 675 PB 37, PG 30
99 N/F JAMES S. BRYANT OR RFTTY S. BRYANT
29 N/F PHILIP INMAN & WIFE, MELISSA INMAN DB 3335, PG 426 PB 37, PG 30
111 N/F LANDON LEVI HOOK & WIFE, KAILI S. HOOK DB 10775, PG 781 PB 37, PG 30
112 N/F JAMES W. JOHNSON DB 9408, PG 439 PB 37, PG 30
113 N/F UNIQUA CHARTALE BOSTICK DB 11318, PG 764 PB 37, PG 30
114 N/F MICHAEL G. LUCK & WIFE, CONNIE W. LUCK DB 5178, PG 458 PB 37, PG 30
115 N/F GEORGE FREITAS & WIFE, ANN MARIE FREITAS DB 11347, PG 91 PB 41, PG 45
116 N/F MATTHEW STOKES & WIFE, VICKIE STOKES DB 10026, PG 354 PB 41, PG 45
117 N/F NE MICHELLE AYALA TORRES DB 10827, PG 276 PB 41, PG 45
118 N/F SHIHLUNG HUANG & WIFE, CHIU JUNG CHANG DB 6916, PG 314 PB 41, PG 45
122 N/F RAAED AL HADDAD & SPOUSE, DOHA H. AL HADDAD DB 10445, PG 319 PB 41, PG 45
123 N/F SFR3-020 LLC DB 11215, PG 284 PB 41, PG 45
124 N/F MICHAEL C. BOOSE DB 4261, PG 560 PB 41, PG 45

NORTH
40 0 40 80
1 INCH = 40 FT

IMPROVEMENTS PLAN
SHEET NUMBER 8 of 45
PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

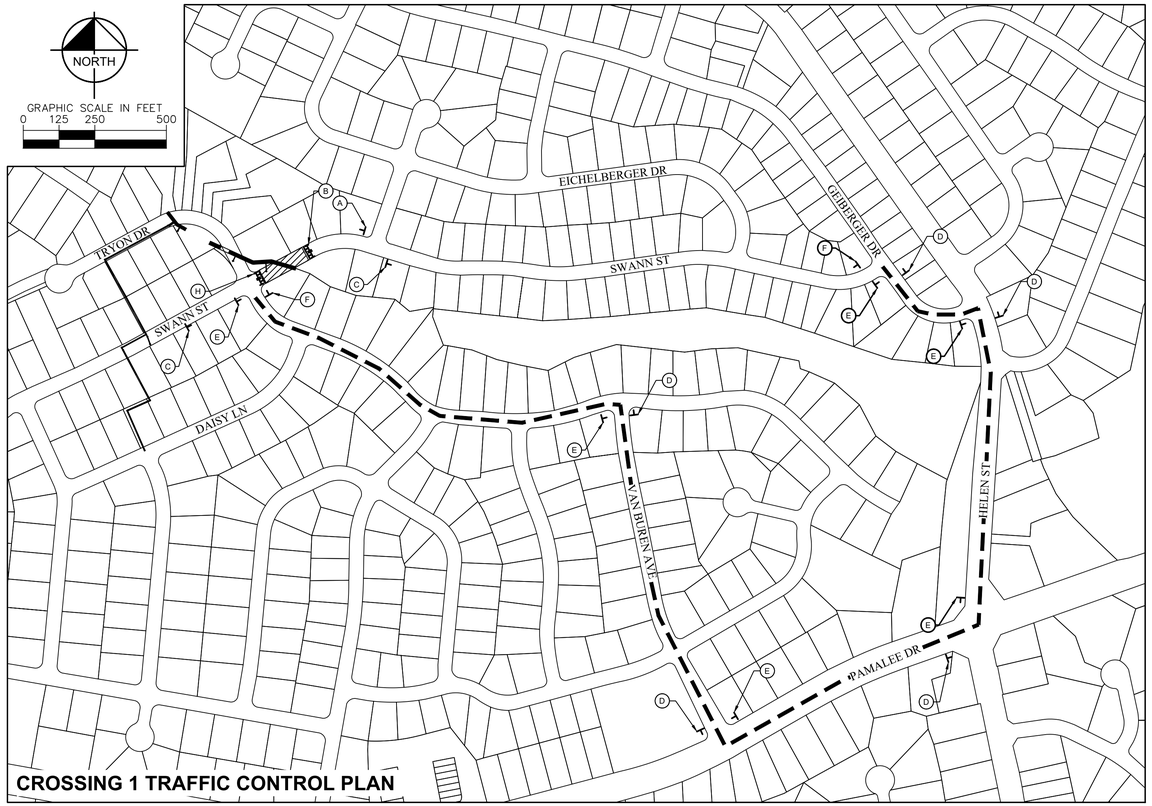
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN
11/24/25

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

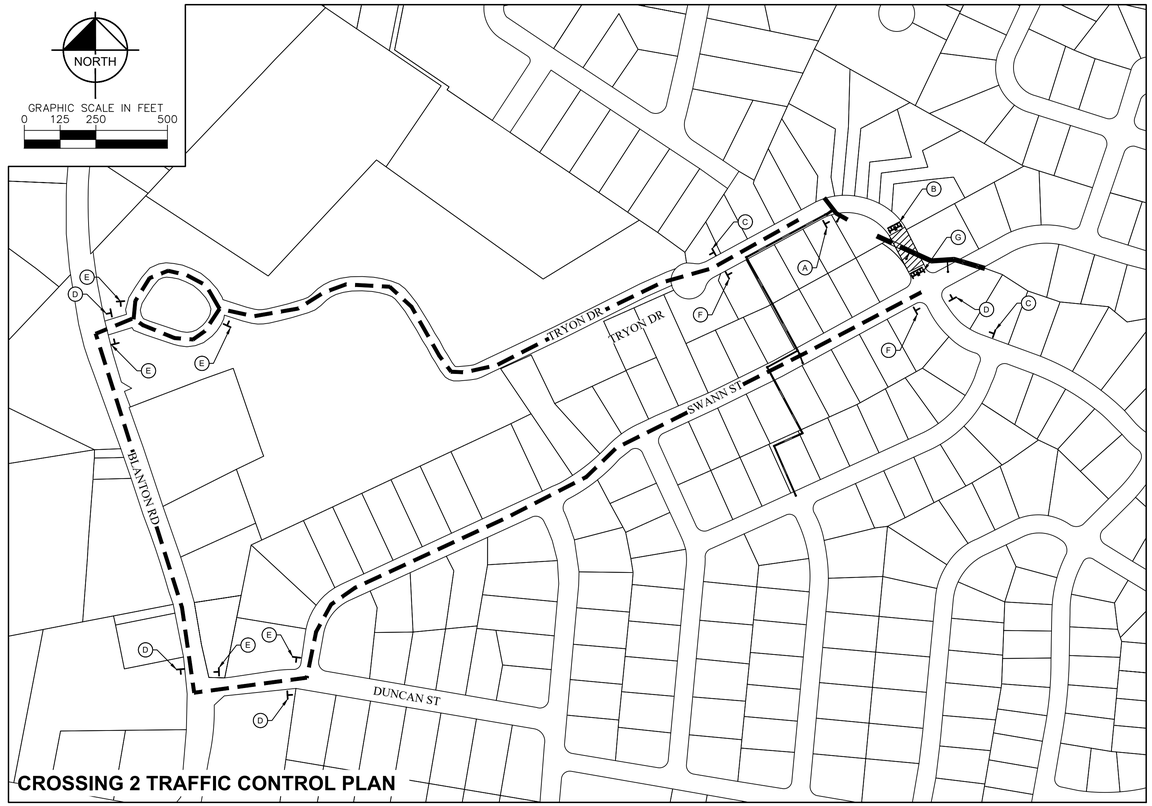
ISSUED FOR CONSTRUCTION

PROJECT DRAINAGE IMPROVEMENTS
TRYON DRIVE
NAME :
DATE : NOV 2025
DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :

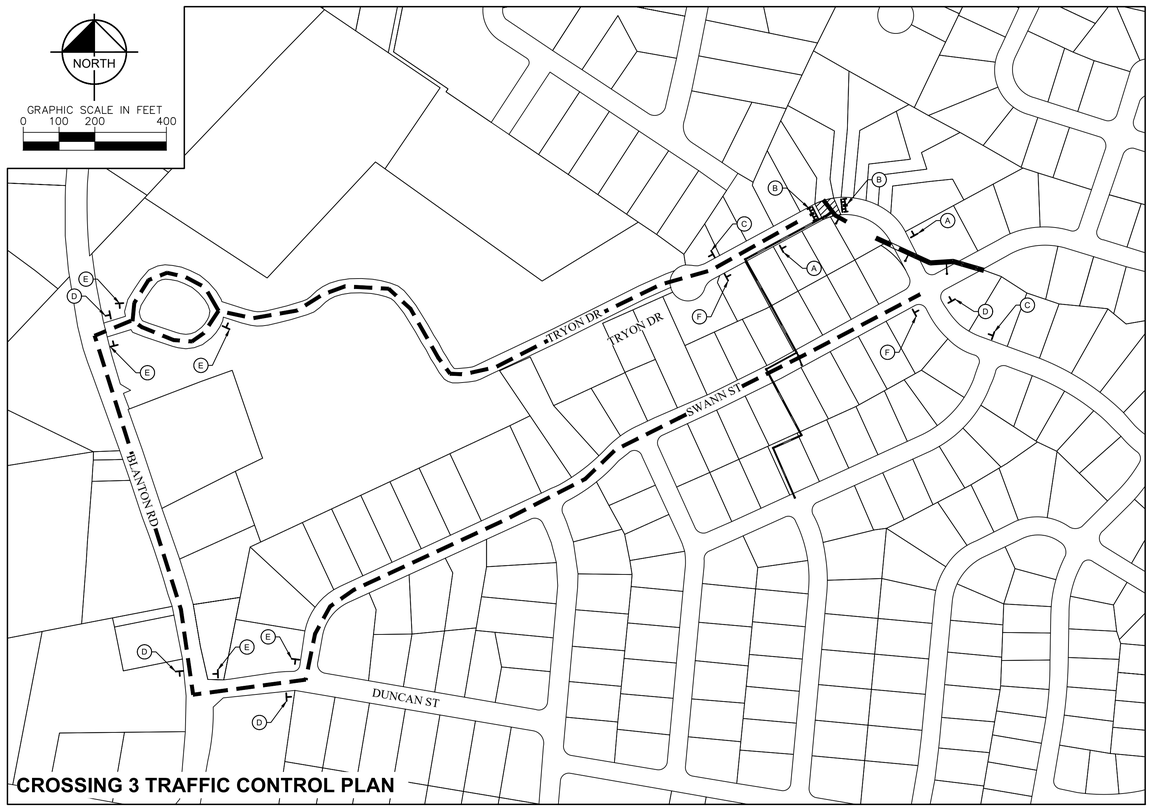
PROJECT NO. KH 011017025
SUB-LEDGER NO.



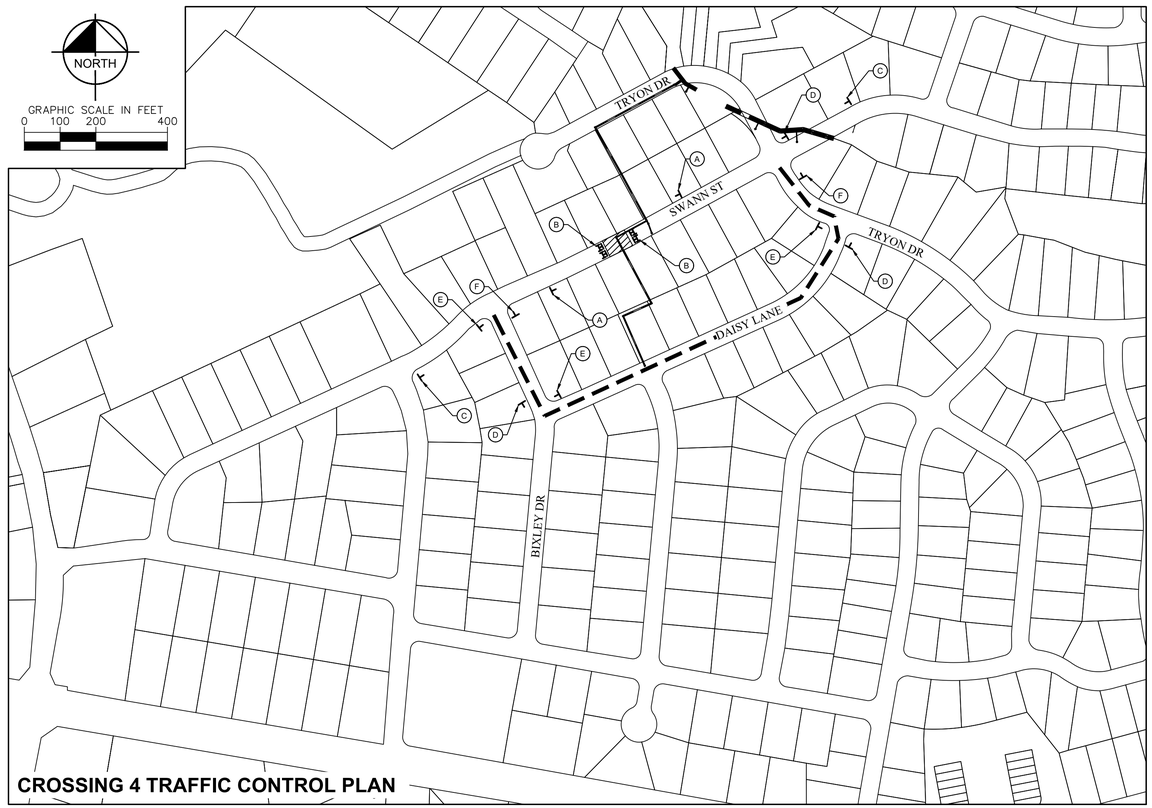
CROSSING 1 TRAFFIC CONTROL PLAN



CROSSING 2 TRAFFIC CONTROL PLAN



CROSSING 3 TRAFFIC CONTROL PLAN



CROSSING 4 TRAFFIC CONTROL PLAN

TRAFFIC CONTROL PLAN

SHEET NUMBER 9 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/24/25

REVISIONS

REV. #	DESCRIPTION	REV.BY	DATE
1	BID SET		NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

A

W20-3

B

R11-2

TYPE III BARRICADE

C

W20-2

D

M4-9L

E

M4-9R

F

M4-8A

G

R11-2, M4-9L

TYPE III BARRICADE

H

R11-2, M4-9R

TYPE III BARRICADE

TRAFFIC CONTROL PLAN

SHEET NUMBER 10 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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PUBLIC SERVICES
ENGINEERING DIVISION
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433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN
Travis Crissman 11/24/25

REVISIONS:

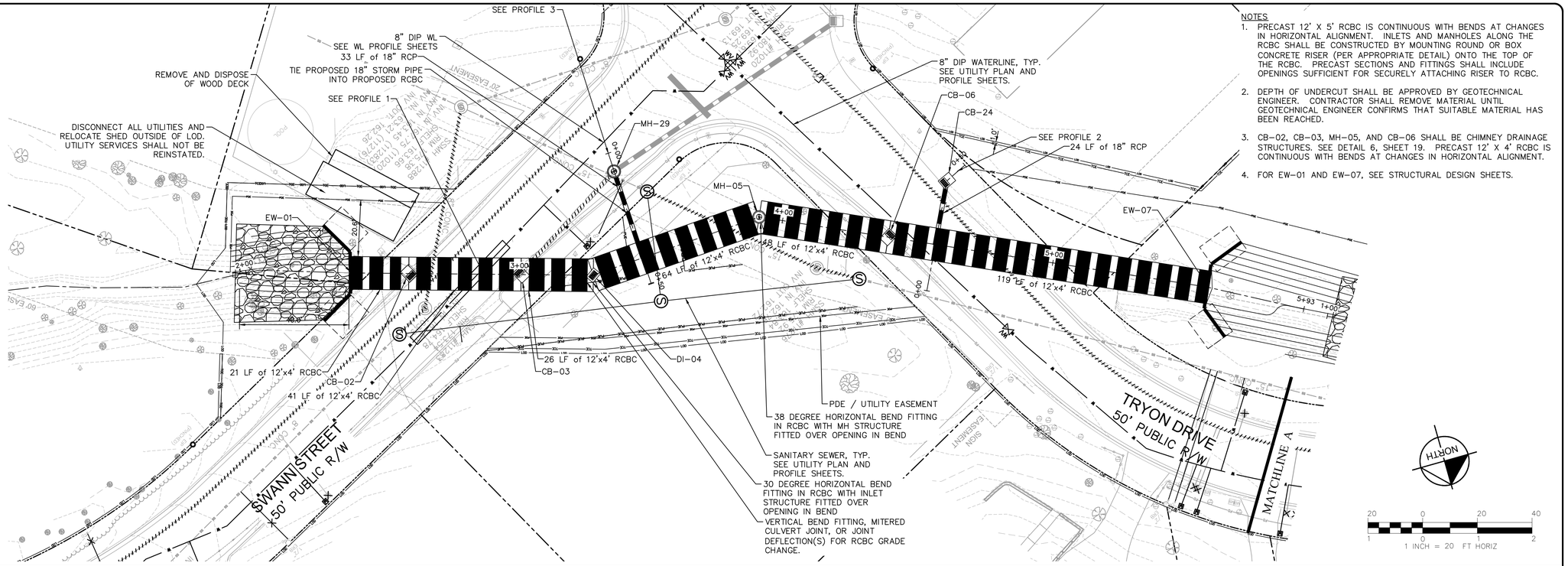
REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : G. SETZ
APPROVED : T. CRISSMAN
SCALE :

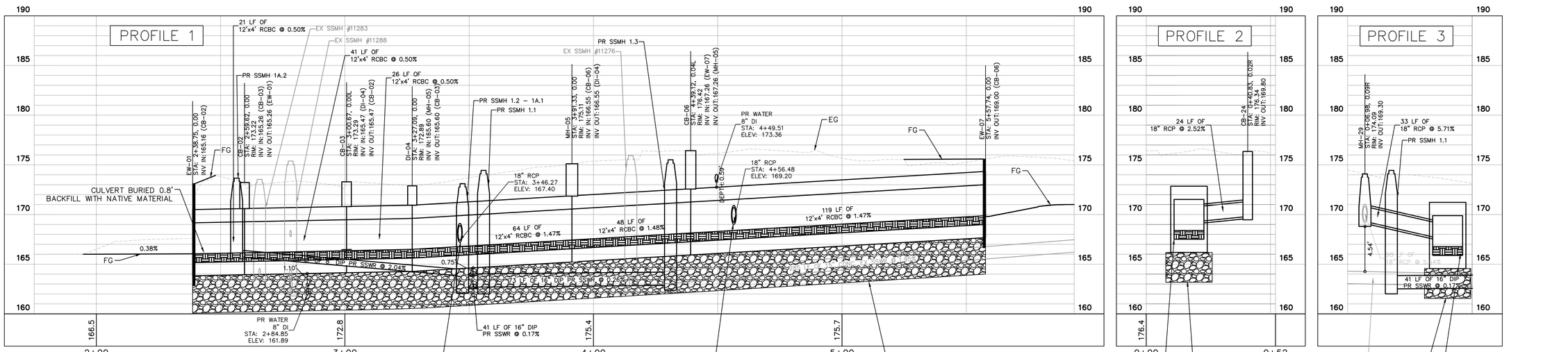
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.



NOTES

1. PRECAST 12' X 5' RCBC IS CONTINUOUS WITH BENDS AT CHANGES IN HORIZONTAL ALIGNMENT. INLETS AND MANHOLES ALONG THE RCBC SHALL BE CONSTRUCTED BY MOUNTING ROUND OR BOX CONCRETE RISER (PER APPROPRIATE DETAIL) ONTO THE TOP OF THE RCBC. PRECAST SECTIONS AND FITTINGS SHALL INCLUDE OPENINGS SUFFICIENT FOR SECURELY ATTACHING RISER TO RCBC.
2. DEPTH OF UNDERCUT SHALL BE APPROVED BY GEOTECHNICAL ENGINEER. CONTRACTOR SHALL REMOVE MATERIAL UNTIL GEOTECHNICAL ENGINEER CONFIRMS THAT SUITABLE MATERIAL HAS BEEN REACHED.
3. CB-02, CB-03, MH-05, AND CB-06 SHALL BE CHIMNEY DRAINAGE STRUCTURES. SEE DETAIL 6, SHEET 19. PRECAST 12' X 4' RCBC IS CONTINUOUS WITH BENDS AT CHANGES IN HORIZONTAL ALIGNMENT.
4. FOR EW-01 AND EW-07, SEE STRUCTURAL DESIGN SHEETS.



STORM PLAN PROFILE (1)

SHEET NUMBER 11 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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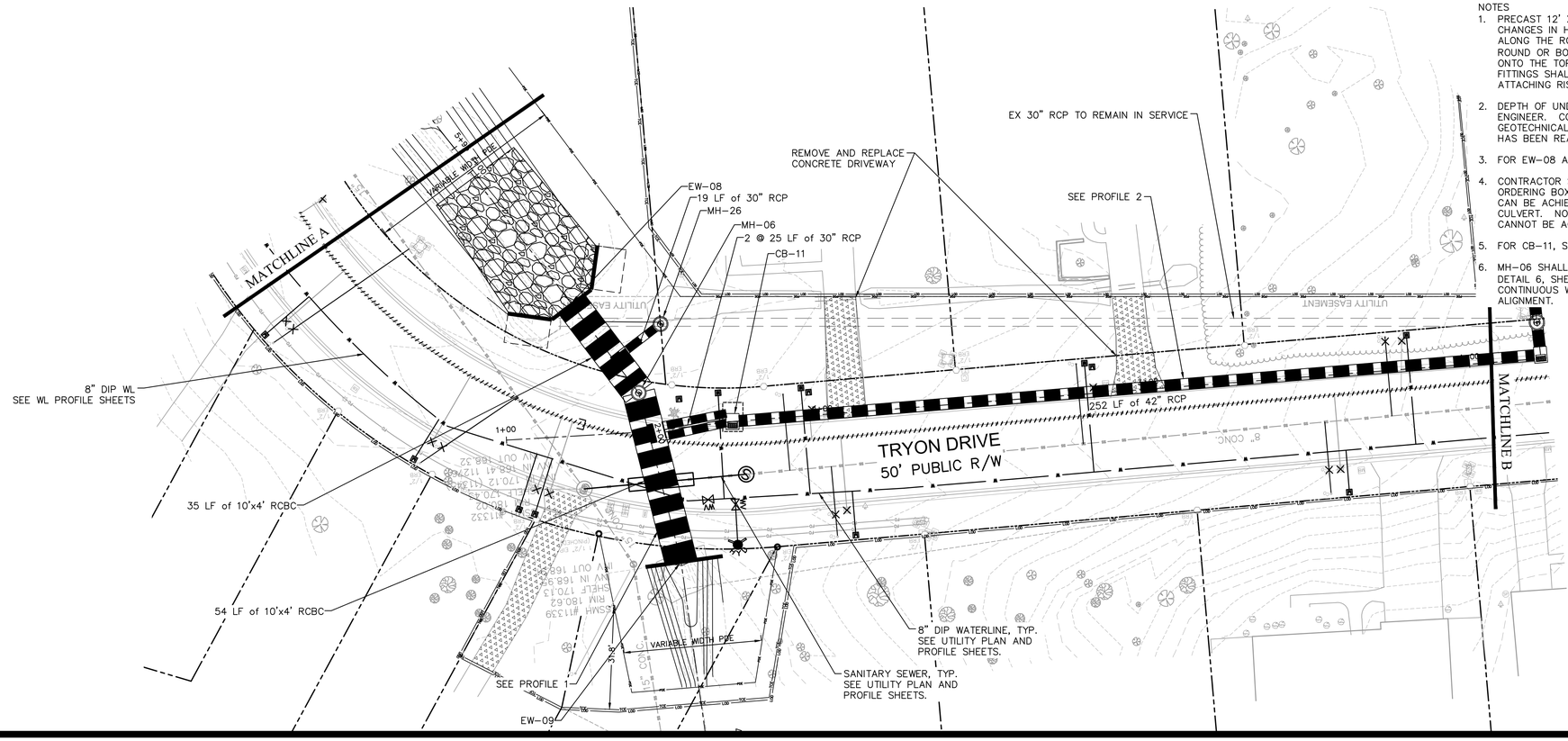
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN
SEAL 11/24/25

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025
DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :

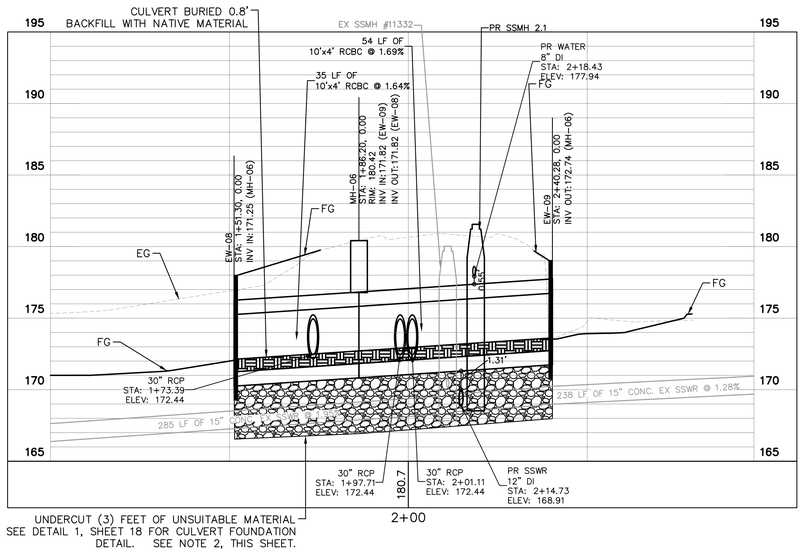
PROJECT NO. KH 011017025
SUB-LEDGER NO.



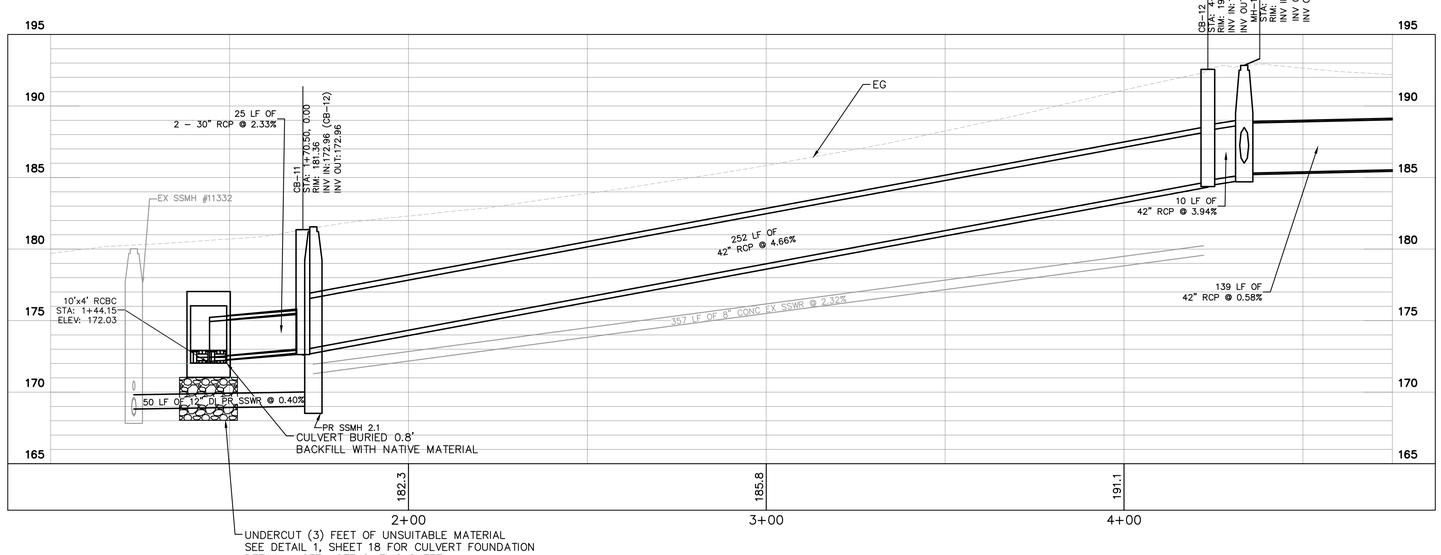
NOTES

1. PRECAST 12' X 5' RCBC IS CONTINUOUS WITH BENDS AT CHANGES IN HORIZONTAL ALIGNMENT. INLETS AND MANHOLES ALONG THE RCBC SHALL BE CONSTRUCTED BY MOUNTING ROUND OR BOX CONCRETE RISER (PER APPROPRIATE DETAIL) ONTO THE TOP OF THE RCBC. PRECAST SECTIONS AND FITTINGS SHALL INCLUDE OPENINGS SUFFICIENT FOR SECURELY ATTACHING RISER TO RCBC.
2. DEPTH OF UNDERCUT SHALL BE APPROVED BY GEOTECHNICAL ENGINEER. CONTRACTOR SHALL REMOVE MATERIAL UNTIL GEOTECHNICAL ENGINEER CONFIRMS THAT SUITABLE MATERIAL HAS BEEN REACHED.
3. FOR EW-08 AND EW-09, SEE STRUCTURAL DESIGN SHEETS.
4. CONTRACTOR SHALL CHECK INVERT OF MH-26 PRIOR TO ORDERING BOX CULVERT TO ENSURE THAT POSITIVE SLOPE CAN BE ACHIEVED FROM MH-26 TO THE PROPOSED BOX CULVERT. NOTIFY ENGINEER IMMEDIATELY IF POSITIVE SLOPE CANNOT BE ACHIEVED.
5. FOR CB-11, SEE STRUCTURAL DESIGN SHEETS.
6. MH-06 SHALL BE CHIMNEY DRAINAGE STRUCTURE. SEE DETAIL 6, SHEET 19. PRECAST 10' X 4' RCBC IS CONTINUOUS WITH BENDS AT CHANGES IN HORIZONTAL ALIGNMENT.

PROFILE 1



PROFILE 2



20 0 20 40
1 0 1 2
1 INCH = 20 FT HORIZ
1 INCH = 5 FT VERT

STORM PLAN PROFILE (2)

SHEET NUMBER 12 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/24/25

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025
DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :

PROJECT NO. KH 011017025
SUB-LEDGER NO.

PROFILE 1

PROFILE 2

20 0 20 40
1 0 1 2
1 INCH = 20 FT HORIZ
1 INCH = 5 FT VERT

STORM PLAN PROFILE (3)

PLAN TYPE:

SHEET NUMBER 13 of 45

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/24/25

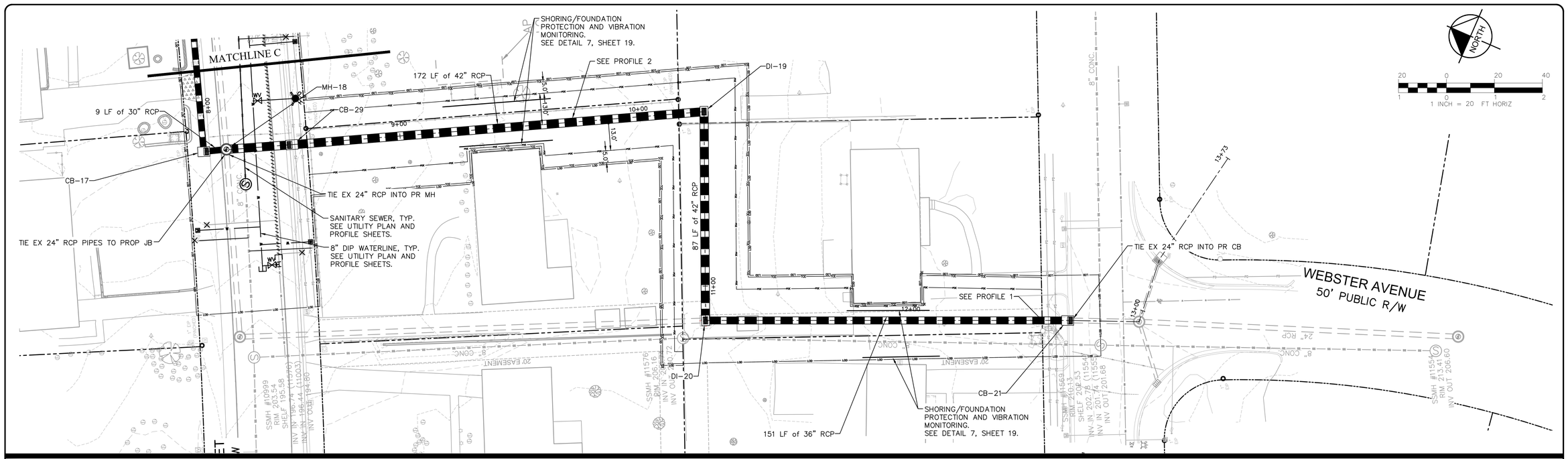
REVISIONS

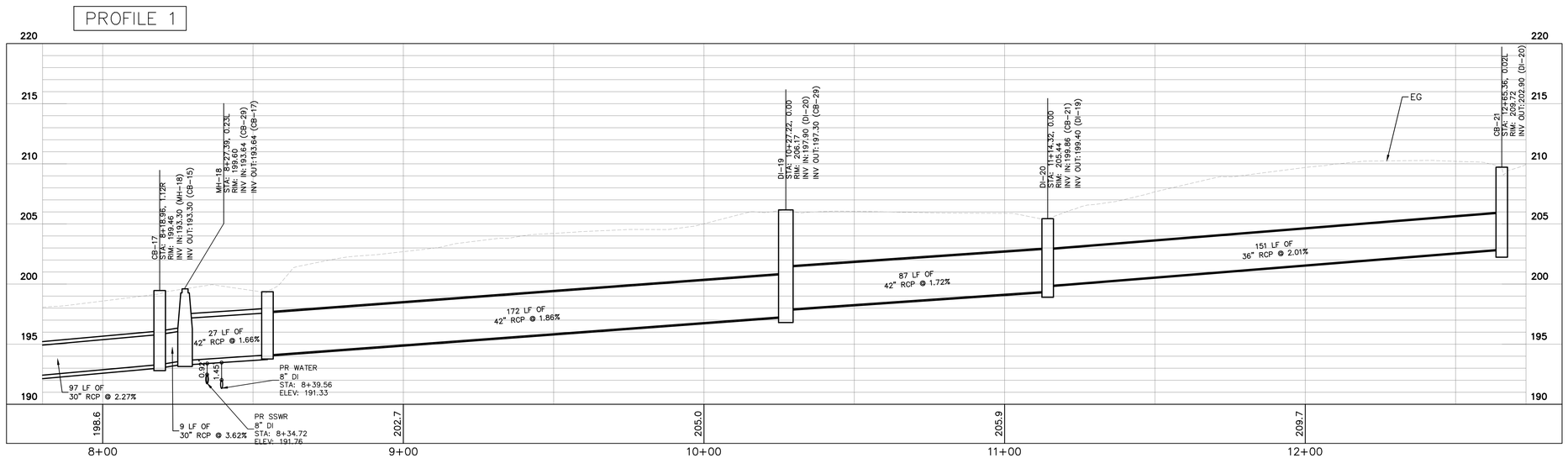
REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

PROJECT: TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025
DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :

PROJECT NO. KH 011017025
SUB-LEDGER NO.





STORM PLAN PROFILE (4)

SHEET NUMBER 14 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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PUBLIC SERVICES

ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/14/25

REV. #	REVISIONS: DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

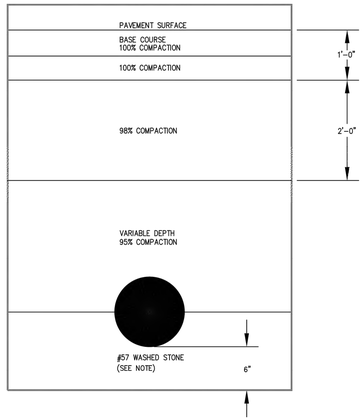
ISSUED FOR CONSTRUCTION

PROJECT: TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :

PROJECT NO. KH 011017025

SUB-LEDGER NO.



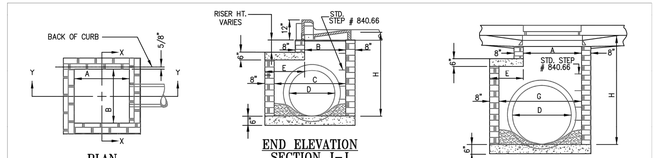
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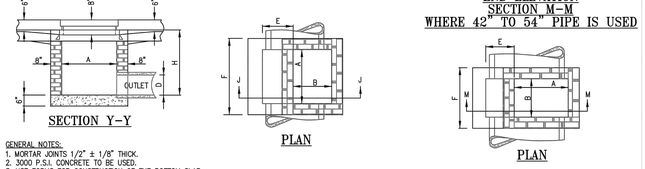
1. STONE BEDDING FOR PIPE IS REQUIRED UNLESS OTHERWISE APPROVED BY CITY ENGINEER OR THEIR DESIGNEE.

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TYPICAL STORM DRAIN COMPACTION

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-1





GENERAL NOTES:
1. MORTAR JOINTS 1/2" ± 1/8" THICK.
2. 3000 P.S.I. CONCRETE TO BE USED.
3. USE FORMS FOR CONSTRUCTION OF THE BOTTOM SLAB.
4. DEDUCT FOR PIPE(S) TOTAL CU. YDS. OF BRICK MASONRY.
5. USE #4 BAR DOWELS AT 12" CENTERS FOR ALL PIPE SIZES.
6. ALL CATCH BASINS OVER 3'-6" IN DEPTH SHALL BE PROVIDED WITH STEPS 12" ON CENTERS.
7. USE TYPE "S", "T", & "G" GRATE UNLESS OTHERWISE INDICATED.
8. JUMBO BRICK WILL BE PERMITTED. CONCRETE BRICK OR 4" SOLID CONCRETE BLOCKS MAY BE USED IN LIEU OF CLAY BRICKS.
9. FOR 8'-0" IN HEIGHT OR LESS USE 8" WALL. OVER 8'-0" IN HEIGHT USE 12" WALL TO 6'-0" FROM TOP OF WALL, 8" WALL FOR THE UPPER 6'-0".
10. INVERTS SHALL BE SHAPED TO FORM A SMOOTH, REGULAR SURFACE, SLOPED TO PREVENT SEDIMENTATION.
11. FOR VARIABLE DIMENSIONS, SEE STANDARD DETAIL DR-3.1.
12. CONSTRUCT WITH PIPE CROWNS MATCHING.
13. CHAMFER ALL EXPOSED CORNERS 1".

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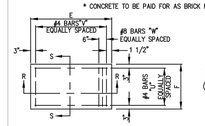
STANDARD BRICK CATCH BASIN
(15" THRU 54" PIPE)
ADOPTED FROM NCDOT STANDARD NO. 840.01
PAGE 1 OF 2

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-3

DIMENSIONS AND QUANTITIES FOR BRICK CATCH BASIN
(LOCATION OF SOME VARIABLES SHOWN IN STANDARD DETAIL SD-3)

DIMENSIONS OF BOX AND PIPE						COVER DIMENSION	REINFORCING BARS-U		BARS-V		BARS-W		TOTAL	* CUBIC YARDS OF CONCRETE IN BOX		BRICK MASON	DEDUCTIONS FOR ONE PIPE	
PIPE	SPAN	WIDTH	LENGTH	SPAN	HEIGHT		NO	LENGTH	NO	LENGTH	NO	LENGTH	LBS.	TOP SLAB	FLOOR	TOTAL IN WALLS	ONE PIPE C.M.	R.C.
D	A	B	C	G	H	F										BRICK MORT.	TOTAL BRICK & CONCRETE	
15"	3'-0"	2'-2"	–	–	3'-5"	–	–	–	–	–	–	–	–	–	0.281	0.281	0.963	1.244	0.0308	0.047
18"	3'-0"	2'-2"	–	–	3'-5"	–	–	–	–	–	–	–	–	–	0.281	0.281	1.043	1.324	0.0442	0.065
24"	3'-0"	2'-2"	–	–	3'-5"	–	–	–	–	–	–	–	–	–	0.281	0.281	1.204	1.485	0.0764	0.121
30"	3'-0"	2'-2"	3'-4"	–	4'-5"	1'-0"	4	4'-4"	4	1'-6"	3	4'-1"	3	4'-1"	45	0.147	0.374	0.521	1.606	2.217	0.1224	0.184
36"	3'-0"	2'-2"	3'-10"	–	4'-5"	1'-0"	4	4'-4"	4	2'-0"	4	4'-1"	3	4'-1"	49	0.187	0.415	0.602	1.914	2.516	0.1760	0.261
42"	3'-0"	2'-2"	–	4'-5"	5'-1"	1'-0"	4	4'-4"	4	1'-6"	3	5'-1"	3	5'-1"	38	0.135	0.373	0.508	2.152	2.660	0.2400	0.371
48"	3'-0"	2'-2"	–	5'-0"	5'-7"	1'-0"	4	5'-0"	4	2'-0"	4	5'-1"	3	5'-1"	43	0.123	0.403	0.583	2.415	2.998	0.3133	0.477
54"	3'-0"	2'-2"	–	5'-7"	6'-1"	2'-1"	5	5'-6"	5	2'-0"	4	5'-7"	3	5'-7"	47	0.211	0.448	0.659	2.868	3.485	0.3958	0.595

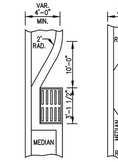
* CONCRETE TO BE PAID FOR AS BRICK MASONRY

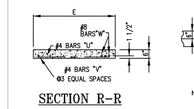


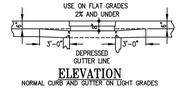


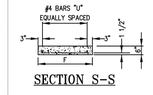
NOTE:
SEE GENERAL NOTES ON STANDARD DETAIL SD-3

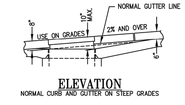












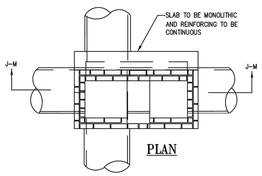
CATCH BASIN INSTALLATION
IN MEDIAN WHERE
8"X6" CURB IS USED
(NOT TO BE USED ON FEDERAL-AID PROJECT)

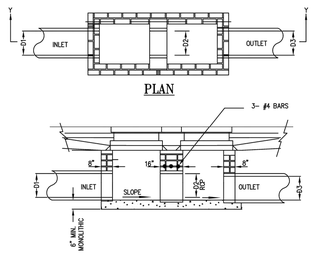
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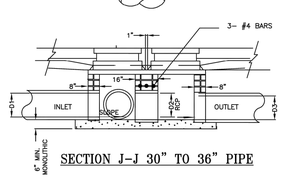
STANDARD BRICK CATCH BASIN
(15" THRU 54" PIPE)
ADOPTED FROM NCDOT STANDARD NO. 840.01
PAGE 2 OF 2

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-3.1

GENERAL NOTES:
1. INSTALLATION REQUIRES A MINIMUM OF ONE 4'-0" LONG SECTION OF REINFORCED CONCRETE PIPE BETWEEN CATCH BASINS.
2. SEE NCDOT STANDARD 840.01 FOR DETAILS BASED ON PIPE SIZE PER CROSS SECTION.
3. CONSTRUCT TWO SINGLE BASINS PER NCDOT STANDARD WITH DOUBLE INTERIOR WALL.
4. ALL CONCRETE TO BE 3000 P.S.I. COMPRESSIVE STRENGTH.
5. BASE SLAB SHALL BE MONOLITHIC.
6. SEE CITY OF FAYETTEVILLE STANDARDS SD-4 AND SD-5 FOR PLACEMENT OF CATCH BASIN.
7. PIPE SECTION D2 CONNECTING CATCH BASINS SHALL HAVE A MINIMUM DIAMETER SAME AS OF OUTLET PIPE D3.
8. ALL REINFORCING STEEL SHOWN ON NCDOT STANDARDS IS TO BE PROVIDED AS CONTINUOUS MEMBERS. (NO LAPS, USED AS A SINGLE CONTINUOUS BAR IN THE SLAB)



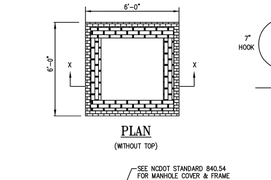


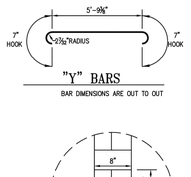


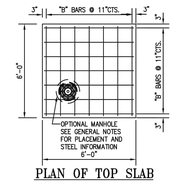
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433 HAY ST. 28301
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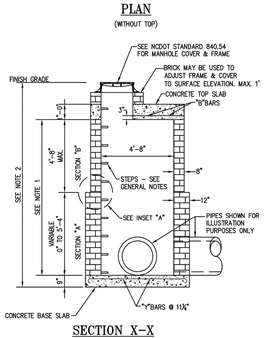
TYPICAL BRICK DOUBLE CATCH BASIN 15" THRU 36" PIPE

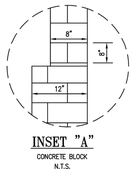
Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-4

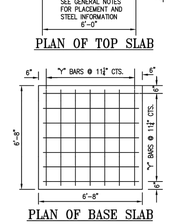












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STANDARD TRAFFIC BEARING
JUNCTION BOX - 42" AND UNDER PIPES
NCDOT STANDARD # 840.34
SHEET 1 OF 2

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-6

GENERAL NOTES:

STANDARD OR JUMBO BRICK SHALL BE USED FOR WALL CONSTRUCTION. SOLID CONCRETE BRICK OR BLOCK ARE OPTIONAL WALL CONSTRUCTION MATERIAL.

PRECAST UNITS MADE OF CLASS "AA" CONCRETE MAY BE USED IN LIEU OF BRICK MASONRY CONSTRUCTION. DESIGN OF PRECAST UNITS SHALL BE SUBMITTED FOR APPROVAL PRIOR TO CONSTRUCTION.

ALL ADJUSTMENTS TO WALLS, SLABS OR REINFORCING MATERIAL SHALL BE INCLUDED IN THE UNIT PRICE BID FOR EACH UNIT.

OPTIONAL MANHOLE SHALL BE INSTALLED IN POSITION AS DIRECTED BY THE ENGINEER. ALL REBAR CROSSING THIS OPENING SHALL BE CUT OR BENT TO ALLOW 2" MINIMUM CONCRETE COVERAGE. THE OPENING SHALL BE ENCLOSED WITH 8 "A" BARS TIED TO THE REBAR MAT AND SET SO A MINIMUM OF A 3" CONCRETE COVERAGE IS OBTAINED. REFERENCE NCDOT STD. NO. 840.54 FOR ALL MANHOLE INFORMATION.

JUNCTION BOXES OVER 3'-6" IN DEPTH WITH MANHOLES SHALL REQUIRE STEPS TO BE PLACED ON 12" - 16" CENTERS. REFERENCE NCDOT STD. NO. 840.66.

DOWEL "C" BARS SHALL BE SPACED AT A MINIMUM OF 12" CENTERS.

MAXIMUM DEPTH OF THIS UNIT AS SHOWN IS 12'.

BILL OF MATERIALS

BAR	QTY.	SIZE	LENGTH	WEIGHT
A	8	#5	1'-2"	5.7
B	14	#5	5'-6"	80.3
C	28	#4	1'-6"	28.1
Y	14	#5	6'-11 3/8"	101.5
STEEL TOTAL WEIGHT				217.6
CU. YDS. CLASS "AA" CONC.				2.6
CU. YDS. BRICK/FT. HT. (8")				0.53
CU. YDS. BRICK/FT. HT. (12")				0.84

NOTE 1: SECTION "B" OF THE PROPOSED WALL SHALL BE 8" THICK. SECTION "A" SHALL BE 12" THICK.

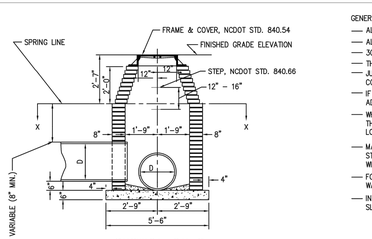
NOTE 2: IF PROPOSED STRUCTURE EXCEEDS 12'-0" VERTICAL HEIGHT A DESIGN WILL BE REQUIRED FOR APPROVAL.

NOTE 3: ALL REINFORCING STEEL SHALL BE SINGLE MAT; EXCEPT DOUBLE MAT STEEL MAY BE USED IN LIEU OF HOOK BARS IN BASE SLAB.

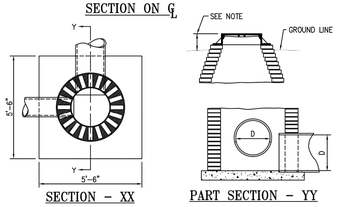
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ENGINEERING DIVISION
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STANDARD TRAFFIC BEARING
JUNCTION BOX - 42" AND UNDER PIPES
NCDOT STANDARD # 840.34
SHEET 2 OF 2

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-6.1



GENERAL NOTES:
- ALL MORTAR JOINTS ARE TO BE 1/2" ± 1/8".
- ALL EXPOSED JOINTS WILL BE CONCAVE TOOLED.
- 3000 PSI CONCRETE TO BE USED.
- THE POURING OF FLOOR SLAB TO BE ACCOMPLISHED BY FORMING.
- JUMBO BRICK WILL BE PERMITTED. CONCRETE BRICK OR 4" SOLID CONCRETE BLOCKS MAY BE USED IN LIEU OF CLAY BRICK.
- IF REINFORCED CONCRETE PIPE IS SET IN BASE SLAB OF BOX, ADD TO BASE AS SHOWN ON STANDARD DR-9.
- WHERE THE MANHOLE IS EXPOSED TO ROAD TRAFFIC, THE TOP OF THE MANHOLE IS TO BE FLUSH WITH THE GROUND. AT OTHER LOCATIONS, IT SHOULD BE A MINIMUM OF 9" ABOVE THE GROUND.
- MANHOLES OVER 3'-6" IN DEPTH SHALL BE PROVIDED WITH STEPS 12" - 16" ON CENTERS. STEPS SHALL BE IN ACCORDANCE WITH NCDOT STD. 840.66.
- FOR 8' HEIGHT OR LESS USE 8" WALL. OVER 8' HEIGHT USE 12" WALL TO 6' FROM TOP OF WALL, 8" WALL FOR REMAINING 6'.
- INVERTS SHALL BE SHAPED TO FORM A SMOOTH, REGULAR SURFACE, SLOPED TO PREVENT SEDIMENTATION.

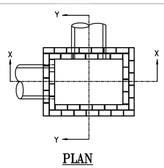


MIN. DIMENSIONS & QUANTITIES FOR MANHOLE					
PIPE DIM	CU. YDS. CONC.	TOTAL BRICK MASONRY CU. YDS.	CU YDS BRICK MASONRY PER FT. HT.	DEDUCTIONS FOR ONE PIPE (CU YDS)	
D	BASE	ABOVE S-L	BELOW S-L	C. M.	R. C.
	0.560	0.530	0.323		
15"				0.031	0.047
18"				0.044	0.065
24"				0.078	0.113
30"				0.122	0.170
36"	0.560	0.530	0.323	0.176	0.238

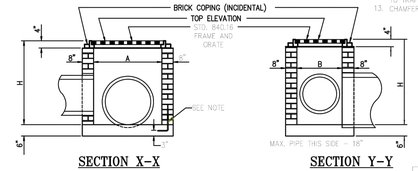
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STANDARD BRICK MANHOLE
12" THRU 36" PIPE
ADOPTED FROM N.C.D.O.T.
STANDARD NO. 840.51

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-7



GENERAL NOTES:
1. MORTAR JOINTS 1/2" +/- 1/8" THICK.
2. USE CLASS "B" CONCRETE THROUGHOUT.
3. USE FORMS FOR CONSTRUCTION OF THE BOTTOM SLAB.
4. USE #4 BAR DOWELS AT 12" CENTERS.
5. DEDUCT FOR PIPE(S) FROM TOTAL CU. YDS. OF BRICK MASONRY.
6. PROVIDE ALL CATCH BASINS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.
7. USE BRICK OR CONCRETE BLOCK WHICH COMPLIES WITH THE REQUIREMENTS OF SECTION 840 OF THE STANDARD SPECIFICATIONS.
8. IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.
9. FOR 8'-0" IN HEIGHT OR LESS, USE 8" WALL. OVER 8'-0" IN HEIGHT, USE 12" WALL TO 6'-0" FROM TOP OF WALL AND 8" WALL FOR THE UPPER 6'-0". QUANTITIES TO BE ADJUSTED ACCORDINGLY.
10. CONSTRUCT WITH PIPE CROWNS MATCHING.
11. SEE NCDOT STANDARD DRAWING 840.25 FOR ATTACHMENT OF FRAMES AND GRATES.
12. DO NOT USE BRICK MASONRY DROP INLET IN LOCATIONS SUBJECT TO TRAFFIC.
13. CHAMFER ALL EXPOSED CORNERS 1".





DIMENSIONS AND QUANTITIES FOR DROP INLET(BASED ON MIN. HEIGHT, H)								
DIMENSIONS OF BOX & PIPE				CUBIC YARDS CONCRETE	CUBIC YARDS BRICK MASONRY		DEDUCTIONS FOR ONE PIPE	
PIPE	SPAN	WIDTH	MIN. HEIGHT	BOTTOM SLAB	WALL PER FOOT HT.	TOTAL BRICK MASONRY FOR MIN. HEIGHT, H	C.S.	R.C.
D	A	B	H					
12"	3'-0"	2'-0"	2'-0"	0.268	0.313	0.522	0.020	0.032
15"	/	/	2'-3"	0.268	0.313	0.600	0.031	0.047
18"	/	/	2'-6"	0.268	0.313	0.678	0.044	0.065
24"	/	/	3'-0"	0.268	0.313	0.835	0.078	0.113
30"	3'-0"	2'-0"	3'-6"	0.268	0.313	0.991	0.122	0.170

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DROP INLET WITH GRATE
12" TO 30" PIPE
NCDOT STANDARD NO. 840.15

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-11

TOP OF MANHOLE

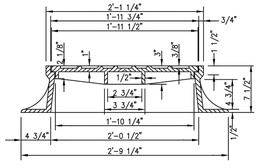




SPECIFICATIONS

1. MANHOLE RING AND COVER TO BE MADE OF GREY CAST IRON CONFORMING TO ASTM SPECIFICATIONS A-48-74, CLASS 30. ALL CASTINGS SHALL CONFORM TO THE SHAPE AND DIMENSIONS SHOWN. THEY SHALL BE CLEAN AND PERFECT WITHOUT BLOW OR SANDHOLES OR DEFECTS OF ANY KIND, TENDING TO IMPAIR THEIR STRENGTH. NO PLUGGING OR STOPPING OF DEFECTIVE HOLES WILL BE PERMITTED.
2. MANHOLE RING AND COVER TO WITHSTAND VEHICULAR TRAFFIC WITHOUT OBJECTIONABLE NOISE.
3. MINIMUM AVERAGE WEIGHT:
   FRAME: 180 LBS
   COVER: 120 LBS

US FOUNDRY 669-KL RING & COVER OR APPROVED EQUAL



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STANDARD MANHOLE RING AND COVER
ADOPTED FROM NCDOT
STANDARD NO. 840.54

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | DR-13

STANDARD DETAILS

SHEET NUMBER 15 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE!
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

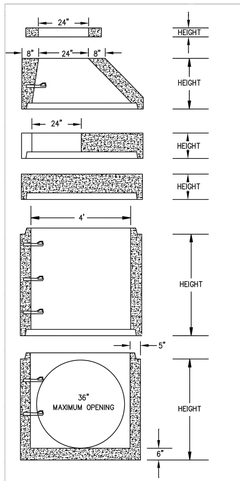
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS C. CRISSMAN 11/24/25

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025
DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :

PROJECT NO. KH 011017025
SUB-LEDGER NO.



FUQUAY VARINA PLANT SPECIFICATIONS:
ASTM C 478 – LATEST
AASHTO M 199 – LATEST
WITH AASHTO M-198B PREFORMED PLASTIC OR ASTM C-443 RUBBER GASKET JOINTS. REINFORCED IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS.

HEIGHT FEET	HEIGHT INCHES	WEIGHT POUNDS
GRADING RING		
.33'	4"	150
.50'	6"	235
ECCENTRIC CONE		
2.00'	24"	1695
3.00'	36"	2550
4.00'	48"	3400
FLAT TOP		
1.00'	12"	1700

SOLID FLAT TOP
CUSTOM VENT OR METER OPENINGS PLACED PER CUSTOMER REQUEST.
FLAT TOPS MEET H-20 LOADING.

1.00'	12"	2000

RISER

1.00'	12"	865
1.33'	16"	1150
2.67'	32"	2310
4.00'	48"	3460
5.33'	64"	4610

REGULAR MONOLITHIC BASE
WITH 6" BASE INCLUDED IN HEIGHT SHOWN.

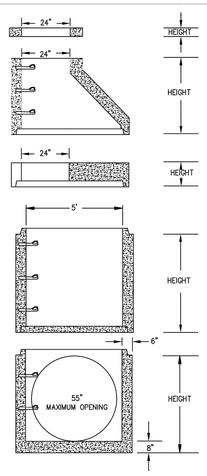
2.67'	32"	3250
4.00'	48"	4400
5.33'	60"	5265

NOTES:
1. PRECAST MANHOLES MAY BE USED WITH PRIOR APPROVAL FROM THE CITY ENGINEER.
2. PRECAST MANHOLES ARE NOT PERMITTED INSIDE RIGHT-OF-WAY OR EASEMENTS.

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4-FOOT DIAMETER PRECAST REINFORCED CONCRETE MANHOLE SECTIONS

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 28 JAN 21 | DR-14



FUQUAY VARINA PLANT SPECIFICATIONS:
ASTM C 478 – LATEST
AASHTO M 199 – LATEST
WITH AASHTO M-198B PREFORMED PLASTIC OR ASTM C-443 RUBBER GASKET JOINTS. REINFORCED IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS.

HEIGHT FEET	HEIGHT INCHES	WEIGHT POUNDS
GRADING RING		
.33'	4"	150
.50'	6"	235
ECCENTRIC CONE		
4.00'	48"	4360
FLAT TOP		
1.00'	12"	2825

RISER

1.00'	12"	1290
1.33'	16"	1716
2.67'	32"	3444
4.00'	48"	5160

REGULAR MONOLITHIC BASE
WITH 8" BASE INCLUDED IN HEIGHT SHOWN.

2.67'	32"	5394
3.00'	36"	5820
3.33'	40"	6245
3.67'	44"	6684
4.00'	48"	7110
4.33'	52"	7535
4.67'	56"	7974
5.00'	60"	8400
5.33'	64"	8825
5.67'	68"	9264
6.00'	72"	9690
6.33'	76"	10115
6.67'	80"	10554

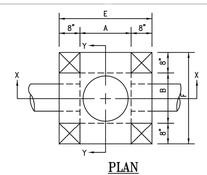
FLAT TOP
FLAT TOPS ARE AVAILABLE IN ECCENTRIC (AS SHOWN) AND CONCENTRIC UNITS.
FLAT TOPS MEET H-20 LOADING.

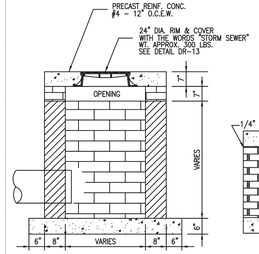
NOTES:
1. PRECAST MANHOLES MAY BE USED WITH PRIOR APPROVAL FROM THE CITY ENGINEER.
2. PRECAST MANHOLES ARE NOT PERMITTED INSIDE RIGHT-OF-WAY OR EASEMENTS.

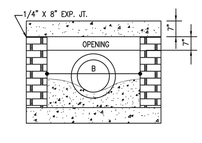
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5-FOOT DIAMETER PRECAST REINFORCED CONCRETE MANHOLE SECTIONS

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 28 JAN 21 | DR-14.1







GENERAL NOTES:
1. CONCRETE BASES TO BE CLASS "A" (3000 P.S.I.) PLACES ON A FIRM FOUNDATION.
2. FORMS ARE TO BE USED FOR THE CONSTRUCTION OF THE BOTTOM SLAB.
3. ALL MORTAR JOINTS ARE TO BE 1/2" +/- 1/8".
4. ALL EXPOSED JOINTS SHALL BE CONCAVE TOOLED.
5. CEMENT MORTAR SHALL BE ASTM C-270, TYPE "M".
6. JUMBO BRICK WILL BE PERMITTED. CONCRETE BRICK OR 4" SOLID CONCRETE BLOCKS MAY BE USED IN LIEU OF CLAY BRICK.
7. FOR 8'-0" IN HEIGHT OR LESS USE 8" WALL; OVER 8'-0" IN HEIGHT USE 12" WALL TO 8'-0" FORM TOP OF WALL, AND 8" WALL FOR THE REMAINING 6"-0".
8. ALL JUNCTION BOXES OVER 3'-5" IN DEPTH SHALL BE PROVIDED WITH STEPS 12" TO 16" ON CENTERS.
9. INVERTS SHALL BE SHAPED TO FORM A SMOOTH, REGULAR SURFACE, SLOPED TO PREVENT SEDIMENTATION.

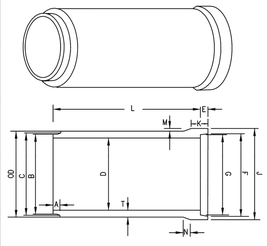
DIMENSIONS AND QUANTITES FOR BRICK JUNCTION BOXES												
DIM'S OF BOX & PIPE				REINFORCEMENT		COVER	CUBIC YARDS			DEDUCTIONS FOR ONE PIPE CU. YDS.	
PIPE	SPAN	WIDTH	HEIGHT	BARS		DIMENSIONS	CONC. BASE & COVER	BRICK MASONRY MIN. WALL THICKNESS	MASONRY WALL PER VERT. FT. CU. YD.	C.S.	R.C.
D	A	B	H	NO.	LENGTH	E	F				
15"	2'-0"	2'-0"	2'-6"	12	3'-1"	3'-4"	3'-4"	0.412	0.657	0.263	0.031	0.047
18"	2'-4"	2'-4"	2'-9"	14	3'-5"	3'-8"	3'-8"	0.498	0.814	0.296	0.044	0.065
24"	3'-0"	3'-0"	3'-3"	16	4'-1"	4'-4"	4'-4"	0.695	1.176	0.362	0.078	0.113
30"	3'-4"	3'-4"	3'-9"	16	4'-5"	4'-8"	4'-8"	0.807	1.481	0.395	0.122	0.170
36"	4'-0"	4'-0"	4'-3"	20	5'-1"	5'-4"	5'-4"	1.053	1.959	0.461	0.176	0.238
42"	4'-8"	4'-8"	4'-9"	22	5'-9"	6'-0"	6'-0"	1.333	2.503	0.527	0.240	0.323
48"	5'-4"	5'-4"	5'-3"	26	6'-5"	6'-8"	6'-8"	1.646	2.940	0.560	0.313	0.422
54"	5'-10"	5'-10"	5'-9"	28	6'-11"	7'-2"	7'-2"	1.902	3.502	0.609	0.396	0.535
60"	6'-6"	6'-6"	6'-3"	30	7'-7"	7'-10"	7'-10"	2.272	4.113	0.658	0.489	0.660
66"	7'-1"	7'-1"	6'-9"	32	8'-2"	8'-5"	8'-5"	2.624	4.778	0.708	0.591	0.798

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OPEN THROAT JUNCTION BOX

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 28 JAN 21 | DR-16

SIZE D	T	L	POUNDS PER FOOT	ASTM SPEC. & CLASS	OD	A	B	C	E	F	G	J	K	M	N	PLANT
15	B2 1/4	8'	134	ASTM C76 III IV V	19 1/2	2	16 15/16	17 1/4	2	17 3/4	17	21 3/8	4 1/2	7/16	1 1/4	SR VN-KN
18	B2 1/2	8'	173	ASTM C76 III IV V	23	2	20	20 3/4	2	21 1/4	20 1/2	23 1/2	6 1/2	3/4	1 1/4	SR VN-KN
24	B3	8'	268	ASTM C76 III IV V	30	2 1/2	26 3/16	26 7/8	2 13/16	27 3/4	27	31 1/2	4 1/2	1/2	1 1/2	VN-KN SR
30	B3 1/2	8'	396	ASTM C76 III IV V	37	2 15/16	32 1/16	33 1/8	3	34 1/32	33 1/32	38 1/2	5 1/2	3/4	1 1/2	SR-K
36	B4	8'	543	ASTM C76 III IV V	44	3 3/4	39 1/4	39 29/32	3 13/16	40 19/32	40 5/16	46 1/2	6	1 1/4	2 11/16	SR-K



A MINIMUM OF 6" OF #57 WASHED STONE IS REQUIRED FOR ALL PIPE INSTALLATION. SEE CITY CITY OF FAYETTEVILLE STANDARD DETAIL DR-1.

MODIFIED TONGUE AND GROOVE

8 FOOT LENGTH

MORTAR OF FLEXIBLE PLASTIC TYPE JOINT

SPECIFICATIONS:
ASTM C 76-LATEST
NCDOT
REINFORCED IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS

LIFT HOLES STANDARD ON 36" AS ALLOWED PER ASTM SPECIFICATIONS

MINIMUM FILL UNDER ROADWAYS	
PIPE CLASS	MINIMUM FILL
CLASS III	2'
CLASS IV	1'
CLASS V	1'

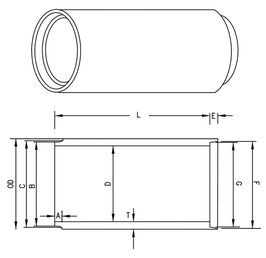
FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE.

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REINFORCED CONCRETE SEWER, STORM DRAIN AND CULVERT 15" THRU 36" PIPE

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 28 JAN 21 | DR-19

SIZE D	T	L	POUNDS PER FOOT	ASTM SPEC. & CLASS	OD	A	B	C	E	F	G	PLANT
42	C5 1/4	8'	807	ASTM C76 III IV V	52 1/2	4 1/4	45 15/32	46 17/32	4 5/16	47 3/16	46 7/8	SR
48	C5 3/4	8'	1018	ASTM C76 III IV V	59 1/2	4 1/4	51 3/4	52 1/2	4 5/16	53 3/16	52 7/8	SR
54	C6 1/4	8'	1228	ASTM C76 III IV V	66 1/2	4 1/4	57 1/2	58 1/4	4 5/16	58 19/32	58 19/32	SR
60	C6 3/4	8'	1488	ASTM C76 III IV V	73 1/2	4 3/4	63 15/16	64 25/32	4 13/16	65 5/32	65 7/8	SR
66	C7 1/4	8'/12'	1791	ASTM C76 III IV V	80 1/2	5	71	71 11/16	5 1/16	71 7/8	71 19/32	SR
72	C7 3/4	8'/12'	2052	ASTM C76 III IV V	87 1/2	5	77 9/32	77 15/16	5 1/16	78 1/8	77 7/8	SR



A MINIMUM OF 6" OF #57 WASHED STONE IS REQUIRED FOR ALL PIPE INSTALLATION. SEE CITY CITY OF FAYETTEVILLE STANDARD DETAIL DR-1.

MODIFIED TONGUE AND GROOVE

8 FOOT LENGTH

MORTAR OF FLEXIBLE PLASTIC TYPE JOINT

SPECIFICATIONS:
ASTM C 76-LATEST
NCDOT
REINFORCED IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS

LIFT HOLES STANDARD ON 36" AS ALLOWED PER ASTM SPECIFICATIONS

MINIMUM FILL UNDER ROADWAYS	
PIPE CLASS	MINIMUM FILL
CLASS III	2'
CLASS IV	1'
CLASS V	1'

FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE.

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REINFORCED CONCRETE SEWER, STORM DRAIN AND CULVERT 42" THRU 72" PIPE

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 28 JAN 21 | DR-19.1

SIZE D IN.	MIN. SLOPE (FT) RCP	MIN. SLOPE (FT) CMP	CLEARANCE DIST. (FT) RCP	CLEARANCE DIST. (FT) CMP
15	0.00325	0.01107	2.4	2.3
18	0.00255	0.00868	2.7	2.6
24	0.00174	0.00592	3.3	3.1
30	0.00129	0.00439	3.8	3.6
36	0.00101	0.00345	4.3	4.1
42	0.00082	0.00281	4.9	4.6
48	0.00069	0.00235	5.4	5.1

MINIMUM FILL UNDER ROADWAYS	
PIPE CLASS	MINIMUM FILL
CLASS III	2'
CLASS IV	1'
CLASS V	1'

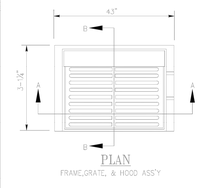
FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE.

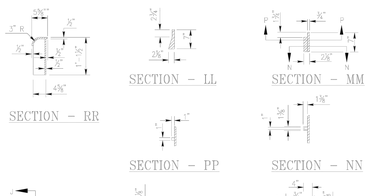
NOTES:
1. THE MAXIMUM PIPE VELOCITY SHALL NOT EXCEED 20 FT PER SEC., BUT SHALL NOT CAUSE SCOUR OR OTHER EROSION PROBLEMS IN THE RECEIVING CHANNEL.
2. SLOPES REQUIRED TO MAINTAIN MINIMUM VELOCITY OF 3 FT PER SEC. AT FULL FLOW.
3. THE MINIMUM SIZE STORM DRAIN PIPE SHALL BE 15 IN.
4. ALL STORM DRAINAGE PIPE USED WITHIN CITY RIGHT-OF-WAY SHALL BE REINFORCED CONCRETE PIPE (RCP). ALL RCP SHALL BE CLASS III OR HIGHER.
5. CLEARANCE DISTANCE IS DETERMINED FROM THE PIPE INVERT ELEVATION UP.
6. A MINIMUM OF 6" OF #57 WASHED STONE IS REQUIRED FOR ALL PIPE INSTALLATION. SEE CITY OF FAYETTVILLE STANDARD DETAIL DR-1.

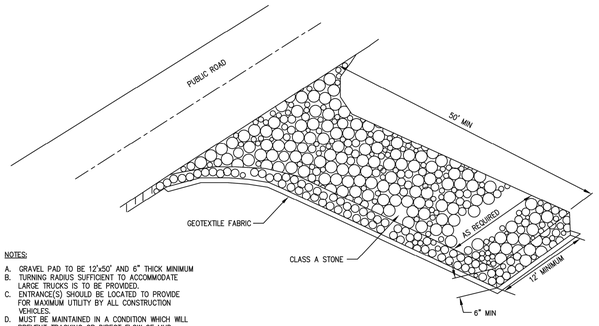
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MINIMUM SLOPE & COVER FOR STORM DRAIN AND CULVERT PIPE

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 28 JAN 21 | DR-19.2




3/4"
3/4"
3/4"



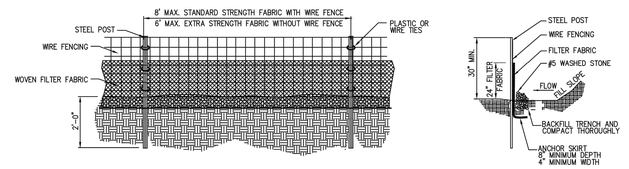
NOTES:

A. GRAVEL PAD TO BE 12'x50' AND 6" THICK MINIMUM
B. TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS IS TO BE PROVIDED.
C. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR MAXIMUM UTILITY BY ALL CONSTRUCTION VEHICLES.
D. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING WITH STONE WILL BE NECESSARY; KEEP SOME HANDY.
E. ANY MATERIAL WHICH STILL MAKES IT ONTO THE ROAD MUST BE CLEANED UP IMMEDIATELY.
F. GEOTEXTILE FABRICS SHALL BE USED BENEATH STONE TO IMPROVE STABILITY OF THE FOUNDATION.
G. APPLICABLE AT ALL POINTS OF INGRESS & EGRESS UNTIL SITE IS STABILIZED. FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE MUST BE PROVIDED.

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GRAVEL CONSTRUCTION ENTRANCE/EXIT

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | EC-2



GENERAL NOTES:

1. FILTER FABRIC FENCE SHALL BE A MINIMUM OF 32" IN WIDTH AND SHALL HAVE A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
2. WOVEN FILTER FABRIC BE USED WHERE SILT FENCE IS TO REMAIN FOR A PERIOD OF MORE THAN 30 DAYS.
3. STEEL POSTS SHALL BE 5'-0" IN HEIGHT AND BE OF THE SELF-FASTENER ANGLE STEEL TYPE.
4. WIRE FENCING SHALL BE AT LEAST #10 GAGE WITH A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
5. TURN SILT FENCE UP SLOPE AT ENDS.
6. WIRE MESH SHALL BE MIN. 13 GAGE WITH MAXIMUM 12" OPENINGS.
7. WIRE AND WASHED STONE IS REQUIRED TO BE SHOWN ON PLANS AT THE TOE OF SLOPES GREATER THAN 10 FEET VERTICAL (2:1 SLOPE)
8. ORANGE SAFETY FENCE IS REQUIRED AT BACK OF SILT FENCE WHEN GRADING IS ADJACENT TO SWIM BUFFERS, STREAMS OR WETLANDS THE COLOR ORANGE IS RESERVED FOR VISUAL IDENTIFICATION OF ENVIRONMENTALLY SENSITIVE AREAS.
9. DRAINAGE AREA CAN NOT BE GREATER THAN 1/4 ACRE PER 100 FT OF FENCE.
10. SLOPE LENGTHS CAN NOT EXCEED CRITERIA SHOWN IN TABLE 6.62A NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.
11. DO NOT INSTALL SEDIMENT FENCE ACROSS STREAMS, DITCHES, WATERWAYS OR OTHER AREAS OF CONCENTRATED FLOW.

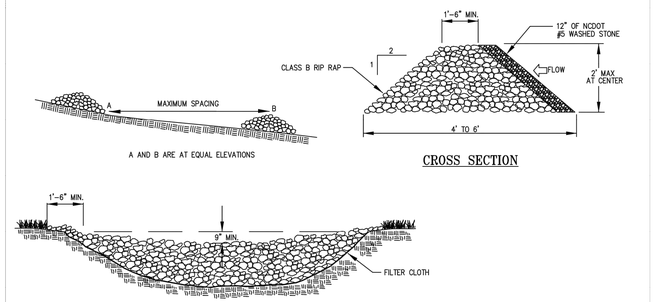
MAINTENANCE NOTES:

1. FILTER BARRIERS SHALL BE INSPECTED BY THE FINANCIALLY RESPONSIBLE PARTY OR HIS AGENT IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REPAIRS NEEDED SHALL BE MADE IMMEDIATELY.
2. SHOULD THE FABRIC DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND THE BARRIER STILL IS NECESSARY, THE FABRIC SHALL BE REPLACED PROMPTLY.
3. SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN DEPOSITS REACH HALF THE HEIGHT OF THE BARRIER. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE IS REMOVED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.

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HIGH HAZARD TEMPORARY SILT FENCE

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | EC-5



GENERAL NOTES:

1. RIPRAP SIZE TO BE CLASS B RIPRAP
2. CHECK DAMS MAY BE USED IN SLOPING DITCHES OR CHANNELS TO SLOW VELOCITY OR TO CREATE SEDIMENT TRAPS.
3. ENSURE THAT MAXIMUM SPACING BETWEEN DAMS PLACES THE TOE OF THE UPSTREAM DAM AT THE SAME ELEVATION AS THE DOWNSTREAM DAM (SEE DIAGRAM BELOW).
4. REFER TO NCDSPDM SECTION #8.03 FOR ADDITIONAL SPECIFICATIONS.

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TEMPORARY ROCK CHECK DAM

Rev. Date: 16JAN18 | Not to Scale | Review Date: 01JAN19 | EC-6

	WARMER SEASON	COOL SEASON
SEEDING MIXTURE	100 lbs/acre of tall fesue 25 lbs/acre of german millet 25 lbs/acre of hulled bermuda	100 lbs/acre of tall fesue 30 lbs/acre of wheat 25 lbs/acre of unhulled bermuda
SEEDING DATES	March 15 – September 15	September 15 – March 15
SEEDING AMENDMENTS	Apply lime and fertilizer per soil tests, or 4000 lbs/acre limestone and 1000 lbs/acre 10-10-10 fertilizer.	Apply lime and fertilizer per soil tests, or 4000 lbs/acre limestone and 1000 lbs/acre 10-10-10 fertilizer.

STABILIZATION TIMEFRAMES

SITE AREA DESCRIPTION	STABILIZATION	TIMEFRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES, SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED
SLOPES 3:1 OR FLATTER	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE, EXCEPT FOR PERIMETERS AND HQW ZONES

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PERMANENT SEEDING SCHEDULE

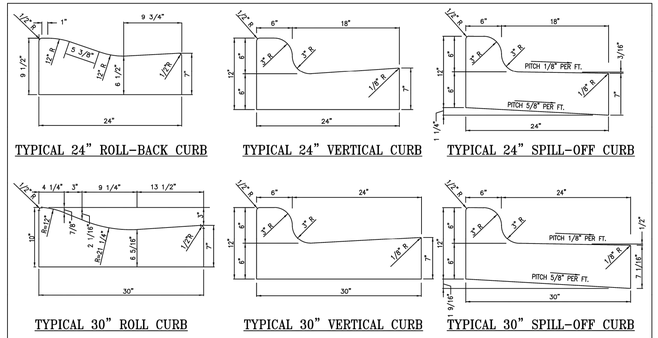
Rev. Date: 16JAN18 | Not to Scale | Review Date: 01JAN19 | EC-7

	EARLY SUMMER SEASON	FALL/WINTER SEASON
SEEDING MIXTURE	40 lbs/acre of German millet 80 lbs/acre of tall fesue	120 lbs/acre Rye (grain) 80 lbs/acre tall fesue
SEEDING DATES	May 1 – August 15 Refertilize if growth is not fully adequate. Apply 4000 lbs/acre straw or equivalent hydroseeding.	October 25 – December 30 Between December 30 – February 15, add 50 lbs/acre of annual Kobe lespedeza. Apply 4000 lbs/acre straw or equivalent hydroseeding.
SEEDING AMENDMENTS	Apply lime and fertilizer per soil tests, or 2000 lbs/acre limestone and 750 lbs/acre 10-10-10 fertilizer.	Apply lime and fertilizer per soil tests, or 2000 lbs/acre limestone and 750 lbs/acre 10-10-10 fertilizer.

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TEMPORARY SEEDING SCHEDULE (SEASONAL)

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | EC-8



NOTES

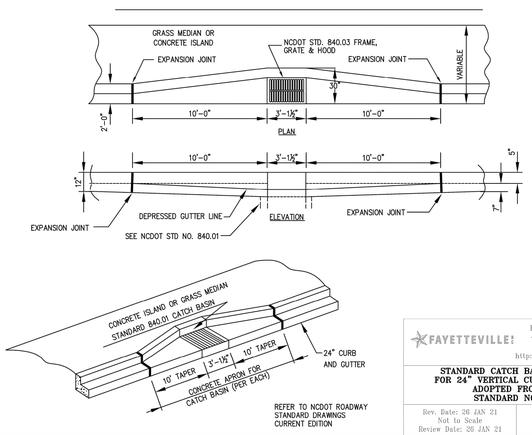
1. ALL CURBS CONSTRUCTED OF 3000 PSI CONCRETE.
2. CONTRACTION JOINTS EVERY 10'; EXPANSION JOINTS EVERY 30'.
3. CURB SHALL BE DEPRESSED AT INTERSECTIONS TO PROVIDE FOR FUTURE ACCESSIBLE RAMPS.
4. TOP 6" OF SUBGRADE BENEATH THE CURB AND GUTTER SHALL BE COMPACTED TO 100% STANDARD PROCTOR DENSITY.

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24" AND 30" CURB DETAILS

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 26 JAN 21 | SD-1

STANDARD CATCH BASIN TRANSITION FOR 24" VERTICAL CURB AND GUTTER



REFER TO NCDOT ROADWAY STANDARD DRAWINGS CURRENT EDITION

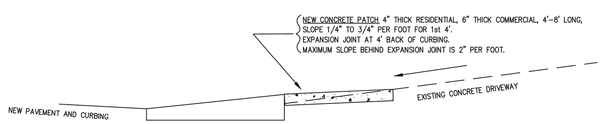
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STANDARD CATCH BASIN TRANSITION FOR 24" VERTICAL CURB AND GUTTER ADOPTED FROM NCDOT STANDARD NO. 852.05

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | SD-5

(CONCRETE PATCH FOR DRIVEWAY UPHILL FROM NEW ASPHALT CURBING)

DETERMINE SAWCUT LOCATION: CHECK SLOPE FROM BACK OF CURBING TO 4' BACK OF CURBING, IF DIFFERENCE IS 1" TO 3"(1/4" TO 3/4" PER FOOT) CUT AND FORM AT 4' BEHIND BACK OF CURBING. IF SLOPE IS TOO FLAT OR STEEP, CONSULT INSPECTOR TO DETERMINE SAWCUT.



NOTE:

UPHILL DRIVEWAYS: ASPHALT CURB HEIGHT CAN BE LOWERED TO REDUCE PATCHING NEED. FOR FURTHER INFORMATION ON DRIVEWAY CONNECTIONS, CONTACT CONSTRUCTION MANAGEMENT AT (910) 433-1661.

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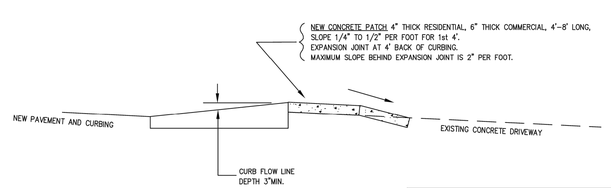
DRIVEWAY CONNECTIONS TO OVERLAID OR RAISED CURBING (UPHILL DRIVEWAY) PAGE 1 OF 2

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | SD-6

(CONCRETE PATCH FOR DRIVEWAY DOWNHILL FROM NEW ASPHALT CURBING)

1st CHECK AND MAKE SURE CURB HEIGHT IS 3" MINIMUM

DETERMINE SAWCUT LOCATION: 1st CHECK SLOPE FROM BACK OF CURBING TO TO 4' BACK OF CURBING, IF DIFFERENCE IS 1" TO 2"(1/4" TO 1/2" PER FOOT) CUT AND FORM AT 4' BEHIND BACK OF CURBING. IF SLOPE IS TOO FLAT OR STEEP, CONSULT INSPECTOR TO DETERMINE SAWCUT.



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DRIVEWAY CONNECTIONS TO OVERLAID OR RAISED CURBING (DOWNHILL DRIVEWAY) PAGE 2 OF 2

Rev. Date: 26 JAN 21 | Not to Scale | Review Date: 29 JAN 21 | SD-6.1

STANDARD DETAILS

SHEET NUMBER 17 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE! PUBLIC SERVICES

ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

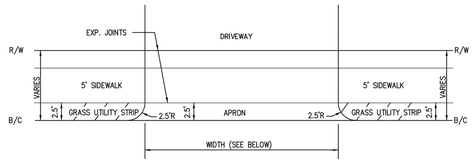
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN 11/24/25

ISSUED FOR CONSTRUCTION

REV. #	REVISIONS DESCRIPTION	REV. BY DATE
1	BID SET	NOV 2025

PROJECT: TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025
DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :

PROJECT NO. KH011017025
SUB-LEDGER NO.



DRIVEWAY APRON

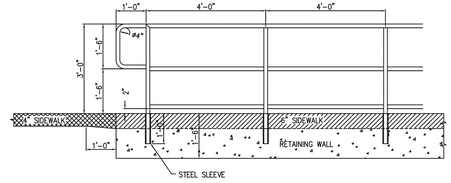
12'(MIN) WIDTH
20'(MAX) WIDTH (DOUBLE)
4" THICK(MIN) CONCRETE

NOTE: DISTANCE FROM B/C TO R/W VARIES ON DIFFERENT STREETS.

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TYPICAL RESIDENTIAL DRIVEWAY APRON

Rev. Date: 26 JAN 21 Not to Scale Review Date: 26 JAN 21	SD-9



NOTES:

1. HORIZONTAL RAIL TO BE 1-1/4" (ADA) I.D. – SCHEDULE 40-TYPE E, GRADE A OR STRONGER (MIN. YIELD STRESS TO BE 30 KSI, WHICH ALLOWS 21.6 KSI DESIGN STRESS.)
2. POSTS TO BE 1-1/2" I.D. – SCHEDULE 80-TYPE E, GRADE A OR STRONGER (MIN. YELD STRESS TO BE 30 KSI, WHICH ALLOWS 21.6 KSI DESIGN STRESS.)
3. ALL JOINTS TO BE WELDED AND GROUND TO A SMOOTH SURFACE. PREFABRICATED CONNECTIONS MAY BE USED IF APPROVED BY CITY ENGINEER. WELDS ARE REQUIRED TO MEET AMERICAN WELDING SOCIETY SPECIFICATIONS.
4. POSTS TO EMBEDDED A MIN. OF 12" IN A CORE DRILLED HOLE OR PRESET PIPE SLEEVE. SLEEVE SHALL BE SCHEDULE 40, TYPE E, GRADE A STEEL OR STRONGER.
5. FINISH WITH 1 COAT OF PRIMER AND 2 COATS OF ALL WEATHER ENAMEL USE PAINT. A NEUTRAL COLOR TO BE APPROVED BY PROJECT ENGINEER.
6. CONTRACTOR SHALL WARRANT PAINT AND HANDRAIL FOR 1 YEAR.
7. ANY CHANGES FROM ABOVE RAIL DESIGN SHALL BE SUBMITTED OVER SEAL OF REGISTERED N.C. ENGINEER WITH DESIGN CRITERIA AND STRESS CALCULATIONS.
8. ALL CONCRETE TO BE 3000 PSI COMPRESSIVE STRENGTH
9. STEEL SLEEVE TO ACCOMMODATE 1-1/2" I.D. SCHEDULE 80 TYPE E POST.
10. ALLOW A 12" TRANSITION FROM A 4" SIDEWALK TO A 6" SIDEWALK AND VICE VERSA.

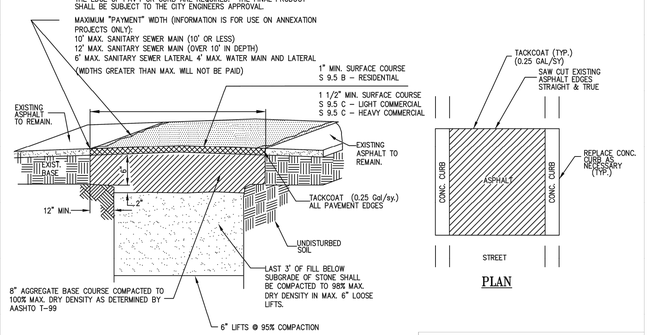
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PIPE HANDRAIL

Rev. Date: 26 JAN 21 Not to Scale Review Date: 26 JAN 21	SD-10

SAWCUT ASPH. EDGES STRAIGHT AND TRUE APPROX. 2" DEEP IMMEDIATELY PRIOR TO PATCHING. JAGGED SAWCUTS SHALL NOT BE ACCEPTABLE. STRAIGHT UNIFORM WIDTHS PARALLEL TO THE EDGE OF PAVT OR CURB ARE REQUIRED. THE FINAL PRODUCT SHALL BE SUBJECT TO THE CITY ENGINEERS APPROVAL.

MAXIMUM "PAYMENT" WIDTH (INFORMATION IS FOR USE ON ANNEXATION PROJECTS ONLY):
10' MAX. SANITARY SEWER MAIN (10' OR LESS)
12' MAX. SANITARY SEWER MAIN (OVER 10' IN DEPTH)
6' MAX. SANITARY SEWER LATERAL 4' MAX. WATER MAIN AND LATERAL
(WIDTHS GREATER THAN MAX. WILL NOT BE PAID)



ISOMETRIC

PLAN

NOTE:
TEMPORARY PATCH IS ONLY ALLOWED TO BE USED IF CONVERTED TO PERMANENT PATCH WITHIN 12 MONTHS. SEE DETAIL SD-11.1

SEE ADDITIONAL NOTES ON DETAIL SD-11.2

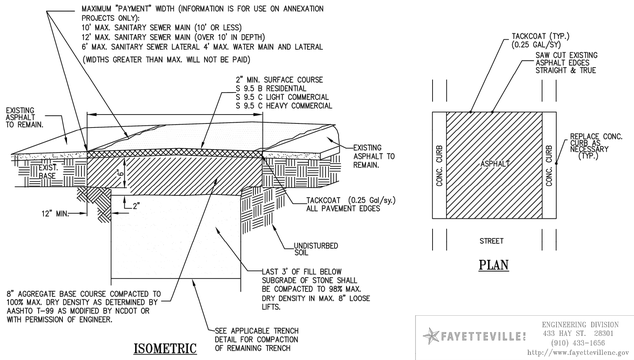
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TYPICAL TEMPORARY SAWCUT AND PAVEMENT PATCH PAGE 1 OF 3

Rev. Date: 26 JAN 21 Not to Scale Review Date: 26 JAN 21	SD-11

SAWCUT ASPH. EDGES STRAIGHT AND TRUE APPROX. 2" DEEP IMMEDIATELY PRIOR TO PATCHING. JAGGED SAWCUTS SHALL NOT BE ACCEPTABLE. STRAIGHT UNIFORM WIDTHS PARALLEL TO THE EDGE OF PAVT OR CURB ARE REQUIRED. THE FINAL PRODUCT SHALL BE SUBJECT TO THE CITY ENGINEERS APPROVAL.

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12' MAX. SANITARY SEWER MAIN (OVER 10' IN DEPTH)
6' MAX. SANITARY SEWER LATERAL 4' MAX. WATER MAIN AND LATERAL
(WIDTHS GREATER THAN MAX. WILL NOT BE PAID)



ISOMETRIC

PLAN

NOTE:
SEE DETAIL SD-16.2 FOR TYPICAL CROSS SECTION OF PAVEMENT STRUCTURE.

SEE ADDITIONAL NOTES ON DETAIL SD-11.2

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TYPICAL PERMANENT SAWCUT AND PAVEMENT PATCH PAGE 2 OF 3

Rev. Date: 26 JAN 21 Not to Scale Review Date: 26 JAN 21	SD-11.1

NOTES:

1. CONTRACTOR SHALL PATCH PAVEMENT TO THE SAME PAVEMENT CROSS SECTION AS EXISTED PRIOR TO REMOVING PAVEMENT. THE STREET CROWN SHALL BE RESTORED. PATCH SHALL MATCH EXISTING PAVEMENT WITHIN .02' WHEN CHECKED WITH A 10' STRAIGHT EDGE. ADJUST PAVER AS REQUIRED. PATCH PAVING MAY OCCUR PRIOR TO PULLING MANDREL THRU SS PROVIDED DENSITY TEST OF TRENCH BACKFILL MEET THE REQUIRED DENSITY AND ENGINEER APPROVES PATCHING STREET PRIOR TO MANDREL TESTING SANITARY SEWER MAIN.
2. WHERE PATCH OF CURBING OCCURS CONTRACTOR SHALL MATCH EXISTING CURB GRADES WITHIN 0.02 FEET. PATCHES THAT ARE ABOVE THE CURB GRADE LINE WILL NOT BE ACCEPTABLE AND SHALL BE REMOVED AND REPATCHED AT NO EXPENSE TO THE OWNER. CURB PATCH SHALL BE THE SAME SHAPE/TEMPLATE AS THE EXISTING CURB.
3. CONTRACTOR SHALL BE REQUIRED TO PROVIDE TRAFFIC CONTROL AND DEVICES AS REQUIRED BY THE MUTCD OR N.C. SUPPLEMENT. WORK CAN NOT PROCEED UNTIL THE MEASURES ARE IN PLACE. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT NEW PAVEMENT FROM TRAFFIC AND OTHER SOURCES OF DAMAGE UNTIL ASPHALT HAS SUFFICIENTLY COOLED TO PREVENT DAMAGE FROM SURFACE DEFLECTIONS.
4. CONTRACTOR SHALL SAWCUT EXIST. PAVEMENT STRAIGHT AND TRUE PRIOR TO REMOVING ASPHALT FOR UTILITY INSTALLATION. THE ENGINEER MAY APPROVE THE USE OF A MILLING MACHINE FOR REMOVAL OF THE EXISTING PAVEMENT WITHIN TRENCH LIMITS. WHERE MILLING IS APPROVED THE CONTRACTOR SHALL PLACE AND COMPACT MILLINGS IN MILLED AREA TO PROVIDE AN INTERIM TRAFFIC SURFACE. MILLING WHERE APPROVED BY ENGINEER IS AN ALTERNATE TO CUTTING ASPHALT AND DISPOSING OFF-SITE.

* 5. AFTER UTILITY IS INSTALLED AND TESTED AND THE EXCESS BASE MATERIAL REMOVED (APPROX. 2") CONTRACTOR SHALL AGAIN SAWCUT EXISTING PAVEMENT STRAIGHT AND TRUE IMMEDIATELY PRIOR TO PAVING AS NOTED ABOVE.

6. MILLING OPERATIONS SHALL BE LIMITED TO 1800 FEET PER MAIN LINE CREW NOT TO EXCEED 3000 FEET IN TOTAL OF DISTURBED ROADWAY FOR THE ENTIRE PROJECT AT ONE TIME WHERE. CONTRACTOR SHALL PATCH PAVE DISTURBED AREA OF ROADWAY PRIOR TO DISTURBING ADDITIONAL ROADWAY.
7. AT NO TIME SHALL THE TRENCH BE LEFT UNATTENDED WITH A VERTICAL DROP GREATER THAN 1 INCH FROM ASPHALT SURFACE TO TOP OF BACKFILLED TRENCH.
8. IF PAVEMENT SETTLEMENT OCCURS WITHIN WARRANTY PERIOD (SEE PROJECT SPECIFICATIONS), THE CONTRACTOR SHALL REPATCH AT NO ADDITIONAL EXPENSE TO THE OWNER.

* 9. NCDOT WILL REQUIRE FULL DEPTH ASPHALT PATCH TO MATCH EXISTING ASPHALT THICKNESS ON STATE MAINTAINED ROADS. NCDOT REQUIRES PATCH PAVING SAME DAY AS REMOVAL.

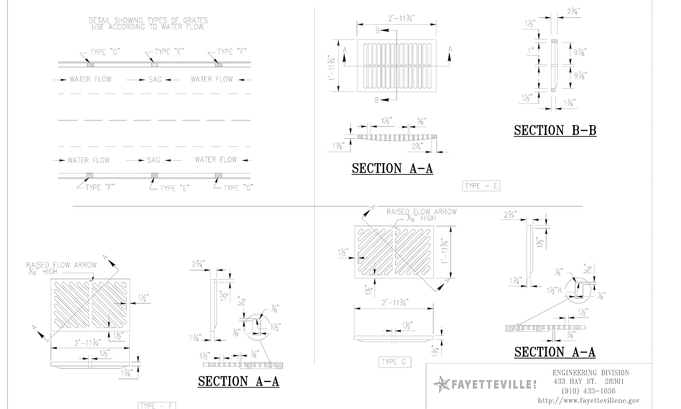
10. TEST FOR DENSITY OF COMPACTION MAY BE MADE AT THE OPTION OF THE ENGINEER AND DEFICIENCIES SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. THE ENGINEER MAY HAVE COMPACTION TEST PERFORMED AFTER THE BACKFILL IS COMPLETE. CONTRACTOR SHALL BE REQUIRED TO EXCAVATE TO VARIOUS ELEVATIONS FOR DENSITY TESTING EXCAVATION, BACKFILL AND RECOMPACTION SHALL BE PERFORMED AT NO ADDITIONAL COSTS TO THE OWNER.

* -- NOTES 5 & 9 APPLY TO PERMANENT PAVEMENT PATCHES ONLY.

FAYETTEVILLE!
ENGINEERING DIVISION
433 HAY ST. 28301
(910) 433-1656
http://www.fayettevillenc.gov

NOTES FOR TYPICAL PERMANENT AND TEMPORARY SAWCUT AND PAVEMENT PATCH PAGE 3 OF 3

Rev. Date: 26 JAN 21 Not to Scale Review Date: 26 JAN 21	SD-11.2

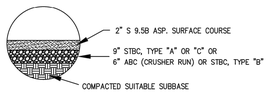


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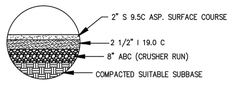
STANDARD FRAME, GRATES AND HOOD FOR USE ON STANDARD CATCH BASIN ADOPTED FROM NCDOT STANDARD NO. 840.03 (PAGE 2 OF 2)

Rev. Date: 26 JAN 21 Not to Scale Review Date: 26 JAN 21	DR-26.1

TYPICAL RESIDENTIAL CROSS SECTION



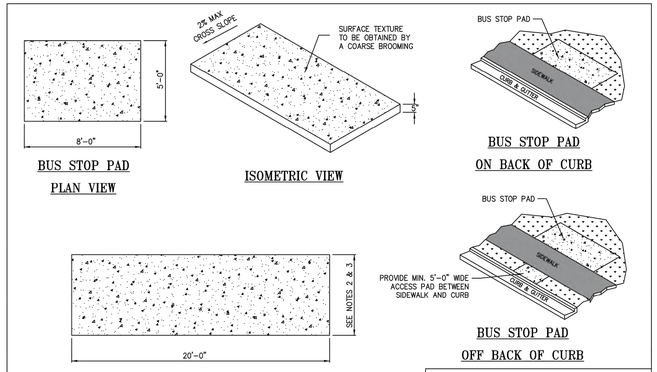
TYPICAL LIGHT & HEAVY COMMERCIAL CROSS SECTION



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TYPICAL CROSS SECTIONS FOR ALL CITY PAVEMENT

Rev. Date: 25 JAN 21 Not to Scale Review Date: 28 JAN 21	SD-16.2

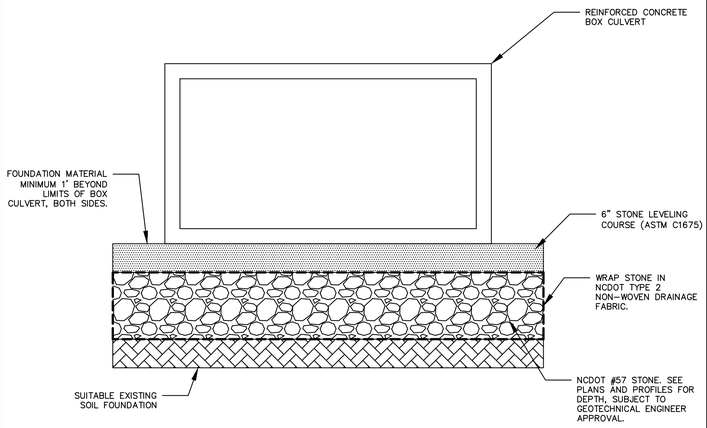


NOTES:
1. BUS STOP PAD SHALL BE PLACED BEHIND THE SIDEWALK.
2. IF SIDEWALK IS OFF THE BACK OF CURB, THE BUS STOP SHELTER PAD WIDTH SHALL BE 5'-0" FOR SPEED LIMITS UP TO 35 MPH; FOR SPEED LIMITS ABOVE 35 MPH, WIDTH SHALL BE 8'-0".
3. IF SIDEWALK IS ON THE BACK OF CURB, THE BUS STOP SHELTER PAD WIDTH SHALL BE 5'-0"
4. CONCRETE SHALL DEVELOP AT 28 DAYS A MIN COMPRESSIVE STRENGTH OF 3000 PSI.

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DETAIL OF BUS STOP PAD

Rev. Date: 26 JAN 21 Not to Scale Review Date: 26 JAN 21	SD-17



BOX CULVERT FOUNDATION DETAIL

NOT TO SCALE

1
18

STANDARD DETAILS
CULVERT
FOUNDATION DETAIL

PLAN TYPE:

SHEET NUMBER 18 of 45

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

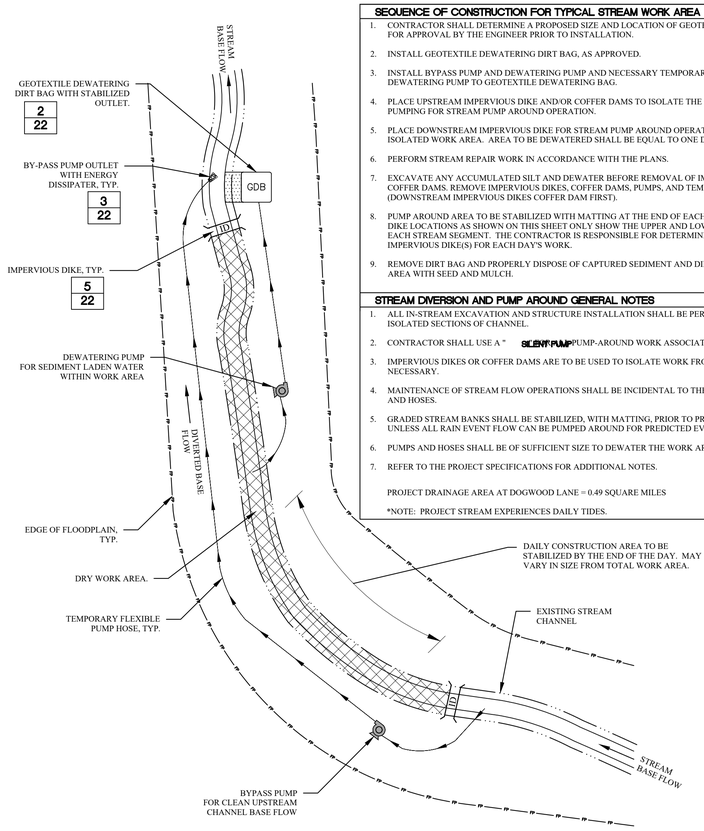
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 ENGINEER TRAVIS CRISSMAN 11/24/25

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :
PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.



EXAMPLE OF PUMP-AROUND OPERATION

NOT TO SCALE

1 / 19

SEQUENCE OF CONSTRUCTION FOR TYPICAL STREAM WORK AREA

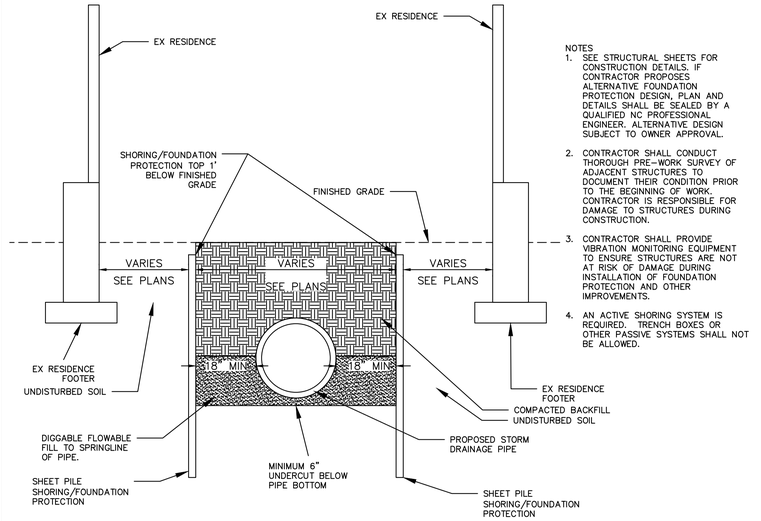
1. CONTRACTOR SHALL DETERMINE A PROPOSED SIZE AND LOCATION OF GEOTEXTILE DEWATERING DIRT BAG FOR APPROVAL BY THE ENGINEER PRIOR TO INSTALLATION.
2. INSTALL GEOTEXTILE DEWATERING DIRT BAG, AS APPROVED.
3. INSTALL BYPASS PUMP AND DEWATERING PUMP AND NECESSARY TEMPORARY FLEXIBLE HOSE. CONNECT DEWATERING PUMP TO GEOTEXTILE DEWATERING BAG.
4. PLACE UPSTREAM IMPERVIOUS DIKE AND/OR COFFER DAMS TO ISOLATE THE WORK AREA. BEGIN BYPASS PUMPING FOR STREAM PUMP AROUND OPERATION.
5. PLACE DOWNSTREAM IMPERVIOUS DIKE FOR STREAM PUMP AROUND OPERATION. BEGIN DEWATERING THE ISOLATED WORK AREA. AREA TO BE DEWATERED SHALL BE EQUAL TO ONE DAY'S WORK.
6. PERFORM STREAM REPAIR WORK IN ACCORDANCE WITH THE PLANS.
7. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES AND/OR COFFER DAMS. REMOVE IMPERVIOUS DIKES, COFFER DAMS, PUMPS, AND TEMPORARY FLEXIBLE HOSE. (DOWNSTREAM IMPERVIOUS DIKES COFFER DAM FIRST).
8. PUMP AROUND AREA TO BE STABILIZED WITH MATTING AT THE END OF EACH WORK DAY. THE IMPERVIOUS DIKE LOCATIONS AS SHOWN ON THIS SHEET ONLY SHOW THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKE(S) FOR EACH DAY'S WORK.
9. REMOVE DIRT BAG AND PROPERLY DISPOSE OF CAPTURED SEDIMENT AND DIRT BAG. STABILIZE DISTURBED AREA WITH SEED AND MULCH.

STREAM DIVERSION AND PUMP AROUND GENERAL NOTES

1. ALL IN-STREAM EXCAVATION AND STRUCTURE INSTALLATION SHALL BE PERFORMED IN ONLY DRY OR ISOLATED SECTIONS OF CHANNEL.
2. CONTRACTOR SHALL USE A " SILENT PUMP PUMP-AROUND WORK ASSOCIATED WITH THIS PROJECT.
3. IMPERVIOUS DIKES OR COFFER DAMS ARE TO BE USED TO ISOLATE WORK FROM STREAM FLOW WHEN NECESSARY.
4. MAINTENANCE OF STREAM FLOW OPERATIONS SHALL BE INCIDENTAL TO THE WORK. THIS INCLUDES PUMPS AND HOSES.
5. GRADED STREAM BANKS SHALL BE STABILIZED, WITH MATTING, PRIOR TO PREDICTED RAIN FALL EVENTS, UNLESS ALL RAIN EVENT FLOW CAN BE PUMPED AROUND FOR PREDICTED EVENT.
6. PUMPS AND HOSES SHALL BE OF SUFFICIENT SIZE TO DEWATER THE WORK AREA.
7. REFER TO THE PROJECT SPECIFICATIONS FOR ADDITIONAL NOTES.

PROJECT DRAINAGE AREA AT DOGWOOD LANE = 0.49 SQUARE MILES

*NOTE: PROJECT STREAM EXPERIENCES DAILY TIDES.



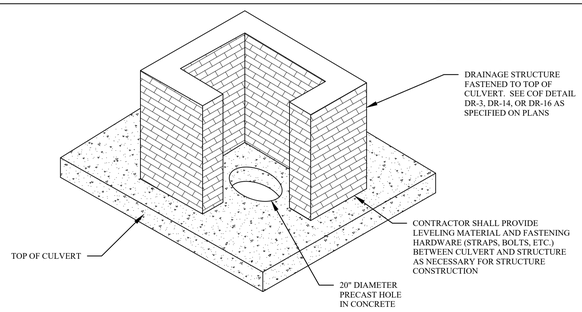
NOTES

1. SEE STRUCTURAL SHEETS FOR CONSTRUCTION DETAILS. IF CONTRACTOR PROPOSES ALTERNATIVE FOUNDATION PROTECTION DESIGN, PLAN AND DETAILS SHALL BE SEALED BY A QUALIFIED NC PROFESSIONAL ENGINEER. ALTERNATIVE DESIGN SUBJECT TO OWNER APPROVAL.
2. CONTRACTOR SHALL CONDUCT THOROUGH PRE-WORK SURVEY OF ADJACENT STRUCTURES TO DOCUMENT THEIR CONDITION PRIOR TO THE BEGINNING OF WORK. CONTRACTOR IS RESPONSIBLE FOR DAMAGE TO STRUCTURES DURING CONSTRUCTION.
3. CONTRACTOR SHALL PROVIDE VIBRATION MONITORING EQUIPMENT TO ENSURE STRUCTURES ARE NOT AT RISK OF DAMAGE DURING INSTALLATION OF FOUNDATION PROTECTION AND OTHER IMPROVEMENTS.
4. AN ACTIVE SHORING SYSTEM IS REQUIRED. TRENCH BOXES OR OTHER PASSIVE SYSTEMS SHALL NOT BE ALLOWED.

FOUNDATION PROTECTION SCHEMATIC

NOT TO SCALE

7 / 19

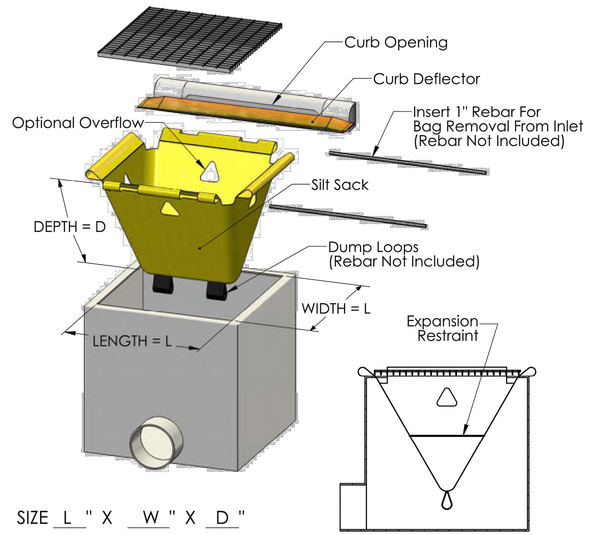


CHIMNEY DRAINAGE STRUCTURE

NOT TO SCALE

6 / 19

Silt Sack - Type B



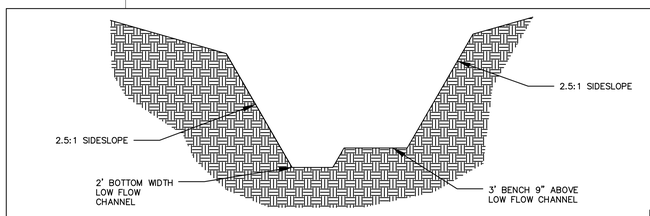
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SILT SACK TYPE B

NOT TO SCALE

2 / 19

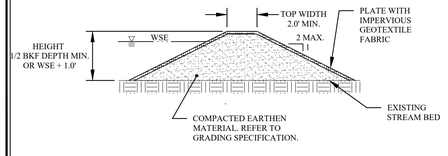
ACF ENVIRONMENTAL
2831 Cardwell Road
Richmond, VA 23234
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REGRADED CHANNEL CROSS-SECTION

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8 / 19



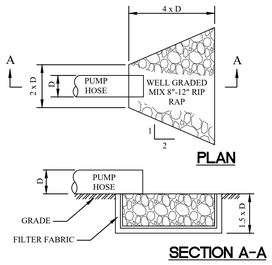
IMPERVIOUS DIKE

NOT TO SCALE

3 / 19

SEQUENCE OF CONSTRUCTION FOR TYPICAL CULVERT WORK AREA

1. CONTRACTOR SHALL DETERMINE A PROPOSED SIZE AND LOCATION OF DEWATERING FILTER BAG AND DEWATERING WORK AREA FOR APPROVAL BY THE ENGINEER PRIOR TO INSTALLATION. AREA TO BE DEWATERED SHALL BE DETERMINED BY THE WORK AREA REQUIRED TO INSTALL THE CULVERT.
2. INSTALL DEWATERING FILTER BAG, AS APPROVED.
3. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE, AS APPROVED.
4. PLACE UPSTREAM IMPERVIOUS DIKE/COFFER DAM AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
5. PLACE DOWNSTREAM IMPERVIOUS DIKE/COFFER DAM AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA.
6. BEGIN CULVERT INSTALLATION IN ACCORDANCE WITH THE APPROVED PLANS.
7. PUMP-AROUND OPERATION SHALL RUN CONTINUOUSLY UNTIL THE CULVERTS ARE COMPLETELY INSTALLED, THE WORK AREA IS STABILIZED AT FINAL STREAM GRADE, AND, APPROVAL HAS BEEN RECEIVED.
8. THE CONTRACTOR SHALL PLAN THE CULVERT INSTALLATION SO THAT SEVERE WEATHER AND RAINFALL ARE NOT LIKELY TO OCCUR DURING THE ANTICIPATED WORK DURATION. IF UNEXPECTED RAINFALL OR SEVERE WEATHER IS TO OCCUR DURING OPERATION OF THE PUMP-AROUND, THE CONTRACTOR SHALL STABILIZE THE WORK AREA WITH COIR FIBER MATING, SECURE THE INSTALLED WORK, AND PROVIDE ADDITIONAL MEASURES NECESSARY TO REDUCE EROSION AND SEDIMENT LOSS FROM THE WORK AREA.
9. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE. (DOWNSTREAM IMPERVIOUS DIKES FIRST).
10. PUMP AROUND AREA TO BE STABILIZED WITH MATTING AT THE END OF EACH WORK DAY. THE IMPERVIOUS DIKE LOCATIONS AS SHOWN ON THIS SHEET ONLY SHOW THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKE(S) FOR EACH DAY'S WORK.
11. REMOVE DEWATERING FILTER BAG AND PROPERLY DISPOSE OF CAPTURED SEDIMENT AND DEWATERING FILTER BAG. STABILIZE DISTURBED AREA WITH SEED AND MULCH.



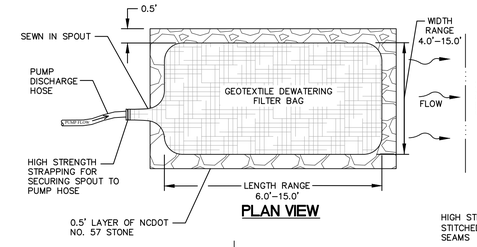
ENERGY DISSIPATOR FOR PUMP AROUND HOSE (IF CLEAN WATER)

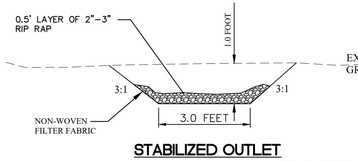
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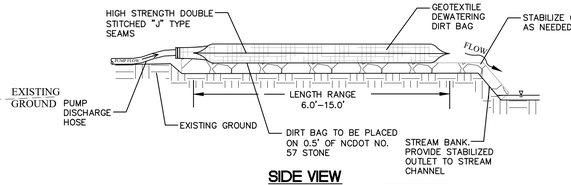
4 / 19

GEOTEXTILE DEWATER DIRT BAG GENERAL NOTES

1. GEOTEXTILE DEWATERING DIRT BAG DIMENSIONS ARE VARIABLE AND DEPENDENT ON SPECIFIC SITE CONSTRAINTS AND PROPOSED CONSTRUCTION OPERATIONS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING THE SIZE AND LOCATION OF THE GEOTEXTILE DEWATERING DIRT BAG FOR APPROVAL BY THE ENGINEER PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL INSURE THAT THE DIRT BAG IS OF A SUFFICIENT SIZE AND STRENGTH TO PROPERLY DEWATER THE PUMP HOSE INFLUENT.
4. DIRT BAG SHALL BE REPLACED WHEN FULL OF SEDIMENT OR WHEN FLOW THROUGH BAG IS LIMITED BY SEDIMENT ACCUMULATION.
5. IF GEOTEXTILE DEWATERING DIRT BAG IS PLACED IN EXISTING VEGETATED AREA ADJACENT TO AN UNDISTURBED STREAM NO OUTLET IS REQUIRED (PREFERRED). IF GEOTEXTILE DEWATERING DIRT BAG IS PLACED ON DISTURBED SOIL THEN A STABILIZED OUTLET/CHANNEL NEEDS TO BE PROVIDED.
6. THE STABILIZED OUTLET WILL BE A MINIMUM OF 1' THICK AND CONSIST OF A WELL GRADED MIX OF 1"-6" RIP RAP PER THE DIMENSIONS BELOW. PLACE FILTER FABRIC BETWEEN THE RIP RAP AND SOIL FOUNDATION. THE STABILIZED OUTLET WILL EXTEND FROM THE SPECIAL STILLING BASIN TO THE BANK OF THE CHANNEL BELOW THE WORK AREA.







GEOTEXTILE DEWATERING DIRT BAG

NOT TO SCALE

5 / 19

STANDARD DETAILS

SHEET NUMBER 19 of 45

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES

ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030525 TRAVIS CRISSMAN

REVISIONS			
REV. #	DESCRIPTION	REV.BY	DATE
1	BID SET		NOV 2025

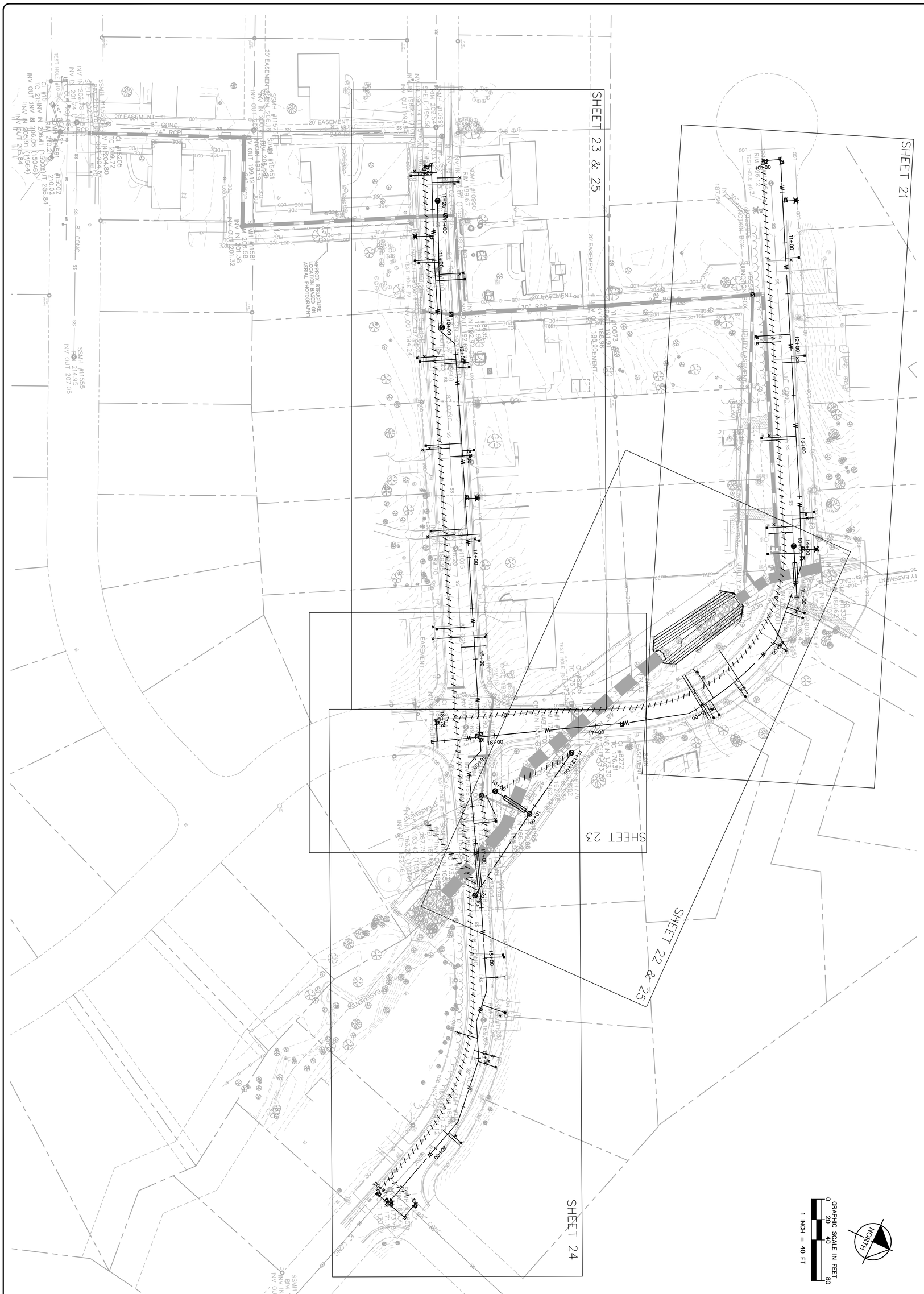
ISSUED FOR CONSTRUCTION

PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS

DRAWN : G. SEITZ
APPROVED : T. CRISSMAN
SCALE :
DATE : NOV 2025

PROJECT NO. KH 011017025

SUB-LEDGER NO.



DRAWN : JNB	PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS	REVISIONS	
CHECK : NDR		REV. #	DESCRIPTION / REV.BY DATE
APPROVED : NLH			
SCALE: 1:40	DATE : NOV 2025		

PROJECT NO. KH 011017025

SUB-LEDGER NO.

ISSUED FOR CONSTRUCTION

FAYETTEVILLE PUBLIC SERVICES

ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

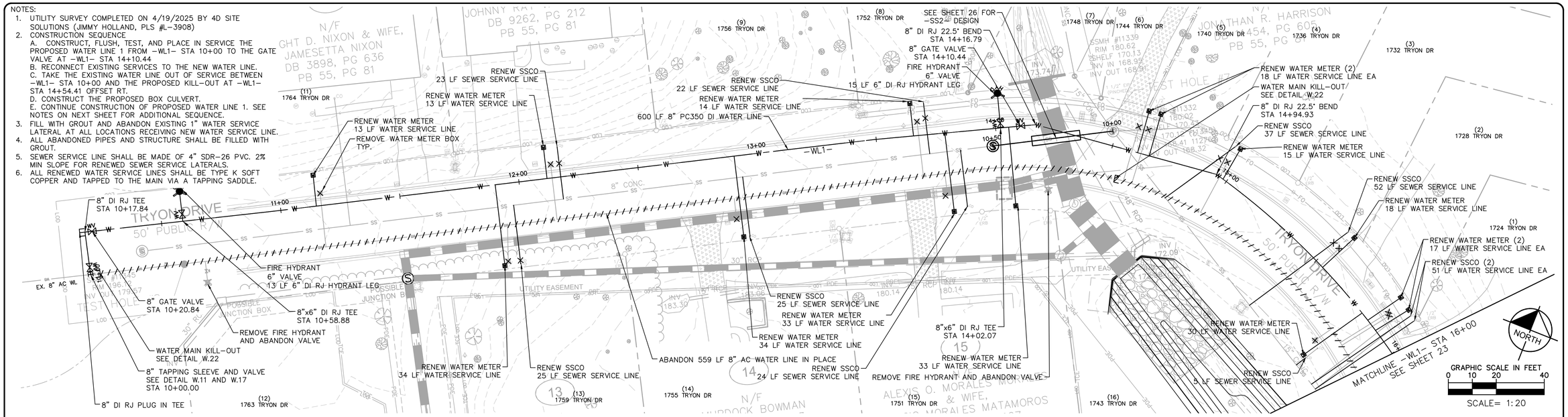
Kimley»Horn
© 2024 KIMLEY-HORN AND ASSOCIATES, INC.
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

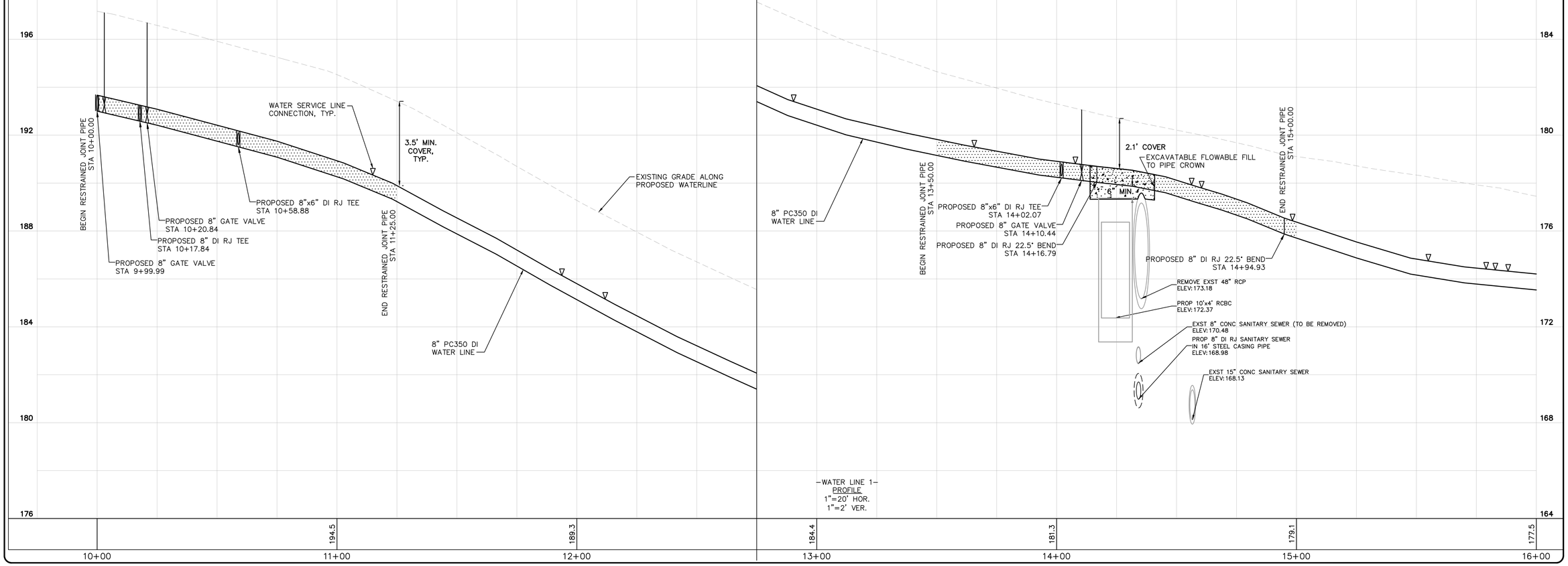
UTILITY OVERALL PLAN

PLAN TYPE: 100% PLANS

SHEET NUMBER 20 OF 45

NOTES:
1. UTILITY SURVEY COMPLETED ON 4/19/2025 BY 4D SITE SOLUTIONS (JIMMY HOLLAND, PLS #L-3908)
2. CONSTRUCTION SEQUENCE
   A. CONSTRUCT, FLUSH, TEST, AND PLACE IN SERVICE THE PROPOSED WATER LINE 1 FROM –WL1– STA 10+00 TO THE GATE VALVE AT –WL1– STA 14+10.44
   B. RECONNECT EXISTING SERVICES TO THE NEW WATER LINE.
   C. TAKE THE EXISTING WATER LINE OUT OF SERVICE BETWEEN –WL1– STA 10+00 AND THE PROPOSED KILL-OUT AT –WL1– STA 14+54.41 OFFSET RT.
   D. CONSTRUCT THE PROPOSED BOX CULVERT.
   E. CONTINUE CONSTRUCTION OF PROPOSED WATER LINE 1. SEE NOTES ON NEXT SHEET FOR ADDITIONAL SEQUENCE.
3. FILL WITH GROUT AND ABANDON EXISTING 1" WATER SERVICE LATERAL AT ALL LOCATIONS RECEIVING NEW WATER SERVICE LINE.
4. ALL ABANDONED PIPES AND STRUCTURE SHALL BE FILLED WITH GROUT.
5. SEWER SERVICE LINE SHALL BE MADE OF 4" SDR-26 PVC. 2% MIN SLOPE FOR RENEWED SEWER SERVICE LATERALS.
6. ALL RENEWED WATER SERVICE LINES SHALL BE TYPE K SOFT COPPER AND TAPPED TO THE MAIN VIA A TAPPING SADDLE.





TRYON DR - WATER LINE 1
10+00 TO 16+00

SHEET NUMBER 21 OF 45

PLAN TYPE: 100% PLANS

Kimley»Horn
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SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045249 DANIEL L. HARLEY 11/21/25

REV. #	REVISIONS DESCRIPTION	REV.BY DATE

ISSUED FOR CONSTRUCTION

DRAWN :	JNB
CHECK :	NDR
APPROVED :	NLH
SCALE:	1:20
PROJECT	TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :	
DATE :	NOV 2025

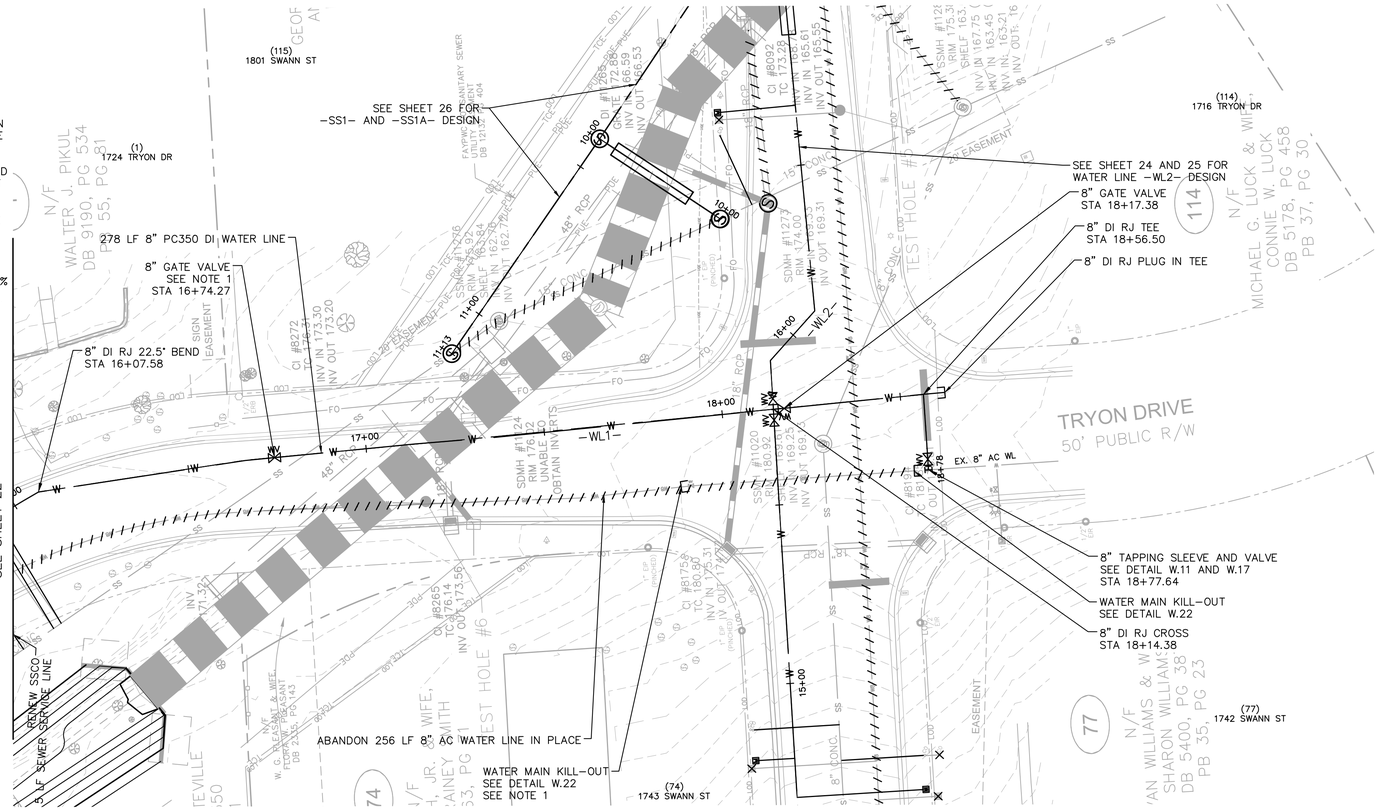
PROJECT NO. KH 011017025

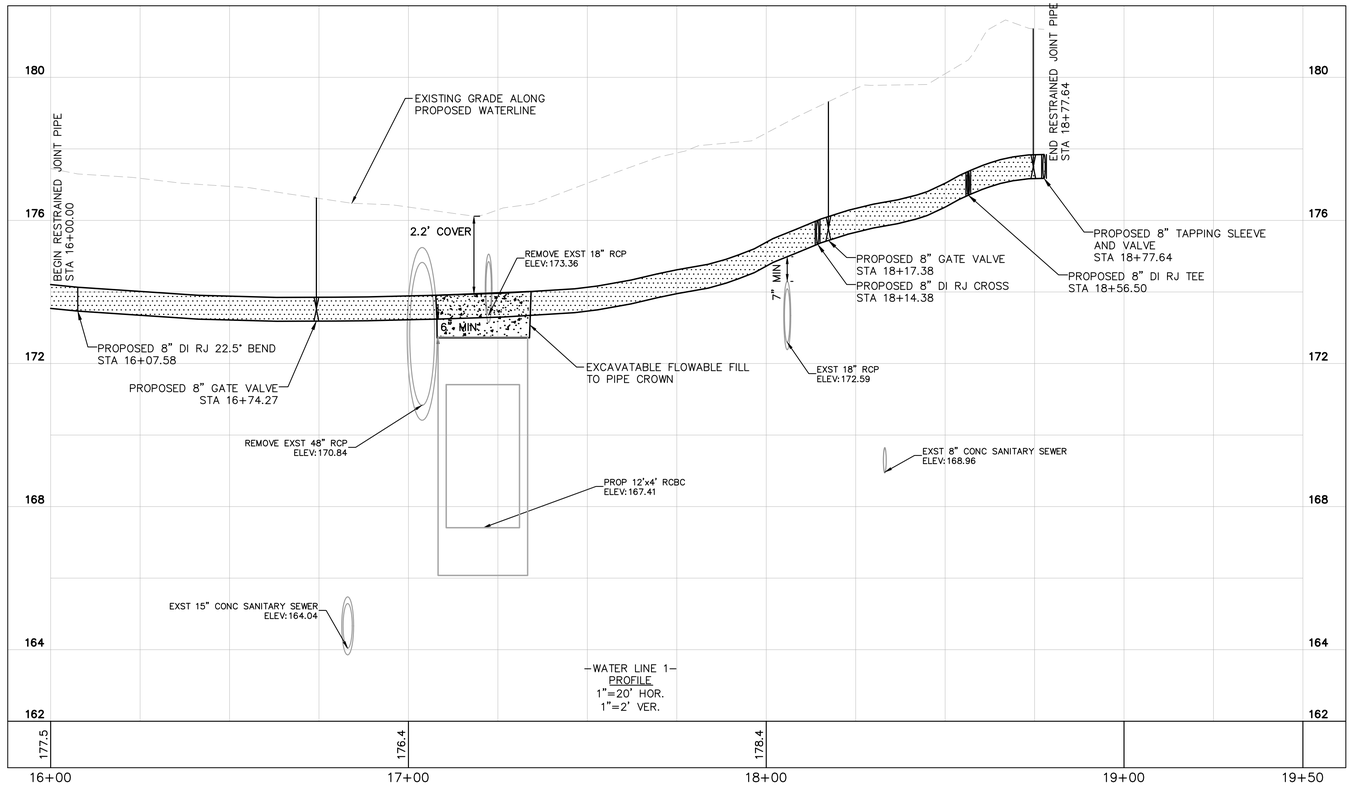
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:Tryon Drainage UC Layout:21 TRYON DR – WATER LINE 1 10+00 TO 16+00 November 18, 2025 11:11:31am K:\RAL_Roadway\011017025_Tryon_Drainage\Utilities\UC\Plan Sheets\UTILITY PLANS.dwg

NOTES:

1. UTILITY SURVEY COMPLETED ON 4/19/2025 BY 4D SITE SOLUTIONS (JIMMY HOLLAND, PLS #L-3908)
2. CONSTRUCTION SEQUENCE
   A. CONSTRUCT, FLUSH, TEST, AND PLACE IN SERVICE THE PROPOSED WATER LINE 1 FROM THE GATE VALVE AT –WL1– STA 14+10.44 (SEE SEQUENCE NOTES ON PREVIOUS SHEET) TO THE PROPOSED GATE VALVE AT –WL1– STA 16+74.27.
   B. RECONNECT EXISTING SERVICES TO THE NEW WATER LINE.
   C. TAKE THE EXISTING WATER LINE OUT OF SERVICE BETWEEN THE KILL–OUT AT –WL1– STA 14+54.41 OFFSET RT AND THE PROPOSED KILL–OUT AT –WL1– STA 17+86.59 OFFSET RT.
   D. CONSTRUCT THE PROPOSED BOX CULVERT.
   E. CONTINUE CONSTRUCTION OF PROPOSED WATER LINE 1 AND ABANDON REMAINING EXISTING WATER LINE TO THE KILL–OUT NEXT TO THE TAPPING SLEEVE AND VALVE AT –WL1– 18+77.64.
3. FILL WITH GROUT AND ABANDON EXISTING 1" WATER SERVICE LATERAL AT ALL LOCATIONS RECEIVING NEW WATER SERVICE LINE.
4. ALL ABANDONED PIPES AND STRUCTURE SHALL BE FILLED WITH GROUT.
5. SEWER SERVICE LINE SHALL BE MADE OF 4" SDR–26 PVC. 2% MIN SLOPE FOR RENEWED SEWER SERVICE LATERALS.
6. ALL RENEWED WATER SERVICE LINES SHALL BE TYPE K SOFT COPPER AND TAPPED TO THE MAIN VIA A TAPPING SADDLE.





TRYON DR - WATER LINE 1
16+00 TO 18+78

PLAN TYPE: 100% PLANS

SHEET NUMBER 22 OF 45

Kimley»Horn
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SUITE 600
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PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049249 JOHN NIEL L. HARVEY 11/25

REVISIONS

REV. #	DESCRIPTION	REV.BY	DATE

ISSUED FOR CONSTRUCTION

DRAWN : JNB
CHECK : NDR
APPROVED : NLH
SCALE: 1:20

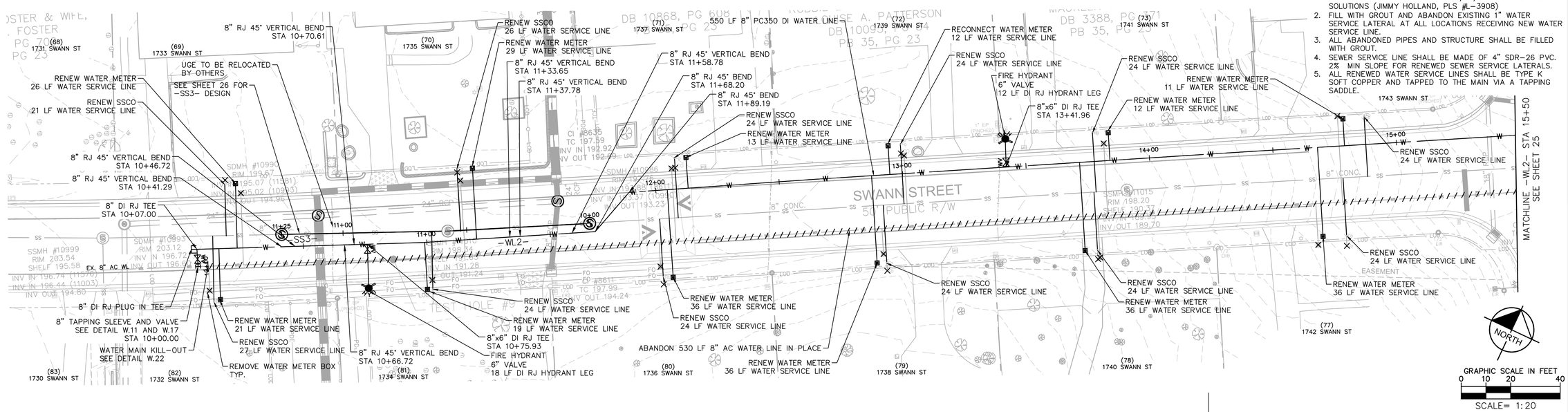
PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025

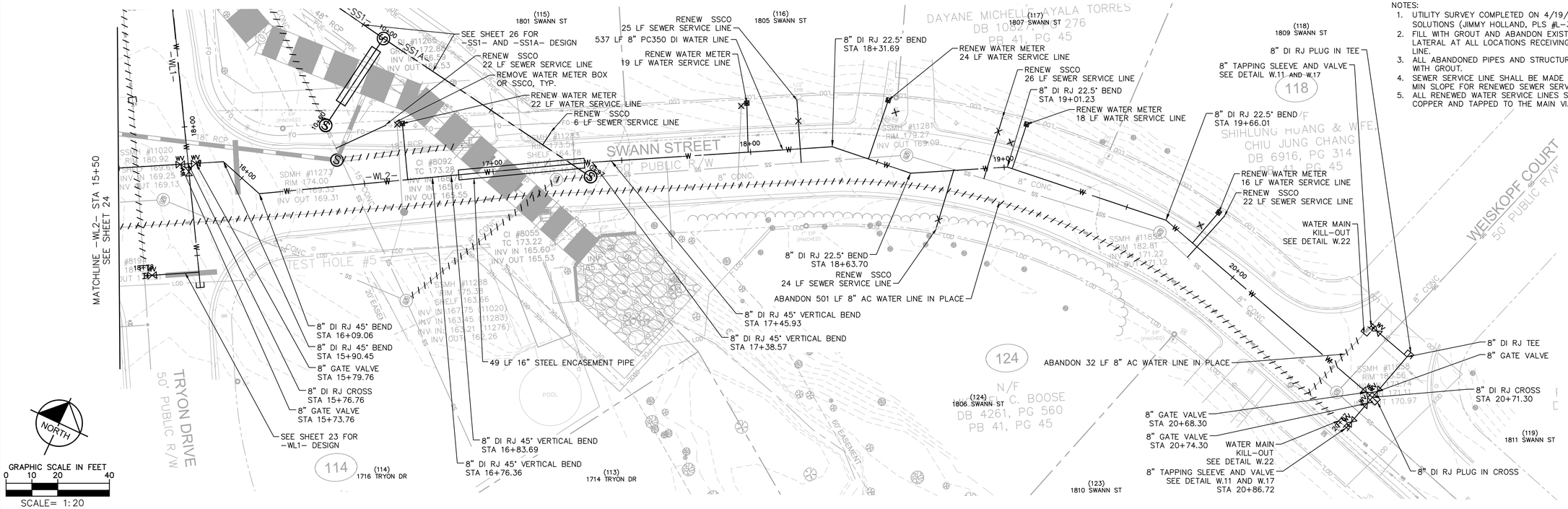
SUB-LEDGER NO.

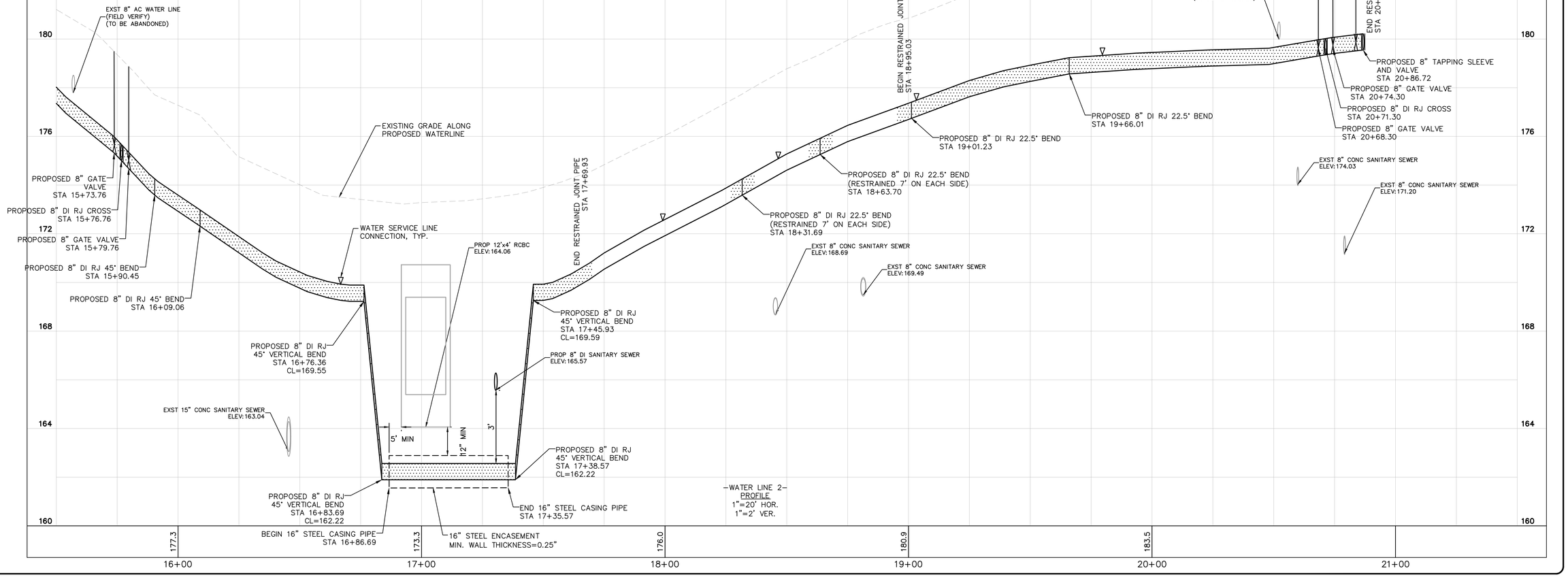
Plotted By:Anderson, Nolen Sheet Set:Tryon Drainage UC Layout:22 TRYON DR – WATER LINE 1 16+00 TO 18+78 November 18, 2025 11:11:46am
K:\RAL_Roadway\011017025_Tryon_Drainage\Utilities\UC\Plan Sheets\UTILITY PLANS.dwg

NOTES:
1. UTILITY SURVEY COMPLETED ON 4/19/2025 BY 4D SITE SOLUTIONS (JIMMY HOLLAND, PLS #L-3908)
2. FILL WITH GROUT AND ABANDON EXISTING 1" WATER SERVICE LATERAL AT ALL LOCATIONS RECEIVING NEW WATER SERVICE LINE.
3. ALL ABANDONED PIPES AND STRUCTURE SHALL BE FILLED WITH GROUT.
4. SEWER SERVICE LINE SHALL BE MADE OF 4" SDR-26 PVC. 2% MIN SLOPE FOR RENEWED SEWER SERVICE LATERALS.
5. ALL RENEWED WATER SERVICE LINES SHALL BE TYPE K SOFT COPPER AND TAPPED TO THE MAIN VIA A TAPPING SADDLE.


8" RJ 45° VERTICAL BEND STA 10+70.61
RENEW SSCO 26 LF WATER SERVICE LINE
RENEW WATER METER 29 LF WATER SERVICE LINE
8" RJ 45° VERTICAL BEND STA 11+33.65
8" RJ 45° VERTICAL BEND STA 11+37.78
550 LF 8" PC350 DI WATER LINE
8" RJ 45° VERTICAL BEND STA 11+58.78
8" RJ 45° BEND STA 11+68.20
8" RJ 45° BEND STA 11+89.19
RENEW SSCO 24 LF WATER SERVICE LINE
RENEW WATER METER 13 LF WATER SERVICE LINE
RECONNECT WATER METER 12 LF WATER SERVICE LINE
RENEW SSCO 24 LF WATER SERVICE LINE
FIRE HYDRANT 6" VALVE 12 LF DI RJ HYDRANT LEG
8"x6" DI RJ TEE STA 13+41.96
RENEW SSCO 24 LF WATER SERVICE LINE
RENEW WATER METER 11 LF WATER SERVICE LINE
RENEW WATER METER 12 LF WATER SERVICE LINE
RENEW SSCO 24 LF WATER SERVICE LINE
RENEW SSCO 24 LF WATER SERVICE LINE
RENEW WATER METER 36 LF WATER SERVICE LINE
RENEW SSCO 24 LF WATER SERVICE LINE
RENEW WATER METER 36 LF WATER SERVICE LINE
RENEW SSCO 24 LF WATER SERVICE LINE
RENEW WATER METER 36 LF WATER SERVICE LINE
RENEW SSCO 24 LF WATER SERVICE LINE
RENEW WATER METER 36 LF WATER SERVICE LINE
ABANDON 530 LF 8" AC WATER LINE IN PLACE
RENEW WATER METER 36 LF WATER SERVICE LINE
UGE TO BE RELOCATED BY OTHERS
SEE SHEET 26 FOR -SS3- DESIGN
RENEW WATER METER 26 LF WATER SERVICE LINE
RENEW SSCO 21 LF WATER SERVICE LINE
8" RJ 45° VERTICAL BEND STA 10+46.72
8" RJ 45° VERTICAL BEND STA 10+41.29
8" DI RJ TEE STA 10+07.00
8" DI RJ PLUG IN TEE
8" TAPPING SLEEVE AND VALVE SEE DETAIL W.11 AND W.17 STA 10+00.00
WATER MAIN KILL-OUT SEE DETAIL W.22
RENEW WATER METER 21 LF WATER SERVICE LINE
RENEW SSCO 27 LF WATER SERVICE LINE
REMOVE WATER METER BOX TYP.
8" RJ 45° VERTICAL BEND STA 10+66.72
RENEW SSCO 24 LF WATER SERVICE LINE
RENEW WATER METER 19 LF WATER SERVICE LINE
8"x6" DI RJ TEE STA 10+75.93
FIRE HYDRANT 6" VALVE 18 LF DI RJ HYDRANT LEG
SWANN STREET 50' PUBLIC R/W
-WL2-
-SS3-
EX. 8" AC WL
8" CONC.
24" RCP
SSMH #10999 RIM 203.54 SHELF 195.58 INV IN 196.74 (11576) INV IN 196.44 (11003) INV OUT 194.80
SSMH #10993 RIM 203.12 INV IN 196.74 INV OUT 196.64
SSMH #10995 RIM 199.67 INV IN 195.07 (11531) INV IN 195.02 (10993) INV OUT 194.96
SSMH #10996 RIM 198.57 INV IN 193.57 (10993) INV OUT 193.23
SSMH #11011 RIM 198.20 INV IN 193.27 INV OUT 189.70
CI #8635 TC 197.59 INV IN 192.92 INV OUT 192.69
CI #8611 TC 197.99 INV OUT 194.24
TEST HOLE #1
TEST HOLE #2
TEST HOLE #3
TEST HOLE #4
TEST HOLE #5
TEST HOLE #6
TEST HOLE #7
TEST HOLE #8
TEST HOLE #9
TEST HOLE #10
TEST HOLE #11
TEST HOLE #12
TEST HOLE #13
TEST HOLE

NOTES:
1. UTILITY SURVEY COMPLETED ON 4/19/2025 BY 4D SITE SOLUTIONS (JIMMY HOLLAND, PLS #L-3908)
2. FILL WITH GROUT AND ABANDON EXISTING 1" WATER SERVICE LATERAL AT ALL LOCATIONS RECEIVING NEW WATER SERVICE LINE.
3. ALL ABANDONED PIPES AND STRUCTURE SHALL BE FILLED WITH GROUT.
4. SEWER SERVICE LINE SHALL BE MADE OF 4" SDR-26 PVC. 2% MIN SLOPE FOR RENEWED SEWER SERVICE LATERALS.
5. ALL RENEWED WATER SERVICE LINES SHALL BE TYPE K SOFT COPPER AND TAPPED TO THE MAIN VIA A TAPPING SADDLE.





SWANN ST - WATER LINE 2
15+50 TO 20+87

SHEET NUMBER 24 OF 45

PLAN TYPE: 100% PLANS

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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FAYETTEVILLE PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL SEAL 045249 ENGINEER NATHANIEL L. HUNTER

REV. #	REVISIONS DESCRIPTION	REV.BY DATE

ISSUED FOR CONSTRUCTION

PROJECT	TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :	
DATE :	NOV 2025
DRAWN :	JNB
CHECK :	NDR
APPROVED :	NLH
SCALE:	1:20

PROJECT NO. KH 011017025

SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:Tryon Drainage UC Layout:24 SWANN ST - WATER LINE 2 15+50 TO 20+87 November 18, 2025 11:12:20am K:\RAL_Roadway\011017025_Tryon_Drainage\Utilities\UC\Plan Sheets\UTILITY PLANS.dwg

NOTES:
1. UTILITY SURVEY COMPLETED ON 4/19/2025 BY 4D SITE SOLUTIONS (JIMMY HOLLAND, PLS #L-3908)
2. ALL ABANDONED PIPES AND STRUCTURE SHALL BE FILLED WITH GROUT.
3. BOX CULVERT SECTION SHALL BE CENTERED OVER PROPOSED SANITARY SEWER CROSSING SUCH THAT JOINTS ARE LOCATED AS FAR AS POSSIBLE FROM PROPOSED SANITARY SEWER PIPE.

(6) 1748 TRYON DR
(5) 1744 TRYON DR
(4) 1736 TRYON DR
(3) 1732 TRYON DR
(2) 1728 TRYON DR
(1) 1724 TRYON DR
(15) 1751 TRYON DR
(16) 1743 TRYON DR
(116) 1805 SWANN ST
(115) 1801 SWANN ST
(70) 1735 SWANN ST
(69) 1733 SWANN ST
(82) 1732 SWANN ST
(81) 1734 SWANN ST

TRYON DRIVE
50' PUBLIC R/W

N/F WALTER J. PIKUL DB 9190, PG 534 PB 55, PG 81
N/F GEORGE FREITAS & WIFE, ANN MARIE FREITAS DB 11347, PG 91 PB 41, PG 45
N/F ALEXIS O. MORALES & WIFE, ROCIO MORALES MATAMOROS DB 10086, PG 827 PB 55, PG 81
N/F THE CITY OF FAYETTEVILLE DB 10193, PG 350 PB 55, PG 81
N/F WILLIE SMITH, JR. & WIFE, BRENDA RAINEY SMITH DB 4163, PG 71 TEST HOLE #6
N/F BILLINGSLEA 719 PG 894
TEST HOLE #9

SEE SHEET 22 FOR WATER LINE -WL1- DESIGN
SEE SHEET 25 FOR WATER LINE -WL2- DESIGN

EXST SSMH-11332 STA:10+00.00
21 LF 24" STEEL ENCASEMENT PIPE
REPLACE 51 LF EXISTING 8" CONC SEWER PIPE WITH 12" RJ P-401 DI PIPE
PROP 4' DIA SSMH-2.1 STA:10+50.45
PROP 6' DIA SSMH-1.3 (DOGHOUSE) STA:11+13.42
25 LF 30" STEEL ENCASEMENT PIPE
41 LF 16" RJ P-401 DI SANITARY SEWER SEE NOTE 2
73 LF 16" P-401 DI SANITARY SEWER
PROP 6' DIA SSMH-1.2-1A.1 STA:10+40.52
97 LF 8" P-401 DI SANITARY SEWER
PROP 4' DIA SSMH-1A.2 (DOGHOUSE) STA:10+96.60
RELOCATE SSCO 6 LF SEWER SERVICE LINE
REMOVE MANHOLE (RETURN LID TO PWC)
ABANDON 84 LF 15" CONC SEWER LINE
PROP 6' DIA SSMH-1.1 (DOGHOUSE) STA:10+00.00
REMOVE MANHOLE (RETURN LID TO PWC)
ABANDON 88 LF 8" CONC SEWER LINE

PROP 4' DIA SSMH-3.0 STA:10+00.00
REPLACE 58 LF EXISTING CONC SEWER PIPE WITH 8" P-401 DI PIPE
REPLACE 67 LF EXISTING CONC SEWER PIPE WITH 8" P-401 DI PIPE
PROP 4' DIA SSMH-3.1 STA:10+57.65
PROP 4' DIA SSMH-3.2 STA:11+24.81

-SS1-
-SS1A-
-SS2-
-SS3-
-WL1-
-WL2-

NORTH
GRAPHIC SCALE IN FEET
0 10 20 40
SCALE= 1:20

EXISTING GRADE ALONG PROPOSED SEWER

EXST SSMH-11332 STA 10+00 RIM=180.02 DEPTH=11.6 INV IN=168.82 (12" SW) INV OUT (EXST)=168.12
PROP SSMH-2.1 (MIN 6" EXTENDED BASE) STA 10+50.45 RIM=181.56 DEPTH=12.5 INV IN=171.29 (8" SW) INV OUT=169.02 (12" NE)
PROP 8" DI WATER LINE -WL1- ELEV:177.82
REMOVE EXST WATER LINE
REMOVE EXST 48" RCP ELEV:173.19
10'x4' RCBC ELEV:172.31
CORED CONNECTION TO EXISTING MANHOLE
EXIST. 15" CONC PIPE SLOPE: 1.95%
24" STEEL ENCASEMENT MIN. WALL THICKNESS=0.25"
REMOVE EXISTING CONC PIPE
EXIST. 8" CONC PIPE SLOPE: 2.32%
12" MIN
BEGIN 24" STEEL CASING PIPE STA 10+12.81
51 LF 12" RJ P-401 LINED DI @ 0.40%
END 24" STEEL CASING PIPE STA 10+34.97
-SS2- PROFILE 1"=20' HOR. 1"=2' VER.

SSMH-1.1 STA 10+00 RIM=174.44 DEPTH=11.9 INV IN=162.51 (16" N) INV OUT (EXST)=162.51 (15" SE)
SSMH-1.2 - 1A.1 STA 10+40.52 RIM=173.10 DEPTH=10.5 INV OUT=162.68 (16" W) INV OUT=163.80 (8" E) INV IN=162.58 (16" S)
SSMH-1.3 (MIN 6" EXTENDED BASE) STA 11+13.43 RIM=175.51 DEPTH=12.6 INV OUT=162.87 (16" E)
REMOVE EXST 48" RCP ELEV:167.62
10'x4' RCBC ELEV:165.96
30" STEEL ENCASEMENT MIN. WALL THICKNESS=0.50"
EXST. 15" CONC PIPE SLOPE: 0.36%
10.5"
6"
EXCAVATABLE FLOWABLE FILL TO PIPE CROWN
73 LF 16" P-401 LINED DIP @ 0.26%
EXST. 15" CONC PIPE SLOPE: 1.95%
BEGIN 30" STEEL CASING PIPE STA 10+10.47
41 LF 16" RJ P-401 LINED DIP @ 0.17%
END 30" STEEL CASING PIPE STA 10+35.47
-SS1- PROFILE 1"=20' HOR. 1"=2' VER.

SSMH-1.2 - 1A.1 STA 10+40.52 RIM=173.10 DEPTH=10.5 INV OUT=162.68 (16" W) INV OUT=163.80 (8" E) INV IN=162.58 (16" S)
SSMH-1A.2 STA 10+96.37 RIM=173.66 DEPTH=7.9 INV OUT=165.77 (8" W)
97 LF 8" P-401 LINED DIP @ 2.04%
3.08'
EXST. 15" CONC PIPE SLOPE: 2.54%
PROP 8" DI WATER LINE -WL2- ELEV:161.82
-SS1A- PROFILE 1"=20' HOR. 1"=2' VER.

SSMH-3.0 STA 10+00.00 RIM=198.19 DEPTH=7.2 INV IN=190.97 (8" SW) INV OUT (EXST)=190.97 (8" NE)
EXST SSMH-11010/SSMH-3.1 STA 10+57.65 RIM=198.47 DEPTH=7.2 INV IN=191.44 (8" SW) INV OUT=191.24 (8" NE)
PROP SSMH-3.2 STA 11+24.81 RIM=200.53 DEPTH=8.7 INV IN (EXST)=192.98 (8" SW) INV OUT=191.85 (8" NE)
REMOVE EXST 24" RCP ELEV:194.00
PROP 42" RCP ELEV:192.41
REMOVE EXST 24" RCP ELEV:195.29
PROP 42" RCP ELEV:193.77
CORED CONNECTION TO EXISTING MANHOLE
REMOVE EXISTING CONC PIPE
REMOVE EXISTING CONC PIPE
6" MIN
1' MIN
58 LF 8" P-401 LINED DIP @ 0.47%
67 LF 8" P-401 LINED DIP @ 0.61%
EXST. 8" CONC PIPE SLOPE: 0.47%
EXST. 8" CONC PIPE SLOPE: 2.52%
-SS3- PROFILE 1"=20' HOR. 1"=2' VER.

SANITARY SEWER - RELOCATION (-SS1-, -SS1A, -SS2-, -SS3-)

SHEET NUMBER 25 OF 45
PLAN TYPE: 100% PLANS

Kimley»Horn
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421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES
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ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049249 KEVIN HOLLAND

REVISIONS
REV. # | DESCRIPTION | REV.BY | DATE

ISSUED FOR CONSTRUCTION

PROJECT TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025
DRAWN : JNB
CHECK : NDR
APPROVED : NLH
SCALE: 1:20

PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:Tryon Drainage UC Layout:25 SANITARY SEWER - RELOCATION (-SS1- -SS1A -SS2- -SS3-) November 18, 2025 11:13:01am K:\RAL_Roadway\011017025_Tryon_Drainage\Utilities\UC\Plan Sheets\UTILITY PLANS.dwg

1. ALL WATER MAINS, LATERALS AND APPURTENANCES SHALL BE INSTALLED AND TESTED IN ACCORDANCE WITH FAYPWC STANDARDS.
2. CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL PROVIDE A MINIMUM OF 48 HOURS NOTICE FOR ALL WATER OUTAGES.
4. CONSTRUCTION STAKING IS REQUIRED FOR ALL FAYPWC WATER AND SEWER UTILITY INSTALLATIONS. CUT SHEETS, SIGNED AND SEALED BY A NC PLS, SHALL BE PROVIDED TO THE FAYPWC WATER RESOURCES ENGINEERING DEPARTMENT AND THE CONTRACTOR IN ADVANCE OF CONSTRUCTION FOR FAYPWC WATER AND SEWER UTILITIES.
5. CONTRACTOR SHALL MAINTAIN A COPY OF THE SIGNED AND SEALED CUT SHEET ON THE JOB SITE. CONSTRUCTION ON FAYPWC WATER AND SEWER UTILITIES CANNOT BEGIN UNTIL THE CONTRACTOR POSSESSES, ON SITE, A SIGNED AND SEALED CUT SHEET FROM THE PROFESSIONAL LAND SURVEYOR.
6. ALL NEW WATER AND SEWER MAINS, LATERALS, AND APPURTENANCES SHALL BE TESTED AND/OR DISINFECTED IN ACCORDANCE WITH FAYPWC STANDARDS PRIOR TO PLACING INTO SERVICE.
7. CONTRACTOR SHALL COORDINATE TESTING AND INSPECTION WITH THE FAYPWC PROJECT COORDINATOR.
8. CONTRACTOR SHALL REPAIR ALL WATER LATERALS AND MAINS DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL REPORT IMMEDIATELY ALL WATER MAIN AND LATERAL BREAKS TO THE FAYPWC PROJECT COORDINATOR. THE CONTRACTOR SHALL INITIATE IMMEDIATE REPAIRS IN ACCORDANCE WITH FAYPWC STANDARDS. CONTRACTOR SHALL NOT OPERATE FAYPWC WATER MAIN VALVES WITHOUT FAYPWC APPROVAL AND SHALL COORDINATE ALL VALVE CLOSINGS WITH FAYPWC.
9. THE CONTRACTOR SHALL NOT USE HOUSE HOSE BIBBS OR ANY OTHER METHOD OF BLOW OFF WHICH ALLOWS DOMESTIC WATER CONTAINING SEDIMENTS OR HIGH LEVELS OF CHLORINE TO PASS THRU RESIDENT'S METERS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES RESULTING FROM ALLOWING "DIRTY" WATER TO ENTER RESIDENTS PLUMBING SYSTEM, SUCH AS WATER HEATERS, STAINED CLOTHING, CLOGGED SCREENS, ETC.
10. TRANSFER OF WATER SERVICES SHALL BE ACCOMPLISHED AS FOLLOWS:
    A. INSTALL, TEST AND STERILIZE NEW MAIN AND LATERALS. LATERALS SHALL BE INSTALLED 18" INSIDE RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY FAYPWC.
    B. TRANSFER EXISTING METER TO NEW METER BOX AND TIE NEW WATER LATERAL TO EXISTING DOMESTIC SERVICE UTILIZING BRASS FITTINGS. SAME METER NUMBER SHALL BE INSTALLED ON SAME ADDRESS AND/OR CUSTOMER. BLOW OFF SERVICE AT HOSE BIBB ON HOUSE ONLY AFTER METER HAS BEEN TRANSFERRED.
    C. AFTER ALL SERVICES ARE TRANSFERRED TO THE NEW SYSTEM, SHUT OFF VALVE ON EXISTING SYSTEM AND ABANDON EXISTING MAINS IN ACCORDANCE WITH FAYPWC REQUIREMENTS.
    D. CONTRACTOR SHALL SUPPLY NEW METER BOXES AND DISPOSE OF EXISTING METER BOXES.
11. CONTRACTOR SHALL ABANDON ("KILL-OUT") ANY EXISTING WATER SERVICES THAT WILL NOT BE UTILIZED BY CUTTING THE SERVICE AT THE MAIN, PLUGGING THE CORPORATION, AND TURNING OFF THE CORPORATION AT THE METER BOX, THE ABANDONED SERVICE IS TO BE CUT OR CRIMPED, AND BURIED A MINIMUM OF 3 FEET BELOW GRADE.
12. ALL EXISTING UTILITIES IMPACTED BY CONSTRUCTION SHALL BE ADJUSTED TO FINISHED GRADE, IN ACCORDANCE WITH FAYPWC REQUIREMENTS.
13. ALL WORK ON FAYPWC WATER UTILITIES (MAINS, LATERALS, ETC) SHALL BE PERFORMED BY A LICENSED UTILITY CONTRACTOR. THE FAYETTEVILLE PUBLIC WORKS COMMISSION SHALL OBSERVE AND APPROVE ALL WORK ON FAYPWC WATER UTILITIES. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH FAYPWC REQUIREMENTS.
14. SEPARATION REQUIREMENTS:
    A. **LATERAL SEPARATION OF SEWERS AND WATER MAINS:** WATER MAINS SHALL BE LAID AT LEAST 10 FEET LATERALLY FROM EXISTING OR PROPOSED SEWER MAIN/LATERAL, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENT A 10-FOOT LATERAL SEPARATION - IN WHICH CASE:
        i. THE WATER MAIN IS LAID IN A SEPARATE TRENCH, WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL; OR
        ii. THE WATER MAIN IS LAID IN THE SAME TRENCH AS THE SEWER MAIN/LATERAL WITH THE WATER MAIN LOCATED AT ONE SIDE ON A BENCH OF UNDISTURBED EARTH AND WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL.
    B. **CROSSING A WATER MAIN OVER A SEWER:** WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS OVER A SEWER MAIN/LATERAL, THE WATER MAIN SHALL BE LAID AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18-INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL.
    C. **CROSSING WATER MAIN UNDER A SEWER:** WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS UNDER A SEWER MAIN/LATERAL, A MINIMUM OF 18-INCHES OF SEPARATION SHALL BE PROVIDED. BOTH THE WATER MAIN AND THE SEWER MAIN/LATERAL SHALL BE CONSTRUCTED OF DUCTILE IRON MATERIAL AND WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10-FEET ON EACH SIDE OF THE POINT OF CROSSING. A SECTION OF WATER MAIN PIPE SHALL BE CENTERED AT THE POINT OF CROSSING.

WATER UTILITY NOTES		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 2	DWG. NO. W.1	DWG. BY: FAYPWC		1	01/01/18	ADDED NOTES 6, 8
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT	2	06/01/21	ADDED NOTES 1-7 AND RENUMBERED
				3	11/23	REVISED NOTES 10, 14

W1-WATER-UTILITY-NOTES.dwg

D. **CROSSING STORM DRAINAGE LINES:** A MINIMUM OF 12-INCHES OF VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN A WATER LINE CROSSING OVER A STORM DRAINAGE LINE UNLESS DUCTILE IRON PIPE IS USED. IN ADDITION, THREE AND A HALF (3.5) FEET OF COVER MUST BE MAINTAINED OVER THE WATER MAIN OR IT SHALL BE DUCTILE IRON. IF DUCTILE IRON PIPE IS USED THEN TWO AN A HALF (2.5) FEET OF COVER MUST BE MAINTAINED OVER THE WATER MAIN AND A MINIMUM OF 12-INCHES OF VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN THE WATER MAIN AND THE STORM DRAINAGE LINE. WHERE A WATER MAIN CROSSES UNDER A STORM DRAINAGE LINE THE MINIMUM OF TWELVE (12) INCHES OF VERTICAL SEPARATION SHALL BE MAINTAINED AND THE WATER MAIN SHALL BE DUCTILE IRON FOR A DISTANCE OF 10-FEET ON EACH SIDE OF THE CROSSING.

15. **WATER OUTAGES:** THE CONTRACTOR SHALL SCHEDULE A COORDINATION MEETING WITH THE FAYPWC PROJECT COORDINATOR AND PROJECT ENGINEER A MINIMUM OF THREE (3) WORKING DAYS PRIOR TO ANY PLANNED WATER OUTAGE. THE COORDINATION MEETING SHALL BE CONDUCTED PRIOR TO ANY NOTICES BEING ISSUED. ADDITIONALLY, THE CONTRACTOR SHALL LOCATE (VERTICALLY AND HORIZONTALLY) ANY UTILITIES WITHIN THE WORK AREA, IN ACCORDANCE WITH THESE CONTRACT DOCUMENTS. THE LOCATIONS OF ALL UTILITIES WITHIN THE WORK AREA SHALL BE DETERMINED PRIOR TO THE COORDINATION MEETING. ANY CONFLICTS WITH THE PENDING WORK AND THE EXISTING UTILITIES SHALL BE IDENTIFIED AND A PLAN FOR RESOLVING ANY CONFLICTS SHALL BE PRESENTED. THE PURPOSE OF THIS COORDINATION MEETING IS TO ENSURE THAT THE CONTRACTOR HAS A GOOD UNDERSTANDING OF THE REQUIREMENTS RELATED TO THE PENDING OUTAGE. VERIFY THAT THERE ARE NO UTILITY CONFLICTS THAT WILL PREVENT THE WORK FROM BEING COMPLETED. ALL EQUIPMENT IS IN GOOD WORKING ORDER, ALL EQUIPMENT IS FUNCTIONAL. ALL MATERIALS ARE ON SITE, ALL NECESSARY TOOLS ARE ON SITE, DISCUSS ANY NECESSARY CONTINGENCY PLANS, AND ANY OTHER ITEMS NECESSARY TO ENSURE THAT THE FAYETTEVILLE PUBLIC WORKS COMMISSION HAS CONFIDENCE THAT THE WORK CAN BE ACCOMPLISHED WITHIN THE GIVEN TIME PERIOD. SHOULD, FOR ANY REASON, THE FAYETTEVILLE PUBLIC WORKS COMMISSION DEEM THAT THE CONTRACTOR IS NOT PREPARED FOR THE PROPOSED OUTAGE, THE OUTAGE NOTIFICATIONS WILL NOT BE DISTRIBUTED AND THE OUTAGE SHALL BE POSTPONED A MINIMUM OF TWO (2) WEEKS. THE FAYETTEVILLE PUBLIC WORKS COMMISSION WILL PROVIDE WRITTEN NOTIFICATION TO THE CONTRACTOR OF THIS DECISION. NO ADDITIONAL CONTRACT TIME WILL BE GRANTED FOR THIS DELAY. SHOULD THE CONTRACT TIME EXPIRE WITHIN THAT TWO (2) WEEK PERIOD, THE FAYETTEVILLE PUBLIC WORKS COMMISSION RESERVES THE RIGHT TO ASSESS LIQUIDATED DAMAGES, AS OUTLINED IN THESE CONTRACT DOCUMENTS.

ONCE THE WATER OUTAGE NOTIFICATIONS HAVE BEEN ISSUED, A FOLLOW-UP COORDINATION MEETING WITH THE FAYPWC PROJECT COORDINATOR AND PROJECT ENGINEER SHALL BE HELD A MINIMUM OF 24 HOURS PRIOR TO THE SCHEDULED THE PURPOSE OF THIS MEETING IS TO VERIFY THAT THE CONTRACTOR IS PREPARED TO PROCEED WITH THE OUTAGE, AND THAT ALL EQUIPMENT, MATERIALS, TOOLS, AND ALL OTHER INCIDENTALS ARE ON THE PROJECT SITE AND FUNCTIONING. IF FOR ANY REASON THE FAYETTEVILLE PUBLIC WORKS COMMISSION DEEMS THAT THE CONTRACTOR IS NOT PREPARED, THE OUTAGE SHALL BE POSTPONED AND ALL CUSTOMERS IMMEDIATELY NOTIFIED OF THE CANCELLATION. THE OUTAGE SHALL BE POSTPONED A MINIMUM OF TWO (2) WEEKS. NO ADDITIONAL CONTRACT TIME WILL BE GRANTED FOR THIS DELAY. SHOULD THE CONTRACT TIME EXPIRE WITHIN THAT TWO (2) WEEK PERIOD, THE FAYETTEVILLE PUBLIC WORKS COMMISSION RESERVES THE RIGHT TO ASSESS LIQUIDATED DAMAGES, AS OUTLINED IN THESE CONTRACT DOCUMENTS.

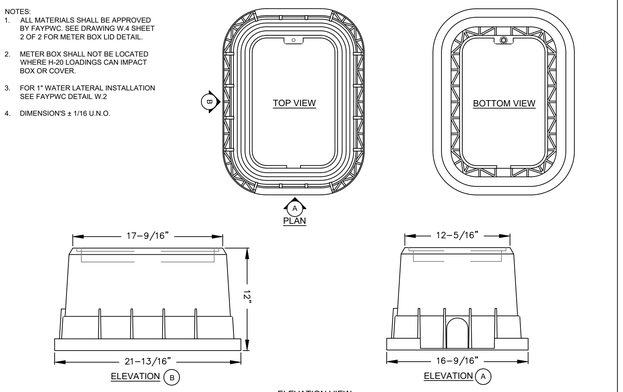
THE CONTRACTOR SHALL COMPLETE THE REQUIRED WORK AND RESTORE WATER SERVICE WITHIN THE GIVEN TIME PERIOD FOR THE OUTAGE. IF THE FAYPWC PROJECT COORDINATOR DETERMINES THAT THE CONTRACTOR WILL NOT RESTORE WATER SERVICE WITHIN THE APPROVED TIMEFRAME, THE FAYPWC PROJECT COORDINATOR WILL DIRECT THE CONTRACTOR ON HOW TO RESTORE WATER SERVICE. THE CONTRACTOR SHALL ADHERE TO ALL INSTRUCTIONS GIVEN BY THE FAYPWC PROJECT COORDINATOR.

SHOULD THE CONTRACTOR FAIL TO COMPLETE THE WORK WITHIN THE ALLOTTED TIME, THE FAYETTEVILLE PUBLIC WORKS COMMISSION SHALL ASSESS A PENALTY OF $500 PER 15-MINUTE INTERVAL OR ANY PORTION THEREOF UNTIL WATER SERVICE IS RESTORED. THIS PENALTY WILL BE DEDUCTED FROM THE CONTRACTOR'S PAY APPLICATION OR BE BILLED DIRECTLY TO THE CONTRACTOR. THE PENALTY MAY BE WAIVED FOR CIRCUMSTANCES BEYOND THE CONTRACTOR'S CONTROL, AS DEEMED BY THE FAYETTEVILLE PUBLIC WORKS COMMISSION. THE FAYPWC PROJECT COORDINATOR AND/OR PROJECT ENGINEER RESERVE THE RIGHT TO CANCEL OR POSTPONE THE OUTAGE AT ANY GIVEN TIME, IF DEEMED NECESSARY.

WATER UTILITY NOTES		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 2 OF 2	DWG. NO. W.1	DWG. BY: FAYPWC		1	01/01/18	ADDED NOTES 6, 8
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT	2	06/01/21	ADDED NOTES 1-7 AND RENUMBERED
				3	11/23	REVISED NOTES 10, 14

W1-WATER-UTILITY-NOTES.dwg

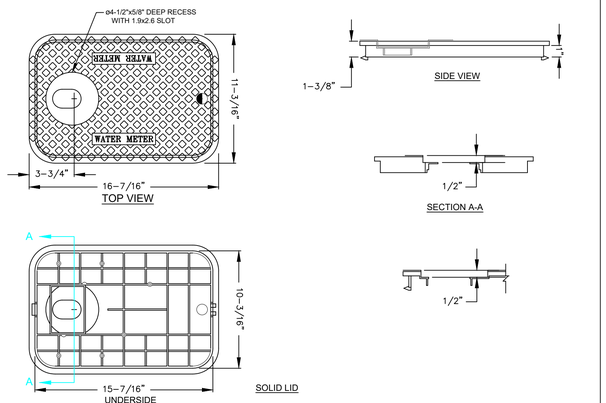
NOTES:
1. ALL MATERIALS SHALL BE APPROVED BY FAYPWC. SEE DRAWING W.4 SHEET 2 OF 2 FOR METER BOX LID DETAIL.
2. METER BOX SHALL NOT BE LOCATED WHERE H-20 LOADINGS CAN IMPACT BOX OR COVER.
3. FOR 1" WATER LATERAL INSTALLATION SEE FAYPWC DETAIL W.2
4. DIMENSION'S ± 1/16 U.N.O.



ELEVATION VIEW

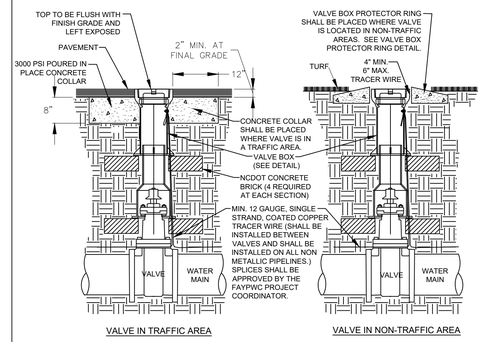
1-INCH METER BOX DETAILS N.T.S.		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 2	DWG. NO. W.4	DWG. BY: FAYPWC		1	03/10	CHANGED BOX DIMENSIONS
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT			

W4-1IN-METERBOX.dwg



1-INCH METER BOX LID N.T.S.		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 2 OF 2	DWG. NO. W.4	DWG. BY: FAYPWC		1	07/07	REVISED LID
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT	1	03/10	CHANGED BOX AND LID DIMENSIONS
				2	01/15	REVISED LID

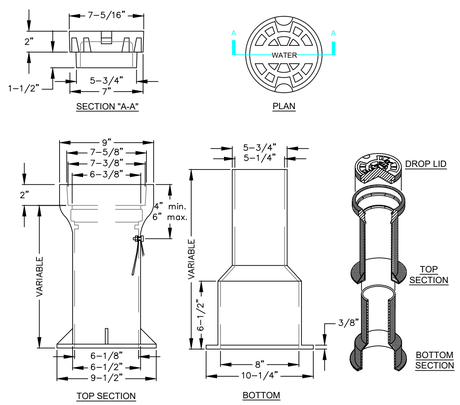
W4-1IN-METERBOX.dwg



NOTES:
1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH FAYPWC STANDARDS.
2. RESILIENT WEDGE GATE VALVE SHALL BE AS MANUFACTURED BY MUELLER CORP., AMERICAN DARLING OR CLOW CORP.
3. ALL VALVES SHALL HAVE 2" SQUARE OPERATING NUT AND SHALL OPEN COUNTERCLOCKWISE.
4. VALVE BODY, BONNET, AND GATE SHALL BE IN ACCORDANCE WITH AWWA C-509/C-515 AND NSF61.
5. VALVE BODY AND BONNET SHALL BE COATED ON ALL INTERIOR AND EXTERIOR SURFACES WITH A FUSION BONDED EPOXY IN ACCORDANCE WITH AWWA C-550-90.
6. ALL VALVES 24" AND SMALLER SHALL HAVE A SAFE WORKING PRESSURE OF 250PSI.
7. SEE VALVE BOX DETAIL FOR ADDITIONAL INFORMATION.
8. SEE VALVE BOX PROTECTOR RING DETAIL FOR ADDITIONAL INFORMATION.
9. VALVE BOX SECTIONS ARE REQUIRED. THE USE OF PIPE IN LIEU OF VALVE BOX SECTIONS SHALL NOT BE PERMITTED.

GATE VALVE N.T.S.		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.6	DWG. BY: FAYPWC		1	6/06	ADDED NOTE NO. 9
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT	2	7/09	CLARIFIED NOTES

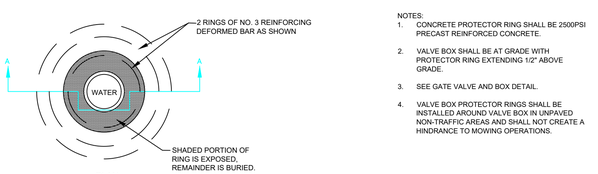
W6-GATEVALVE.dwg



NOTES:
1. VALVE BOX SHALL BE 3 PART SLIP-TYPE MANUFACTURED BY SIGMA CORPORATION (VB-462), TYLER UNION (6855 SERIES), STAR PIPE PRODUCTS (VB-0004), OR APPROVED EQUAL.
2. VALVE BOX SHALL BE 3-PIECE CLOSE GRAINED CAST IRON SLIP-TYPE VALVE BOX WITH A MINIMUM THICKNESS OF 3/16".
3. VALVE BOX SHALL HAVE RAISED LETTERS "WATER" CAST INTO COVER.
4. VALVE BOX SHALL HAVE 3/8" HOLE DRILLED IN TOP SECTION THRU WHICH A 1/4"x1-1/2" GALVANIZED BOLT SHALL BE USED TO SECURE A MINIMUM 12 GAUGE, SINGLE STRAND, COATED COPPER OR COPPER CLAD STEEL TRACER WIRE FOR NON-FERROUS PIPE. A 1/2" WASHER SHALL BE USED BETWEEN NUT AND INSIDE OF BOX. TIGHTEN HAND TIGHT.
5. SCREW TYPE VALVE BOXES ARE NOT ACCEPTABLE.
6. DIMENSIONS SHOWN VARY BASED UPON THE MANUFACTURER. ACTUAL DIMENSIONS SHALL BE APPROVED BY FAYPWC.
7. VALVE BOX SECTIONS ARE REQUIRED. THE USE OF PIPE IN LIEU OF VALVE BOX SECTIONS SHALL NOT BE PERMITTED.
8. TRACING WIRE SHALL BE INSTALLED OUTSIDE OF BOX.
9. REFER TO FAYPWC DETAIL W.6 FOR INSTALLATION REQUIREMENTS.

VALVE BOX N.T.S.		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.7	DWG. BY: FAYPWC		1	07/09	ADDED NOTES 7, 8, AND CLARIFIED NOTES
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT	2	01/14	REVISED NOTES 1, 4, 6

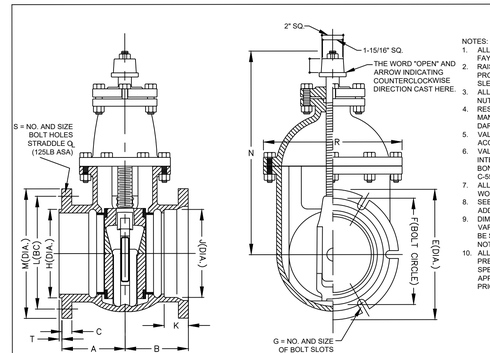
W7-VALVEBOX.dwg



NOTES:
1. CONCRETE PROTECTOR RING SHALL BE 2500PSI PRECAST REINFORCED CONCRETE.
2. VALVE BOX SHALL BE AT GRADE WITH PROTECTOR RING EXTENDING 1/2" ABOVE GRADE.
3. SEE GATE VALVE AND BOX DETAIL.
4. VALVE BOX PROTECTOR RINGS SHALL BE INSTALLED AROUND VALVE BOX IN UNPAVED NON-TRAFFIC AREAS AND SHALL NOT CREATE A HINDRANCE TO MOWING OPERATIONS.

VALVE BOX PROTECTOR RING N.T.S.		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.8	DWG. BY: FAYPWC				
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT			

W8-CONC-PROTECTOR-RING.dwg

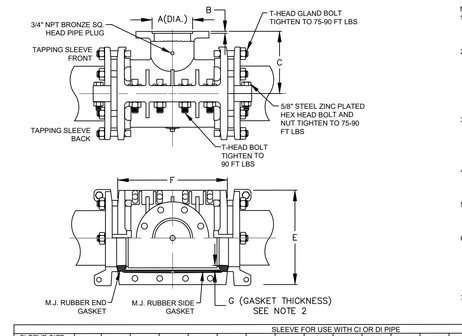


NOTES:
1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH FAYPWC STANDARDS.
2. RAISED MALE FACE SHALL BE REQUIRED TO PROVIDE FOR PROPER ALIGNMENT OF THE TAPPING SLEEVE.
3. ALL VALVES SHALL HAVE 2" SQUARE OPERATING NUT AND SHALL OPEN COUNTERCLOCKWISE.
4. RESILIENT WEDGE GATE VALVE SHALL BE AS MANUFACTURED BY MUELLER CORP., AMERICAN DARLING, CLOW CORP., OR APPROVED EQUAL.
5. VALVE BODY, BONNET, AND GATE SHALL BE IN ACCORDANCE WITH AWWA C-509/C-515 AND NSF61.
6. VALVE BODY AND BONNET SHALL BE COATED ON ALL INTERIOR AND EXTERIOR SURFACES WITH A FUSION BONDED EPOXY IN ACCORDANCE WITH AWWA C-550-90.
7. ALL VALVES 24" AND SMALLER SHALL HAVE A SAFE WORKING PRESSURE OF 250PSI
8. SEE TAPPING SLEEVE (DETAIL W.10 OR W.11) FOR ADDITIONAL INFORMATION.
9. DIMENSIONS SHOWN ARE FOR REFERENCE AND MAY VARY BASED UPON MANUFACTURER. VALVES SHALL BE SIMILAR IN NATURE TO THAT SHOWN AND SHALL NOT DEVIATE IN ESSENTIAL DETAILS.
10. ALL TAPPING SLEEVES SHALL BE HYDROSTATICALLY PRESSURE TESTED IN ACCORDANCE WITH FAYPWC SPECIFICATIONS. TEST SHALL BE WITNESSED AND APPROVED BY FAYPWC PROJECT COORDINATOR PRIOR TO BEGINNING TAPPING PROCESS.

VALVE SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	R	S	T	TURNS TO OPEN	WEIGHT W/ACC
4	4-3/8	5-7/8	15/16	1-1/2	9	7-1/2	4-7/8	4-63/64	4-29/32	2-1/2	7-1/2	9	14-1/8	9	8-3/4	1/4	14	116
6	6-7/8	6-1/4	1	1-5/8	11	9-1/2	6-7/8	6-63/64	7	2-1/2	9-1/2	11	17-5/8	11-3/4	8-7/8	1/4	21	175
8	6-1/2	7-1/4	1-1/8	1-3/4	13-1/4	11-3/4	6-7/8	8-63/64	9-5/32	2-1/2	11-3/4	13-1/2	21	14-1/4	8-7/8	1/4	28	274
12	7	8-1/4	1-1/4	1-3/4	17-7/8	16-1/4	8-7/8	12-63/64	13-5/16	2-1/2	17	19	28-1/4	19-1/8	12-1	1/4	39	570
16	8-1/2	9-1/8	1-7/16	2-1/16	23	21	12-7/8	16-15/16	17-35/64	3-1/2	21-1/4	23-1/2	35-5/8	26-1/8	16-1 1/8	1/4	55	1140
24	10-1/2	14-1/4	1-7/8	2-1/2	31-3/4	30	16-7/8	24-15/16	25-19/16	3-1/2	29-1/2	32	54-5/8	37-5/8	20-1 3/8	5/16	79	3225

TAPPING VALVE N.T.S.		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.9	DWG. BY: FAYPWC		1	07/09	ADDED NOTE 10, REVISED 4 AND 5
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT	2	07/13	REVISED NOTES 4, 8, 10

W9-M.J.-TAPPING-VALVE.dwg



NOTES:
1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH FAYPWC STANDARDS. SLEEVE BODY SHALL BE DUCTILE IRON ASTM A536.
2. MECHANICAL JOINT TAPPING SLEEVES SHALL BE AS MANUFACTURED BY CLOW, M & H, MUELLER, OR AMERICAN AND SHALL BE FURNISHED WITH SPLIT GLANDS, SPLIT END GASKET, BOLTS, ETC. THE OUTLET FLANGE SHALL BE CI, 125 PER ANSI B16.1 COMPATIBLE WITH APPROVED TAPPING VALVES.
3. DIMENSIONS SHOWN ARE FOR REFERENCE AND MAY VARY BASED UPON MANUFACTURER. SLEEVES SHALL BE SIMILAR IN NATURE TO THAT SHOWN AND SHALL NOT DEVIATE IN ESSENTIAL DETAILS.
4. PIPE SURFACES SHALL BE CLEANED THOROUGHLY TO PERMIT FOR A GOOD SEAL PRIOR TO INSTALLATION.
5. EXTERIOR OF TAPPING SLEEVE SHALL BE COATED WITH 2 COATS ASPHALTIC VARNISH MIL-C450.
6. ALL TAPPING SLEEVES SHALL BE HYDROSTATICALLY PRESSURE TESTED IN ACCORDANCE WITH FAYPWC SPECIFICATIONS. TEST SHALL BE WITNESSED AND APPROVED BY FAYPWC PROJECT COORDINATOR PRIOR TO BEGINNING TAPPING PROCESS.
7. SEE DETAILS W.9 AND W.17 FOR ADDITIONAL REQUIREMENTS.

SLEEVE FOR USE WITH CI OR DI PIPE

SLEEVE SIZE PIPE X BRANCH A DIA +.031-.000	6X6	8X6	8X8	12X6	12X8	12X12	16X8	16X8	16X12	24X6	24X8	24X12	24X16	24X24	30X6	30X8	30X12	30X16	30X24
	7.016	7.016	9.016	7.016	9.016	13.016	7.016	9.016	13.016	11.00	13.5	19.0	23.5	32.0	11.00	13.5	19.0	23.5	32.0
B	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
C	7-7/8	9-1/16	9	11-5/8	11-7/8	12-7/8	14-1/8	14-1/2	14-7/8	19.5	19.5	19.5	20.5	20.5	23.25	23.25	23.25	23.75	23.75
E	11-3/4	13-7/8	13-7/8	18-1/2	18-1/2	18-1/2	23-1/2	23-1/2	23-1/2	35.5	35.5	35.5	35.5	35.5	43.37	43.37	43.37	43.37	43.37
F	13-1/2	15	15	19-1/2	19-1/2	19-1/2	22-1/2	22-1/2	22-1/2	18.0	18.0	24.0	30.0	36.0	24.0	24.0	24.0	36.0	36.0

DUCTILE IRON TAPPING SLEEVE N.T.S.		FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.10	DWG. BY: FAYPWC		1	07/09	REVISED NOTE 6/REMOVED NOTE 8
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	WATER RESOURCES ENGINEERING DEPARTMENT	2	07/13	REVISED NOTES 6, 7

W10-M.J.-TAPPING-SLEEVE.dwg

PWC WATER DETAILS

SHEET NUMBER 26 OF 45

PLAN TYPE: 100% PLANS

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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FAYETTEVILLE PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040240 KEVIN A. HOLLOWAY
SIGNATURE DATE

REV. #	DESCRIPTION	REVISIONS REV.BY DATE

ISSUED FOR CONSTRUCTION

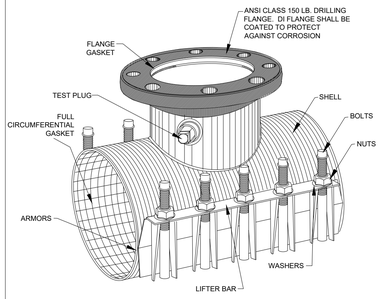
PROJECT NO. KH 011017025
SUB-LEDGER NO.

DRAWN : JNB
CHECK : NDR
APPROVED : NLH
SCALE: NOT TO SCALE

PROJECT TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

Plotted By:Anderson,

NOMINAL PIPE SIZE (INCH)	BRANCH SIZE	APPROX. WT. LBS.
4"	3",4"	28,30
6"	3",4",6"	36,38,45
8"	3",4",6",8"	42,44,48,66
10"	3",4",6",8",10"	45,48,55,70,80,
12"	3",4",6",8",10",12"	50,52,60,81,96,143
16"	3",4",6",8",10",12"	78,80,85,100,115,172
24"	3",4",6",8",10",12"	85,87,90,100,145,230

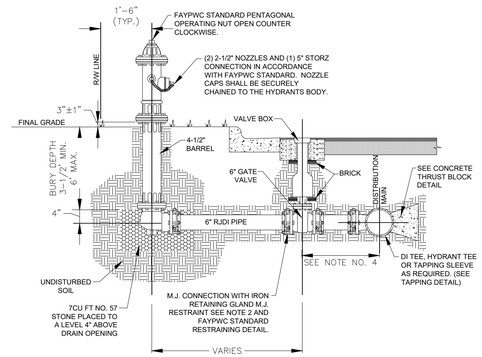


NOTES:

1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH FAYPWC STANDARDS.
2. TAPPING SLEEVES SHALL BE AS MANUFACTURED BY ROMAC, SMITH-BLAIR, OR APPROVED EQUAL
3. STAINLESS STEEL TAPPING SLEEVE MAY BE UTILIZED FOR ALL TAPPING OF MAINS UP TO AND INCLUDING 24" DIAMETER WITH 12" OR LESS BRANCH. BRANCH GREATER THAN 12" SHALL REQUIRE FULL BODY D.I. M.J. TAPPING SLEEVE (SEE DETAIL W.10).
4. SHELL AND LUGS SHALL BE STAINLESS STEEL PER ASTM A 240, TYPE 304 AND 304L.
5. BOLTS SHALL BE 5/8" UNC ROLLED THREAD, STAINLESS STEEL PER ASTM A 193 TYPE 304 4" NOM. PIPE SIZE SHALL HAVE MINIMUM 1/2" BOLTS.
6. NUTS SHALL BE HEAVY HEX STAINLESS STEEL PER ASTM A-194, TYPE 304.
7. WASHERS SHALL BE STEEL AND PLASTIC LUBRICATING WASHER.
8. GASKETS SHALL BE VIRGIN SBR PER ASTM D 2000 MAA 610, COMPOUNDED FOR WATER AND SEWER SERVICE.
9. FLANGE SHALL BE DUCTILE IRON PER ASTM 536, GRADE 65-45-12, OR STAINLESS STEEL PER ASTM A-240, TYPE 304.
10. DIMENSIONS SHOWN ARE FOR REFERENCE AND MAY VARY BASED UPON MANUFACTURER. SLEEVES SHALL BE SIMILAR IN NATURE TO THAT SHOWN AND SHALL NOT DEVIATE IN ESSENTIAL DETAILS.
11. PIPE SURFACES SHALL BE CLEANED THOROUGHLY TO PERMIT A GOOD SEAL PRIOR TO INSTALLATION.
12. ALL TAPPING SLEEVES SHALL BE HYDROSTATICALLY PRESSURE TESTED IN ACCORDANCE WITH FAYPWC SPECIFICATIONS. TEST SHALL BE WITNESSED AND APPROVED BY FAYPWC PROJECT COORDINATOR PRIOR TO BEGINNING TAPPING PROCESS.
13. THE NUMBER OF BOLTS, NUTS AND WASHERS SHOWN ARE FOR ILLUSTRATION ONLY, ACTUAL QUANTITY SHALL BE AS RECOMMENDED BY THE SLEEVE MANUFACTURER FOR THE REQUIRED SERVICE.
14. SEE DETAILS W.9 AND W.17 FOR ADDITIONAL REQUIREMENTS.

STAINLESS STEEL TAPPING SLEEVE N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.11	DWG. BY: FAYPWC	1	07/09	ADDED NOTES 2, 12, AND CLARIFIED NOTES
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	2	07/13	REVISED NOTES 3, 12, 14
	WATER RESOURCES ENGINEERING DEPARTMENT				

W11-SS-TAPPING-SLEEVE.dwg



FIRE HYDRANT AND VALVE INSTALLATION N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 2	DWG. NO. W.13	DWG. BY: FAYPWC	1	08/25/23	REVISED NOTES 16 AND 17
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	2	07/01/09	REVISED NOTE NO. 2, REMOVED NOTE NO. 3 AND ALTERED RESTRAINT DETAIL
	WATER RESOURCES ENGINEERING DEPARTMENT		3	07/01/16	REVISED NOTES

W13-FHCC.dwg

NOTES:

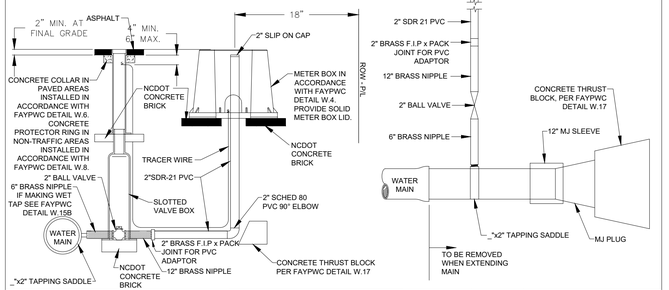
1. FIRE HYDRANT SHALL BE MODELS MANUFACTURED BY MUELLER CO. (CENTURIAN), AMERICAN VALVE AND HYDRANT CO. (MODEL MARK 73), CLOW MEDALLION OR APPROVED EQUAL.
2. ALL VALVES AND HYDRANTS SHALL HAVE M.J. CONNECTIONS WITH IRON RETAINING GLAND M.J. RESTRAINT.
3. HYDRANT VALVE SHALL BE PLACED AS CLOSE AS POSSIBLE TO THE MAIN, BUT DO NOT PLACE VALVE IN PROPOSED OR EXISTING CURB AND GUTTER. IF THE STREET IS SOIL AND NO PAVING IS TO BE DONE AT THIS TIME, THE LOCATION OF THE VALVE IS TO BE DETERMINED BY THE FAYPWC PROJECT COORDINATOR.
4. HYDRANT BRANCH SHALL NOT BE BACK FILLED UNTIL INSPECTED AND APPROVED BY FAYPWC PROJECT COORDINATOR.
5. GATE VALVE AND BOX SHALL BE IN ACCORDANCE WITH FAYPWC STANDARD DETAIL.
6. HYDRANT EXTENSIONS AND/OR OFFSETS SHALL BE APPROVED BY FAYPWC PROJECT COORDINATOR.
7. FIRE HYDRANT CONNECTIONS TO EXISTING WATER MAINS SHALL BE MADE USING A TAPPING SLEEVE AND VALVE BY WET TAP CONNECTION. THE TAPPING SLEEVE AND VALVE SHALL BE HYDROSTATICALLY TESTED PRIOR TO STARTING THE TAP IN THE PRESENCE OF THE FAYPWC PROJECT COORDINATOR.
8. THE PROPOSED LOCATION MAY BE RELOCATED BY THE FAYPWC PROJECT COORDINATOR IF CONFLICTS EXIST (IE: GAS SERVICES, UGE, TELEPHONE, ETC.)
9. THE CONTRACTOR SHALL FIELD VERIFY THE EXISTING WATER MAIN MATERIAL, SIZE, AND DEPTH FOR EACH FIRE HYDRANT LOCATION PRIOR TO ORDERING MATERIALS. THE CONTRACTOR WILL BE REQUIRED TO SUPPLY VARIOUS LENGTHS OF BARRELS AND HYDRANT EXTENSIONS (NO MORE THAN ONE HYDRANT EXTENSION MAY BE USED PER HYDRANT). ADDITIONAL FITTINGS AND/OR HYDRANT EXTENSIONS OR OFFSET CONNECTORS MAY BE REQUIRED TO MAINTAIN PROPER COVER AS APPROVED BY THE FAYPWC PROJECT COORDINATOR.
10. CONTRACTOR SHALL NOTIFY THE APPROPRIATE FIRE DEPARTMENT OF OUT OF SERVICE FIRE HYDRANTS PRIOR TO CONSTRUCTION.
11. FIRE HYDRANT SHALL BE FIELD PAINTED IN ACCORDANCE WITH FAYPWC STANDARDS. BEFORE PROJECT IS ACCEPTED. HYDRANTS SHALL BE PAINTED WITH A GREEN BONNET AND YELLOW BODY. PAINT SHALL BE IN ACCORDANCE WITH FAYPWC REQUIREMENTS. THE CONTRACTOR SHALL PAINT ALL EXPOSED EXTERIOR FIRE HYDRANT SURFACES PRIOR TO FINAL ACCEPTANCE BY FAYPWC. ALL PAINTING SHALL BE DONE IN STRICT ACCORDANCE WITH THE PAINT MANUFACTURER'S RECOMMENDATIONS AND SHALL BE SATISFACTORY TO THE FAYPWC.
12. PROTECTIVE COVERING SHALL BE UTILIZED, AS NECESSARY FOR PROTECTION OF ADJACENT AREAS, EQUIPMENT, SHRUBBERY, OR OTHER ITEMS. AFTER PAINTING IS COMPLETE, THE ENTIRE AREA SHALL BE THOROUGHLY CLEANED UP.
13. ALL PAINT MATERIALS SHALL BE IN THE ORIGINAL SEALED CONTAINERS BEARING THE MANUFACTURER'S NAME.
14. WHERE NECESSARY, THINNING SHALL BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, AND AS APPROVED BY FAYPWC.
15. ALL SURFACES TO BE PAINTED SHALL BE CLEAN AND DRY.
16. THE BONNET OF THE FIRE HYDRANT SHALL BE PAINTED A DARK GREEN, UTILIZING AN OIL BASE GLOSS, WITH A FINAL DRY MIL THICKNESS OF 4 TO 6 MILS. MULTIPLE COATS MAY BE NECESSARY TO ACHIEVE THE FINAL REQUIRED DRY MIL THICKNESS. THE PAINT SHALL BE FOREST GREEN, AS MANUFACTURED BY THE SHERWIN-WILLIAMS COMPANY, PART NUMBER A11T204 BASE AND SW7458 FOREST GREEN. PAINT SHOULD BE MIXED AT THE STORE. SAMPLES SHALL BE SUBMITTED IN ORDER FOR FAYPWC TO CONSIDER ALTERNATIVE PAINT MANUFACTURERS.
17. THE REMAINDER OF THE FIRE HYDRANT SHALL BE PAINTED SAFETY YELLOW, UTILIZING AN OIL BASE GLOSS, WITH A FINAL DRY MIL THICKNESS OF 4 TO 6 MILS. MULTIPLE COATS MAY BE NECESSARY TO ACHIEVE THE FINAL REQUIRED DRY MIL THICKNESS. THE PAINT SHALL BE SAFETY YELLOW, AS MANUFACTURED BY THE SHERWIN-WILLIAMS COMPANY, PART NUMBER B54Y37 BASE AND 617-4072 SAFETY YELLOW. PAINT SHOULD BE MIXED AT THE STORE. SAMPLES SHALL BE SUBMITTED IN ORDER FOR FAYPWC TO CONSIDER ALTERNATE PAINT MANUFACTURERS.

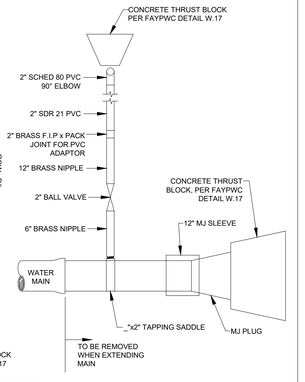
FIRE HYDRANT AND VALVE INSTALLATION N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 2 OF 2	DWG. NO. W.13	DWG. BY: FAYPWC	1	08/25/23	REVISED NOTES 16 AND 17
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	2	07/01/09	REVISED NOTE NO. 2, REMOVED NOTE NO. 3 AND ALTERED RESTRAINT DETAIL
	WATER RESOURCES ENGINEERING DEPARTMENT		3	07/01/16	REVISED NOTES

W13-FHCC.dwg

NOTES:

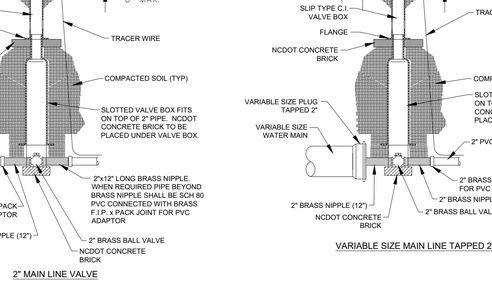
1. ALL MATERIAL SHALL BE APPROVED BY FAYPWC.
2. WHEN INSTALLED IN A PAVED AREA METER BOX SHALL BE SET 1/4" ABOVE FINISHED PAVEMENT GRADE AND PAVEMENT FEATHERED TO TOP OF BOX. COMPOSITE METER BOX (FAYPWC DETAIL W.48) SHALL BE USED IN PAVED AREAS.
3. METER BOX SHALL BE IN ACCORDANCE WITH FAYPWC DETAILS. PROVIDE SOLID METER BOX LID.
4. BLOW-OFF ASSEMBLY NOT TO BE RE-USED UNLESS APPROVED BY FAYPWC.
5. REMOVE ENTIRE ASSEMBLY FROM BELL OF WATER MAIN PIPE WHEN EXTENDING THE MAIN
6. CENTER 2" SDR-21 PIPE IN METER BOX.
7. INSTALLATION SHALL BE INSPECTED AND APPROVED BY FAYPWC PROJECT COORDINATOR PRIOR TO BACKFILL.
8. CONTRACTOR SHALL INSTALL TRACING WIRE INTO THE BOX. A MINIMUM OF 2' OF WIRE SHALL BE IN BOX.
9. VALVE BOX TO BE INSTALLED IN ACCORDANCE WITH FAYPWC DETAIL W.7.





2" BLOW OFF N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.15	DWG. BY: FAYPWC	1	08/06	CHANGED FITTINGS TO SCHED 80
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	2	11/06	REVISED CONFIGURATION
	WATER RESOURCES ENGINEERING DEPARTMENT		3	07/17	REVISED NOTES

W15-2-BLOWOFF.dwg

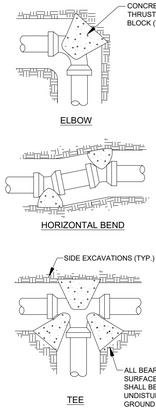


2" MAIN LINE VALVE

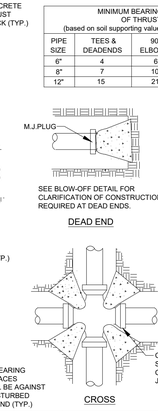
VARIABLE SIZE MAIN LINE TAPPED 2"

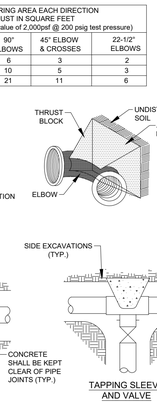
2" VALVE INSTALLATION N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.15A	DWG. BY: FAYPWC	1	06/06	ADDED NOTE ON CONCRETE COLLAR
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	2	07/17	UPDATED NOTES
	WATER RESOURCES ENGINEERING DEPARTMENT				

W15A-2-VALVE-INSTALLATION.dwg



MINIMUM BEARING AREA EACH DIRECTION OF THRUST IN SQUARE FEET (based on soil supporting value of 2,000psf @ 200 psig test pressure)				
PIPE SIZE	TEES & DEADENDS	90° ELBOWS	45° ELBOW & CROSSES	22-1/2° ELBOWS
6"	4	6	3	2
8"	7	10	5	3
12"	15	21	11	6



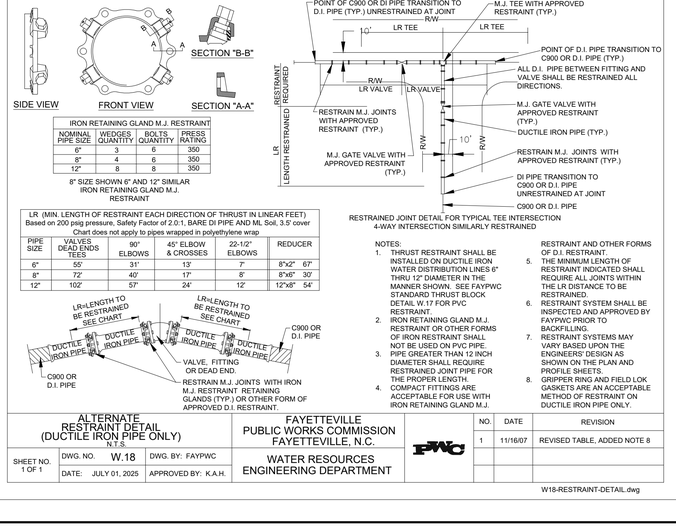


NOTES:

1. THRUST BLOCKS SHALL BE INSTALLED ON PVC WATER DISTRIBUTION LINES 6" THRU 12" DIAMETER IN THE MANNER SHOWN. SEE FAYPWC STANDARD ALTERNATE RESTRAINING DETAIL W.18 FOR ACCEPTABLE ALTERNATE RESTRAINING SYSTEMS.
2. PIPE GREATER THAN 12 INCH DIAMETER SHALL REQUIRE RESTRAINT JOINT PIPE FOR THE PROPER LENGTH.
3. COMPACT FITTINGS ARE NOT ACCEPTABLE. STANDARD FITTINGS SHALL BE USED WITH CONCRETE THRUST BLOCKING.
4. THRUST BLOCKS SHALL BE INSTALLED ON SEWER FORCE MAIN IN THE MANNER SHOWN.
5. IF SAC-CRETE IS USED, MIXING MUST BE ON SITE UTILIZING A MECHANICAL MIXER.
6. NO CONCRETE SHALL BE PLACED ON BOLTS. WRAP JOINT FITTINGS WITH PLASTIC.
7. CONCRETE SHALL BE A MINIMUM 3,000PSI.
8. ALL BEARING SURFACES SHALL BE AGAINST UNDISTURBED SOIL AND SHALL BE APPROVED BY FAYPWC PROJECT COORDINATOR PRIOR TO PLACEMENT OF CONCRETE.
9. USE OF RESTRAINED JOINT DUCTILE IRON WILL BE REQUIRED IF SOIL CONDITIONS DO NOT ALLOW THE USE OF THRUST BLOCKS.
10. ALL VERTICAL BENDS SHALL BE RESTRAINED USING RESTRAINED JOINT DUCTILE IRON PIPE.

CONCRETE THRUST BLOCK DETAIL N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.17	DWG. BY: FAYPWC	1	09/05	REVISED TABLE
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	2	02/07	ADDED NOTES 9 AND 10
	WATER RESOURCES ENGINEERING DEPARTMENT		3	07/13	ADDED TAPPING SLEEVE AND VALVE DETAIL

W17-THRUSTBLOCK.dwg



IRON RETAINING GLAND M.J. RESTRAINT			
NOMINAL PIPE SIZE	WEDGES QUANTITY	BOLTS QUANTITY	PRESS RATING
6"	3	6	350
8"	4	6	350
12"	8	8	350

8" SIZE SHOWN 6" AND 12" SIMILAR IRON RETAINING GLAND M.J. RESTRAINT

LR (MIN. LENGTH OF RESTRAINT EACH DIRECTION OF THRUST IN LINEAR FEET) Based on 200 psig pressure, Safety Factor of 2.0:1, BARE DI PIPE AND ML Soil, 3.5' cover Chart does not apply to pipes wrapped in polyethylene wrap						
PIPE SIZE	VALVES DEAD ENDS TEES	90° ELBOWS	45° ELBOW & CROSSES	22-1/2° ELBOWS	REDUCER	
6"	55'	31'	13'	7'	8"x2"	67'
8"	72'	40'	17'	8'	8"x6"	30'
12"	102'	57'	24'	12'	12"x8"	54'

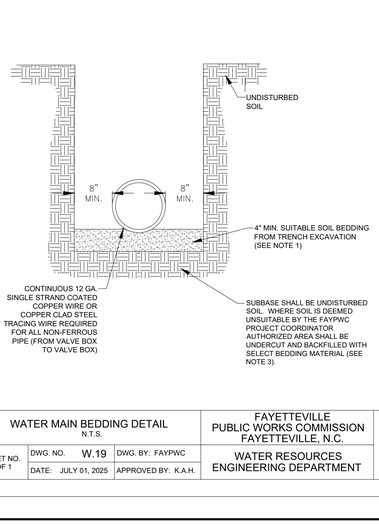
RESTRAINED JOINT DETAIL FOR TYPICAL TEE INTERSECTION 4-WAY INTERSECTION SIMILARLY RESTRAINED

NOTES:

1. THRUST RESTRAINT SHALL BE INSTALLED ON DUCTILE IRON WATER DISTRIBUTION LINES 6" THRU 12" DIAMETER IN THE MANNER SHOWN. SEE FAYPWC STANDARD THRUST BLOCK DETAIL W.17 FOR PVC RESTRAINT.
2. IRON RETAINING GLAND M.J. RESTRAINT OR OTHER FORMS OF IRON RESTRAINT SHALL NOT BE USED ON PVC PIPE.
3. PIPE GREATER THAN 12 INCH DIAMETER SHALL REQUIRE RESTRAINED JOINT PIPE FOR THE PROPER LENGTH.
4. COMPACT FITTINGS ARE ACCEPTABLE FOR USE WITH IRON RETAINING GLAND M.J. RESTRAINT AND OTHER FORMS OF D.I. RESTRAINT.
5. THE MINIMUM LENGTH OF RESTRAINT INDICATED SHALL REQUIRE ALL JOINTS WITHIN THE LR DISTANCE TO BE RESTRAINED.
6. RESTRAINT SYSTEM SHALL BE INSPECTED AND APPROVED BY FAYPWC PRIOR TO BACKFILLING.
7. RESTRAINT SYSTEMS MAY VARY BASED UPON THE ENGINEERS' DESIGN AS SHOWN ON THE PLAN AND PROFILE SHEETS.
8. GRIPPER RING AND FIELD LOK GASKETS ARE AN ACCEPTABLE METHOD OF RESTRAINT ON DUCTILE IRON PIPE ONLY.

ALTERNATE RESTRAINT DETAIL (DUCTILE IRON PIPE ONLY) N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.18	DWG. BY: FAYPWC	1	11/16/07	REVISED TABLE, ADDED NOTE 8
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			
	WATER RESOURCES ENGINEERING DEPARTMENT				

W18-RESTRAINT-DETAIL.dwg



NOTES:

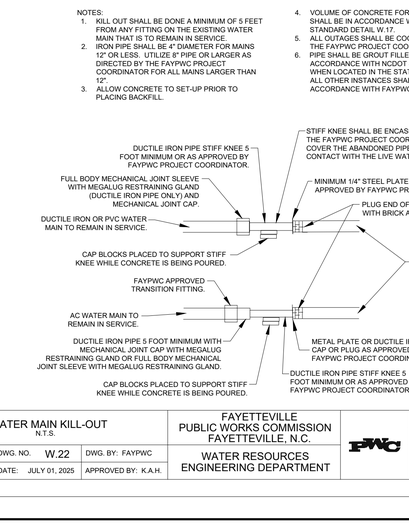
1. SUITABLE SOIL BEDDING IS DEFINED AS "NATIVE" SOIL EXCAVATED FROM THE TRENCH, FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH.
2. SUITABLE BEDDING MATERIAL SHALL EXTEND TO UNDISTURBED TRENCH WALLS.
3. IF GROUND CONDITIONS WARRANT, IT MAY BE NECESSARY TO BED DUCTILE IRON WATER MAINS IN SELECT BEDDING MATERIAL (NO. 5 OR NO. 57 STONE) TO THE SPRINGLINE OF THE PIPE. SUCH INSTALLATION SHALL BE AS DIRECTED BY THE FAYPWC PROJECT COORDINATOR.

WATER MAIN BEDDING DETAIL N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.19	DWG. BY: FAYPWC	1	01/01/17	REVISED NOTES
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.	2	07/01/13	REVISED NOTE RE: TRACER WIRE
	WATER RESOURCES ENGINEERING DEPARTMENT				

W19-WATER-BEDDING.dwg

NOTES:

1. KILL OUT SHALL BE DONE A MINIMUM OF 5 FEET FROM ANY FITTING ON THE EXISTING WATER MAIN THAT IS TO REMAIN IN SERVICE.
2. IRON PIPE SHALL BE 4" DIAMETER FOR MAINS 12" OR LESS. UTILIZE 8" PIPE OR LARGER AS DIRECTED BY THE FAYPWC PROJECT COORDINATOR FOR ALL MAINS LARGER THAN 12".
3. ALLOW CONCRETE TO SET-UP PRIOR TO PLACING BACKFILL.
4. VOLUME OF CONCRETE FOR THRUST BLOCK SHALL BE IN ACCORDANCE WITH FAYPWC STANDARD DETAIL W.17.
5. ALL OUTAGES SHALL BE COORDINATED WITH THE FAYPWC PROJECT COORDINATOR.
6. PIPE SHALL BE GROUT FILLED OR REMOVED IN ACCORDANCE WITH NCDOT SPECIFICATIONS WHEN LOCATED IN THE STATE RIGHT-OF-WAY. ALL OTHER INSTANCES SHALL BE IN ACCORDANCE WITH FAYPWC SPECIFICATIONS.



WATER MAIN KILL-OUT N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.		NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. W.22	DWG. BY: FAYPWC			
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			
	WATER RESOURCES ENGINEERING DEPARTMENT				

W22-WATERMAIN-KILLOUT.dwg

PWC WATER DETAILS

SHEET NUMBER 27 OF 45

PLAN TYPE: 100% PLANS

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

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FAYETTEVILLE PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049264 KENNETH H. NELSON III 4/30/2025 REGISTERED ENGINEER

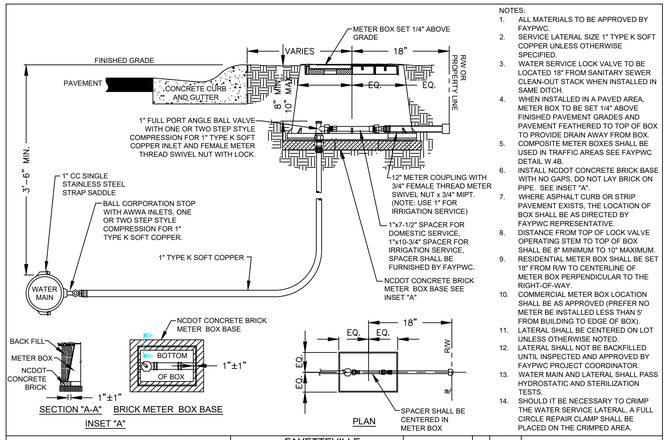
REV.#	DESCRIPTION	REV.BY	DATE
REVISIONS			

ISSUED FOR CONSTRUCTION

PROJECT: TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025
NAME :
APPROVED : NLH
CHECK : NDR
DRAWN : JNB
SCALE: NOT TO SCALE

PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:Tryon Drainage UC Layout:28 PWC WATER DETAILS November 18, 2025 11:13:07am K:\RAL_Roadway\011017025_Tryon_Drainage\Utilities\UC\Plan Sheets\UTILITY PLANS.dwg



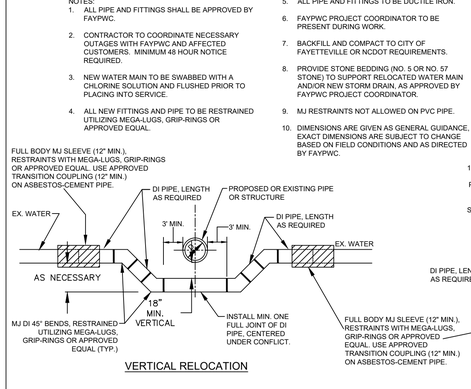
NOTES:
1. ALL MATERIALS TO BE APPROVED BY FAYPWC.
2. SERVICE LATERAL SIZE 1" TYPE K SOFT COPPER UNLESS OTHERWISE SPECIFIED.
3. WATER SERVICE LOCK VALVE TO BE LOCATED 18" FROM SANITARY SEWER CLEAN-OUT STACK WHEN INSTALLED IN SAME DITCH.
4. WHEN INSTALLED IN A PAVED AREA, METER BOX TO BE SET 1/4" ABOVE FINISHED PAVEMENT GRADES AND PAVEMENT FEATHERED TO TOP OF BOX TO PROVIDE DRAIN AWAY FROM BOX.
5. COMPOSITE METER BOXES SHALL BE USED IN TRAFFIC AREAS SEE FAYPWC DETAIL W.4B.
6. INSTALL NCDOT CONCRETE BRICK BASE WITH NO GAPS, DO NOT LAY BRICK ON PIPE. SEE INSET "A".
7. WHERE ASPHALT CURB OR STRIP PAVEMENT EXISTS, THE LOCATION OF BOX SHALL BE AS DIRECTED BY FAYPWC REPRESENTATIVE.
8. DISTANCE FROM TOP OF LOCK VALVE OPERATING STEM TO TOP OF BOX SHALL BE 8" MINIMUM TO 10" MAXIMUM.
9. RESIDENTIAL METER BOX SHALL BE SET 18" FROM R/W TO CENTERLINE OF METER BOX PERPENDICULAR TO THE RIGHT-OF-WAY.
10. COMMERCIAL METER BOX LOCATION SHALL BE AS APPROVED (PREFER NO METER BE INSTALLED LESS THAN 5' FROM BUILDING TO EDGE OF BOX).
11. LATERAL SHALL BE CENTERED ON LOT UNLESS OTHERWISE NOTED.
12. LATERAL SHALL NOT BE BACKFILLED UNTIL INSPECTED AND APPROVED BY FAYPWC PROJECT COORDINATOR.
13. WATER MAIN AND LATERAL SHALL PASS HYDROSTATIC AND STERILIZATION TESTS.
14. SHOULD IT BE NECESSARY TO CRIMP THE WATER SERVICE LATERAL, A FULL CIRCLE REPAIR CLAMP SHALL BE PLACED ON THE CRIMPED AREA.

1" COPPER WATER SERVICE LATERAL N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC
SHEET NO. 1 OF 1	DWG. NO. W.24	DRWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT	
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.		

NO.	DATE	REVISION
2	09/05	VALVE CHANGE, ADD NOTE 16
3	07/06	RESIZED METER COUPLING
4	07/17	RESIZED NOTES

W24-COPPER-SERVICE-LATERAL.dwg

NOTES:
1. ALL PIPE AND FITTINGS SHALL BE APPROVED BY FAYPWC.
2. CONTRACTOR TO COORDINATE NECESSARY OUTAGES WITH FAYPWC AND AFFECTED CUSTOMERS. MINIMUM 48 HOUR NOTICE REQUIRED.
3. NEW WATER MAIN TO BE SWABBED WITH A CHLORINE SOLUTION AND FLUSHED PRIOR TO PLACING INTO SERVICE.
4. ALL NEW FITTINGS AND PIPE TO BE RESTRAINED UTILIZING MEGA-LUGS, GRIP-RINGS OR APPROVED EQUAL.
5. ALL PIPE AND FITTINGS TO BE DUCTILE IRON.
6. FAYPWC PROJECT COORDINATOR TO BE PRESENT DURING WORK.
7. BACKFILL AND COMPACT TO CITY OF FAYETTEVILLE OR NCDOT REQUIREMENTS.
8. PROVIDE STONE BEDDING (NO. 5 OR NO. 57 STONE) TO SUPPORT RELOCATED WATER MAIN AND/OR NEW STORM DRAIN, AS APPROVED BY FAYPWC PROJECT COORDINATOR.
9. MJ RESTRAINTS NOT ALLOWED ON PVC PIPE.
10. DIMENSIONS ARE GIVEN AS GENERAL GUIDANCE, EXACT DIMENSIONS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND AS DIRECTED BY FAYPWC.

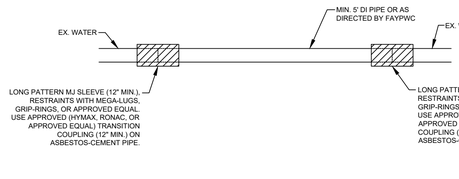


PIPE RELOCATION DETAIL N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC
SHEET NO. 1 OF 1	DWG. NO.: W.26	DRWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT	
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.		

NO.	DATE	REVISION
1	01/12	REVISED NOTES, ADDED HORIZONTAL RELOCATION

W26-PIPE-RELOCATION-DETAIL.dwg

NOTES:
1. ALL PIPE AND FITTINGS SHALL BE APPROVED BY FAYPWC.
2. CONTRACTOR TO COORDINATE NECESSARY OUTAGES WITH FAYPWC AND AFFECTED CUSTOMERS. MINIMUM 48 HOUR NOTICE REQUIRED.
3. NEW WATER MAIN TO BE SWABBED WITH A CHLORINE SOLUTION AND FLUSHED PRIOR TO PLACING INTO SERVICE.
4. ALL NEW FITTINGS AND PIPE TO BE RESTRAINED UTILIZING MEGA-LUGS, GRIP-RINGS, OR APPROVED EQUAL.
5. ALL PIPES TO BE DUCTILE IRON.
6. FAYPWC PROJECT COORDINATOR TO BE PRESENT DURING WORK.
7. BACKFILL AND COMPACT IN ACCORDANCE WITH THE APPLICABLE AGENCY REQUIREMENTS.
8. PROVIDE STONE BEDDING (NO. 5 OR NO. 57 STONE) TO SUPPORT REPAIRED WATER MAIN, AS APPROVED BY FAYPWC PROJECT COORDINATOR.
9. MJ RESTRAINTS ARE NOT ALLOWED ON PVC PIPE.
10. DIMENSIONS ARE GIVEN AS GENERAL GUIDANCE, EXACT DIMENSIONS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND AS DIRECTED BY FAYPWC.
11. ALL MATERIALS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF FAYPWC.
12. PIPE REPAIR SHALL EXHIBIT STRAIGHT HORIZONTAL AND VERTICAL ALIGNMENT. DEFLECTIONS OF HORIZONTAL AND VERTICAL ALIGNMENT ARE NOT ACCEPTABLE.
13. THERE SHALL BE NO MORE THAN 1/4" SPACE BETWEEN THE EXISTING WATER MAIN AND THE REPLACEMENT PIPE AT EACH END.
14. DAMAGED SECTION SHALL BE CUT OUT WITHOUT DAMAGING THE PIPE TO REMAIN.
15. PIPE REPAIRS ON MATERIALS OTHER THAN SHOWN, SHALL BE AS DIRECTED BY FAYPWC.
16. THE MINIMUM LENGTH OF REPAIR SHALL BE 5 FEET, UNLESS OTHERWISE DIRECTED BY FAYPWC.



PIPE REPAIR DETAIL N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC
SHEET NO. 1 OF 1	DWG. NO. W.31	DRWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT	
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.		

NO.	DATE	REVISION

W31-PIPE-REPAIR-DETAIL.dwg

ISOMETRIC

FAYETTEVILLE!	ENGINEERING DIVISION 433 HAY ST. 28301 (910) 433-1656 http://www.fayettevillenc.gov
TYPICAL TEMPORARY SAWCUT AND PAVEMENT PATCH PAGE 1 OF 3	
REVISED FOR THIS PROJECT ONLY	SD-11

PWC WATER DETAILS

SHEET NUMBER 28 OF 45

PLAN TYPE: 100% PLANS

Kimley»Horn
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421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE! PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL SEAL 044524 ENGINEER DANIEL L HARRELL

REVISIONS		
REV. #	DESCRIPTION	REV.BY DATE

ISSUED FOR CONSTRUCTION

DRAWN : JNB
CHECK : NDR
APPROVED : NLH
SCALE: NOT TO SCALE

PROJECT: TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:Tryon Drainage UC Layout:29 PWC WATER DETAILS November 18, 2025 11:13:16am K:\RAL_Roadway\011017025_Tryon_Drainage\Utilities\UC\Plan Sheets\UTILITY PLANS.dwg

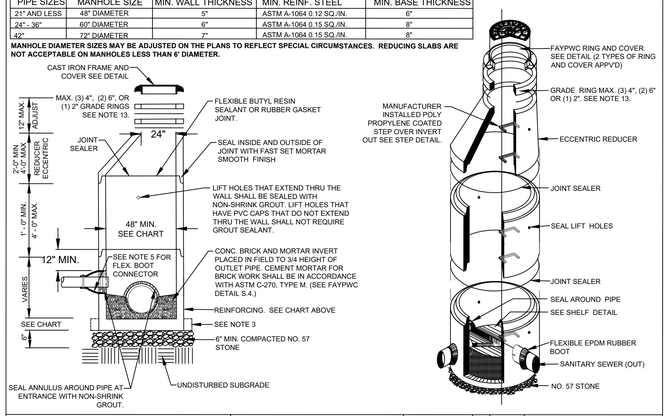
1. ALL SEWER MAINS, LATERALS, AND APPURTENANCES SHALL BE INSTALLED AND TESTED IN ACCORDANCE WITH FAYETTEVILLE FAYPWC STANDARDS.
2. CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
3. CONSTRUCTION STAKING IS REQUIRED FOR ALL FAYPWC WATER AND SEWER UTILITY INSTALLATIONS. CUT SHEETS, SIGNED AND SEALED BY A NC PLS, SHALL BE PROVIDED TO THE FAYPWC WATER RESOURCES ENGINEERING DEPARTMENT AND THE CONTRACTOR IN ADVANCE OF CONSTRUCTION FOR FAYPWC WATER AND SEWER UTILITIES.
4. CONTRACTOR SHALL MAINTAIN A COPY OF THE SIGNED AND SEALED CUT SHEET ON THE JOB SITE. CONSTRUCTION ON FAYPWC WATER AND SEWER UTILITIES CANNOT BEGIN UNTIL THE CONTRACTOR POSSESSES, ON SITE, A SIGNED AND SEALED CUT SHEET FROM THE PROFESSIONAL LAND SURVEYOR.
5. ALL NEW WATER AND SEWER MAINS, LATERALS, AND APPURTENANCES SHALL BE TESTED AND/OR DISINFECTED IN ACCORDANCE WITH FAYETTEVILLE FAYPWC STANDARDS PRIOR TO PLACING INTO SERVICE.
6. CONTRACTOR SHALL COORDINATE TESTING AND INSPECTION WITH THE FAYETTEVILLE FAYPWC PROJECT COORDINATOR.
7. ALL DUCTILE IRON PIPE IN SANITARY SEWER SERVICE SHALL HAVE AN INTERIOR LINING OF PROTECTO 401 OR APPROVED EQUAL.
8. ALL NEW MANHOLES ARE TO BE VACUUM-TESTED IN ACCORDANCE WITH FAYETTEVILLE FAYPWC STANDARDS.
9. CONTRACTOR SHALL REPAIR ALL SEWER LATERALS AND MAINS DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY REPORT ALL SEWER MAIN AND LATERAL BREAKS TO THE FAYPWC PROJECT COORDINATOR. THE CONTRACTOR SHALL INITIATE IMMEDIATE REPAIRS IN ACCORDANCE WITH FAYPWC STANDARDS.
10. TRANSFER OF SEWER SERVICES SHALL BE ACCOMPLISHED AS FOLLOWS:
    A. INSTALL AND TEST NEW MAINS, MANHOLES, AND LATERALS. CLEANOUTS SHALL BE INSTALLED 18" INSIDE R/W UNLESS OTHERWISE DIRECTED BY FAYPWC.
    B. CONNECT EXISTING PLUMBING TO NEW LATERAL UTILIZING THE NECESSARY FITTINGS AS DIRECTED BY FAYPWC.
    C. AFTER ALL SERVICES HAVE BEEN TRANSFERRED TO THE NEW MAIN, THE EXISTING SEWER SYSTEM SHALL BE ABANDONED IN ACCORDANCE WITH FAYPWC REQUIREMENTS.
11. CONTRACTOR SHALL ABANDON ("KILL-OUT") ANY EXISTING SEWER SERVICES THAT WILL NOT BE UTILIZED BY UNCOVERING THE EXISTING LATERAL AT THE MAIN, CUT AND PLUG AT BOTH ENDS, REMOVE THE EXISTING CLEANOUT AND COMBINATION, AND PLUG THE TAP OR TEE AT THE MAIN. FOR LATERALS THAT CONNECT TO A MANHOLE AND ARE TO BE ABANDONED ("KILLED-OUT"), THE LATERAL SHALL BE REMOVED FROM THE MANHOLE AND THE REMAINING VOID IN THE MANHOLE SHALL BE FILLED WITH BLOCK AND MORTAR.
12. SEWER PLUGS SHALL BE INSTALLED TO ELIMINATE ANY DEBRIS OR OTHER MATERIAL FROM ENTERING THE ACTIVE SEWER SYSTEM. UPON ACCEPTANCE OF THE NEW SEWER SYSTEM, THE CONTRACTOR SHALL CLEAN THE NEW MAINS, REMOVE ALL DEBRIS, AND THEN REMOVE THE PLUG.
13. ALL EXISTING UTILITIES IMPACTED BY CONSTRUCTION SHALL BE ADJUSTED TO FINISHED GRADE, IN ACCORDANCE WITH FAYPWC REQUIREMENTS.
14. ALL WORK ON FAYPWC SEWER UTILITIES (MAINS, LATERALS, ETC) SHALL BE PERFORMED BY A LICENSED UTILITY CONTRACTOR. THE FAYETTEVILLE PUBLIC WORKS COMMISSION SHALL OBSERVE AND APPROVE ALL WORK ON FAYPWC SEWER UTILITIES. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH FAYPWC REQUIREMENTS.
15. SEPARATION REQUIREMENTS:
    A. **LATERAL SEPARATION OF SEWER AND WATER MAINS:** WATER MAINS SHALL BE LAID AT LEAST 10 FEET LATERALLY FROM EXISTING OR PROPOSED SEWER MAIN/LATERAL, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENTS A 10-FOOT LATERAL SEPARATION - IN WHICH CASE:
        i. THE WATER MAIN IS LAID IN A SEPARATE TRENCH, WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18-INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL; OR
        ii. THE WATER MAIN IS LAID IN THE SAME TRENCH AS THE SEWER MAIN/LATERAL WITH THE WATER MAIN LOCATED AT ONE SIDE ON A BENCH OF UNDISTURBED EARTH AND WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18-INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL.
    B. **CROSSING A WATER MAIN OVER A SEWER:** WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS OVER A SEWER MAIN/LATERAL, THE WATER MAIN SHALL BE LAID AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18-INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL.
    C. **CROSSING WATER MAIN UNDER A SEWER:** WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS UNDER A SEWER MAIN/LATERAL, A MINIMUM OF 18-INCHES OF SEPARATION SHALL BE PROVIDED. BOTH THE WATER MAIN AND THE SEWER MAIN/LATERAL SHALL BE CONSTRUCTED OF DUCTILE IRON MATERIAL AND WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10-FEET ON EACH SIDE OF THE POINT OF CROSSING. A SECTION OF WATER MAIN PIPE SHALL BE CENTERED AT THE POINT OF CROSSING.
    D. **CROSSING STORM DRAINAGE LINES:** A MINIMUM OF 24-INCHES OF VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN A SEWER MAIN/LATERAL CROSSING UNDER A STORM DRAINAGE LINE UNLESS DUCTILE IRON PIPE IS USED. IF DUCTILE IRON PIPE IS USED, A MINIMUM OF SIX(6) INCHES OF SEPARATION SHALL BE MAINTAINED, UNLESS OTHERWISE APPROVED BY FAYPWC.

GENERAL NOTES SANITARY SEWER UTILITY			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. S.1	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	01/18	ADDED NOTES 5, 8
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	06/21	ADDED NOTES 1-8 AND RENUMBERED
					3	11/23	REVISED NOTE 15

S1-SEWER-NOTES.dwg

PIPE SIZES	MANHOLE SIZE	MIN. WALL THICKNESS	MIN. REINF. STEEL	MIN. BASE THICKNESS
21" AND LESS	48" DIAMETER	5"	ASTM A-1064 0.12 SQ./IN.	6"
24" - 36"	60" DIAMETER	6"	ASTM A-1064 0.15 SQ./IN.	8"
42"	72" DIAMETER	7"	ASTM A-1064 0.15 SQ./IN.	8"

MANHOLE DIAMETER SIZES MAY BE ADJUSTED ON THE PLANS TO REFLECT SPECIAL CIRCUMSTANCES. REDUCING SLABS ARE NOT ACCEPTABLE ON MANHOLES LESS THAN 6' DIAMETER.



STANDARD MANHOLE N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 2	DWG. NO. S.2	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	02/07	CREATED S.2A ADDED NOTES 13-17
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	07/13	ADDED SHEET 2 OF 2
					3	01/01/24	CLARIFIED NOTES REGARDING MORTAR FOR BENCH AND INVERT.

S2-STANDARD-MANHOLE.dwg

NOTES:
1. PRECAST REINFORCED CONCRETE MANHOLES SHALL BE IN ACCORDANCE WITH ASTM C-478.
2. MINIMUM CONCRETE COMPRESSIVE STRENGTH SHALL BE 4,000PSI.
3. MANHOLES GREATER THAN 12' DEPTH SHALL HAVE MINIMUM 6" EXTENDED BASE.
4. FLEXIBLE BUTYL RESIN JOINT SEALANT SHALL BE IN ACCORDANCE WITH ASTM C990. RUBBER GASKET JOINTS SHALL BE IN ACCORDANCE WITH ASTM C-443.
5. FLEXIBLE EPDM RUBBER BOOT CONNECTORS SHALL BE IN ACCORDANCE WITH ASTM C923, INSTALLED BY MANUFACTURER WITH STAINLESS STEEL COMPRESSION RING AND TAKE-UP CLAMP. THE FLEXIBLE BOOT CONNECTOR SHALL BE TIGHTENED ON THE MAIN BY MEANS OF A SINGLE STAINLESS STEEL PIPE CLAMP.
6. CONNECTIONS TO EXISTING MANHOLES SHALL BE BY CORING MANHOLE AND FIELD INSTALLING A FLEXIBLE EPDM RUBBER BOOT CONNECTOR. DO NOT ALLOW DEBRIS TO ENTER SYSTEM.
7. MORTAR USED FOR SEALING JOINTS AND LIFT HOLES SHALL BE QUICK SETTING, NON-SHRINK GROUT MIXED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. MORTAR USED TO CONSTRUCT INVERTS AND SHELF SHALL BE IN ACCORDANCE WITH ASTM C-270, TYPE M, IN ACCORDANCE WITH FAYPWC SPECIFICATION SECTION 03301.
8. MANHOLE STEPS SHALL BE IN ACCORDANCE WITH ASTM C478 AND OSHA REGULATIONS. ALIGN STEPS WITH INVERT OUT.
9. PRECAST INVERTS ARE NOT ALLOWED.
10. VERTICAL DROPS BETWEEN THE INFLOW PIPES AND OUTFLOW PIPES SHALL REQUIRE THE FOLLOWING:
    A. GREATER THAN 2.5' SEE DROP STRUCTURE DETAIL (MIN. 5' DIAMETER MH REQUIRED).
    B. LESS THAN 2.5' SEE PIPE SLIDE DETAIL.
11. AN ECCENTRIC CONE SHALL BE UTILIZED ON ALL MANHOLES, UNLESS OTHERWISE APPROVED BY FAYPWC.
12. INVERT ON PLANS IS TO MANHOLE CENTERLINE.
13. GRADE RINGS SHALL NOT BE USED FOR ABOVE GRADE ADJUSTMENTS (IE: OUTFALL AREAS). USE OF GRADE RINGS ARE ALLOWABLE IN YARD AREAS AND PAVEMENT, WHERE THE RING AND COVER ARE AT GROUND LEVEL. GRADE RINGS CAN BE EITHER CONCRETE OR HDPE. HDPE GRADE RINGS SHALL MEET THE REQUIREMENTS OF ASTM 4796 FOR MATERIAL, QUALITY, AND PERFORMANCE. HDPE GRADE RINGS SHALL BE MANUFACTURED BY LADTECH, INC. OR APPROVED EQUAL.
14. THE MINIMUM SLOPE ACROSS THE INVERT OF THE MANHOLE SHALL BE 1% UNLESS OTHERWISE APPROVED BY FAYPWC. STANDING WATER IN INVERT OF MANHOLE IS NOT ACCEPTABLE.
15. THE EXTERIOR MANHOLE RISER JOINTS, INCLUDING THE JOINT AT THE CONE, SHALL BE SEALED ON THE OUTSIDE BY AN APPROVED JOINT WRAP. THE WRAP SHALL BE IN ACCORDANCE WITH FAYPWC SPECIFICATIONS.
16. MANHOLE BOOT FOR 4-INCH LATERALS, SHOULD IT BE NECESSARY TO INSTALL A 4-INCH LATERAL INTO A MANHOLE, THE RUBBER BOOT THAT THE LATERAL IS INSERTED INTO SHALL BE SECURELY FASTENED TO THE CORE HOLE BY UTILIZING A STAINLESS STEEL BAND THAT IS TIGHTENED USING A JACK OR A TORQUE WRENCH (DIRECT DRIVE). BOTH STANDARD SIZE AND STEP DOWN BOOTS ARE ALLOWED. THE TORQUE WRENCH SHALL BE SUPPLIED BY THE MANUFACTURER. NO OTHER TYPE BANDS OR METHOD OF SECURING THE BOOT TO THE MANHOLE SHALL BE ACCEPTED.

    FOR FOUR (4) INCH SDR 26 LATERALS, THE PIPE OUTSIDE DIAMETER RANGE OF THE BOOT SHALL BE 3.5-INCHES TO 4.25-INCHES.

    FOR FOUR (4) INCH DUCTILE IRON LATERALS, THE PIPE OUTSIDE DIAMETER RANGE OF THE BOOT SHALL EITHER BE AS FOR VC OR 4.25-INCHES TO 4.81-INCHES.

    IN ALL CASES, THE BOOT SHALL BE TIGHTENED ON THE LATERAL BY MEANS OF A SINGLE STAINLESS STEEL PIPE CLAMP.

    THE LATERAL INVERT SHALL BE AT THE TOP O F THE SHELF.
17. NO MORE THAN 4, FOUR-INCH LATERALS OR 3, SIX-INCH LATERALS SHALL ENTER A 4' DIAMETER TERMINAL MANHOLE. NO MORE THAN 2 LATERALS (REGARDLESS OF SIZE) SHALL ENTER ALL OTHER 4' DIAMETER MANHOLES. ALL LATERALS SHALL HAVE AN INDIVIDUAL TROUGH. 5' DIAMETER MANHOLES SHALL BE USED IF THE ABOVE CONDITIONS ARE NOT MET.
18. NO MORE THAN 5 LATERALS SHALL ENTER A 5' DIAMETER MANHOLE.
19. USE OF TEE-WYES ON LATERALS IS NOT ALLOWED.
20. ALL MANHOLES SHALL BE VACUUM TESTED IN ACCORDANCE WITH FAYPWC STANDARDS.

STANDARD MANHOLE			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 2 OF 2	DWG. NO. S.2	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	07/13	REVISED NOTES 9, 10, 11, 15, CONVERTED TO S.2 SHEET 2 OF 2
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	01/01/19	REVISED NOTES 10, 18
					3	01/01/24	REVISED NOTES 5, 7, 16.

S2-STANDARD-MANHOLE.dwg

NOTES:
1. MANHOLE MEETS ALL REQUIREMENTS OF ASTM C478.
2. CONCRETE IS MINIMUM 4,000PSI COMPRESSIVE STRENGTH.
3. MATERIAL USED TO SEAL AROUND PIPE SHALL BE NON-SHRINK GROUT.
4. MANHOLE SHALL BE CONSTRUCTED OF PRECAST CONCRETE. FIBERGLASS MANHOLE IS NOT ACCEPTABLE.
5. A DROP STRUCTURE SHALL BE PLACED WHERE PIPE VERTICAL SEPARATION BETWEEN INVERTS EXCEEDS 2.50'. USE 5' DIAMETER MANHOLES WHEN DROP STRUCTURES ARE NEEDED. WITH THE EXCEPTION OF THE MANHOLE BASE SECTION. ALL OTHER MATERIALS, INSTALLATION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE FAYPWC STANDARD MANHOLE DETAILS.
7. DOGHOUSE MANHOLE SHALL BE FREE OF LEAKS.
8. SEE STANDARD MANHOLE DETAIL S.2 FOR ADDITIONAL REQUIREMENTS.

DOGHOUSE MANHOLE (MAINS 15" OR LESS) N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 2	DWG. NO. S.3	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	11/25/08	MADE CHANGES TO NOTES
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	07/16	ADDED SHEET 2

S3-DOGHOUSE-MH.dwg

PIPE SIZE	MIN. DIA.
16" - 30"	6'-0"
OVER 30"	8'-0"

THE ABOVE CHART REFERS TO THE MINIMUM REQUIREMENTS ACCEPTED BY FAYPWC. THE MANHOLE DIAMETER MAY INCREASE BASED ON PROJECT SPECIFICATIONS.

NOTES:
1. MANHOLE MEETS ALL REQUIREMENTS OF ASTM C478.
2. CONCRETE IS MINIMUM 4,000PSI COMPRESSIVE STRENGTH.
3. MATERIAL USED TO SEAL AROUND PIPE SHALL BE NON-SHRINK GROUT.
4. MANHOLE SHALL BE CONSTRUCTED OF PRECAST CONCRETE. FIBERGLASS MANHOLE IS NOT ACCEPTABLE.
5. A DROP STRUCTURE SHALL BE PLACED WHERE PIPE VERTICAL SEPARATION BETWEEN INVERTS EXCEEDS 2.50'. WITH THE EXCEPTION OF THE MANHOLE BASE SECTION, ALL OTHER MATERIALS, INSTALLATION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE FAYPWC STANDARD MANHOLE DETAILS.
7. DOGHOUSE MANHOLE SHALL BE FREE OF LEAKS.
8. SEE STANDARD MANHOLE DETAIL S.2 FOR ADDITIONAL REQUIREMENTS.

DOGHOUSE MANHOLE (MAINS 16" OR LARGER) N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 2 OF 2	DWG. NO. S.3	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	11/25/08	MADE CHANGES TO NOTES
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	07/16	ADDED SHEET 2
					3	01/01/19	ADDED MH CHART

S3-DOGHOUSE-MH.dwg

NOTES:
1. PIPE SLIDE REQUIRED WHERE VERTICAL SEPARATION BETWEEN PIPE INVERTS IS LESS THAN 2.5'. FOR LATERAL INVERTS AT OR WITHIN FOUR (4) INCHES OF THE SHELF, CONSTRUCT BENCH AND INVERT AS DIRECTED BY THE FAYPWC PROJECT COORDINATOR.
2. INTERIOR DROP STRUCTURE REQUIRED WHERE VERTICAL SEPARATION BETWEEN INVERTS EQUALS OR EXCEEDS 2.50'. FOR INTERIOR DROP STRUCTURE SEE FAYPWC DETAIL S.5.
3. VERIFY SLIDE INSTALLATION WITH PROJECT COORDINATOR PRIOR TO CONSTRUCTION.
4. MANHOLE AND CONNECTIONS SHALL BE IN ACCORDANCE WITH FAYPWC REQUIREMENTS.
5. BRICK USED FOR INVERT AND SHELF CONSTRUCTION SHALL BE NCDOT STANDARD CONCRETE BRICK.
6. MANHOLES GREATER THAN 12' IN DEPTH SHALL HAVE MINIMUM 6" EXTENDED BASE.
7. THE MINIMUM SLOPE ACROSS THE INVERT OF THE MANHOLE SHALL BE 1% UNLESS OTHERWISE APPROVED BY FAYPWC.
8. DROP AND/OR SLIDE REQUIREMENTS SHALL APPLY TO ALL LATERALS ENTERING MANHOLES AS OUTLINED IN NOTES 1, 2, AND 3. NO MORE THAN FOUR INCH LATERALS OR 3, SIX INCH LATERALS SHALL ENTER A 4' DIAMETER TERMINAL MANHOLE. NO MORE THAN 2 LATERALS (REGARDLESS OF SIZE) SHALL ENTER ALL OTHER 4' DIAMETER MANHOLES. ALL LATERALS SHALL HAVE AN INDIVIDUAL TROUGH. 5' DIAMETER MANHOLES SHALL BE USED IF THE ABOVE CONDITIONS ARE NOT MET. THE INVERT OF THE LATERAL SHALL BE A MINIMUM OF 1" ABOVE THE SHELF.
9. NO MORE THAN 5 LATERALS SHALL ENTER A 5' DIAMETER TERMINAL MANHOLE.
10. USE OF TEE-WYES ON LATERALS IS NOT ALLOWED.

PIPE SLIDE AND SHELF DETAILS N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. S.4	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	01/05	ADDED NOTE 8
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	02/07	REVISED NOTE 8, SLIDE DETAIL, ADDED NOTES 10, 11,12
					3	01/18	DELETED MORTAR SLIDE, REVISED NOTES

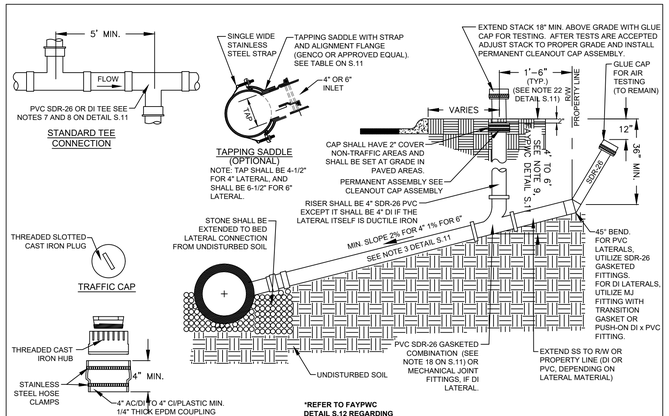
S4-PSLIDE.dwg

NOTES:
1. MANHOLE FRAME AND COVER TO BE MADE OF GRAY CAST IRON CONFORMING TO ASTM SPEC. A48-83, CLASS 35, MANUFACTURED BY SAME MANUFACTURER. ALL CASTINGS SHALL CONFORM TO THE SHAPE AND DIMENSIONS SHOWN. ALL CASTINGS SHALL BE CLEAN AND FREE FROM DEFECTS.
2. CASTINGS SHALL BE UNPAINTED AND SHALL HAVE THE LETTERS "PWC-FAY-NC" AND "SANITARY SEWER" CAST INTO COVER. LETTERS SHALL BE RAISED AND CLEARLY VISIBLE.
3. MANHOLE RING AND COVER SHALL WITHSTAND H-20 VEHICULAR TRAFFIC.
4. MINIMUM AVERAGE WEIGHT: PLUS OR MINUS 5% RING 155LBS., COVER 160LBS., UNIT 315LBS.
5. PERFORATED COVERS WILL NOT BE ALLOWED.
6. SUPPLY SOCKET FOR TURNING CAM LOCK MECHANISM. ONE SOCKET PER PROJECT.
7. USE OF GRADE RINGS ARE NOT ALLOWED, UNLESS APPROVED BY THE FAYPWC PROJECT COORDINATOR. FOR MANHOLES OUTSIDE OF YARD OR LANDSCAPE AREAS, THE USE OF GRADE RINGS ARE NOT ALLOWED.
8. FOR MANHOLES IN YARD OR LANDSCAPED AREAS, THE RING AND COVER SHALL BE SET TO FINISHED GRADE. THE USE OF GRADE RINGS ARE ALLOWED TO SET THE MANHOLE TO FINISHED GRADE. FOR GRADE RINGS 4" OR LESS, THE RING AND COVER SHALL BE ANCHORED TO THE CONE USING 5/8" DIAMETER STAINLESS STEEL BOLTS WITH WEDGE ANCHORS. FOR GRADE RINGS OVER 4", THE RING AND COVER SHALL BE ANCHORED TO THE GRADE RING, USING 5/8" DIAMETER x 5-1/2" STAINLESS STEEL BOLTS WITH WEDGE ANCHORS.
9. FOR OUTFALL AREAS, THE RING AND COVER SHALL BE SET A MINIMUM OF 18" ABOVE FINISHED GRADE, UNLESS OTHERWISE APPROVED.
10. THIS DETAIL IS TO BE USED ON ALL MANHOLES LOCATED OUTSIDE OF PAVED AREAS, UNLESS OTHERWISE APPROVED.
11. REFER TO FAYPWC STANDARD DETAIL S.17 FOR INSTALLATION OF VENT STACK.

STANDARD NON-TRAFFIC AREA MANHOLE RING AND COVER WITH WIPER GASKET AND CAM LOCK N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. S.6	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	07/09	REVISED NOTES ON FRAME SECTION/REVISED NOTE 3
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	07/17	ADDED NOTE ON WEDGE CAM LOCKS
					3	01/18	UPDATED NOTES 7 AND 8

S6-RING-COVER.dwg

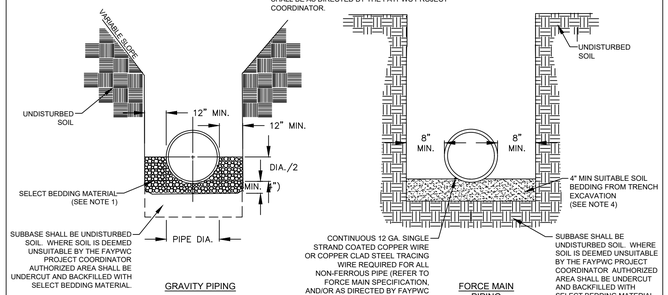
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SEWER LATERAL (4-INCH AND 6-INCH) N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. S.10	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		2	01/14	ADDED TAILPIECE, NOTES
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			3	01/15	REVISED NOTES RE: TAILPIECE
					4	07/18	REVISED NOTE RE: LATERAL DEPTH

S10-RESSLAT.dwg

NOTES:
1. THE SELECT BEDDING MATERIAL SHALL BE WELL GRADED CRUSHED ROCK (NO. 5 OR NO. 57 STONE) FOR THE FULL WIDTH OF THE TRENCH.
2. SELECT BEDDING MATERIAL SHALL EXTEND TO UNDISTURBED TRENCH WALLS.
3. SELECT BEDDING MATERIAL SHALL BE PROPERLY PLACED TO THE SPRING LINE OF THE PIPE FOR ITS ENTIRE LENGTH.
4. SUITABLE SOIL BEDDING IS DEFINED AS "NATIVE" SOIL EXCAVATED FROM THE TRENCH, FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH.
5. SUITABLE BEDDING MATERIAL SHALL EXTEND TO UNDISTURBED TRENCH WALLS.
6. IF GROUND CONDITIONS WARRANT, IT MAY BE NECESSARY TO BED DUCTILE IRON FORCE MAINS IN SELECT BEDDING MATERIAL (NO. 5 OR NO. 57 STONE) TO THE SPRINGLINE OF THE PIPE. SUCH INSTALLATION SHALL BE AS DIRECTED BY THE FAYPWC PROJECT COORDINATOR.



SEWER BEDDING N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. S.13	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	01/01/05	REVISED NOTES
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	01/01/16	REVISED NOTES

S13-SEWER-BEDDING.dwg

SEWER LATERAL NOTES

1. HOLE IN SANITARY SEWER MAIN MUST BE CUT WITH SHELL CUTTER NO HAMMER TAPS ALLOWED.
2. LATERAL SHALL CONFORM TO ASTM SPECS. D-3034 SDR-26 UNLESS OTHERWISE INDICATED AS DI.
3. ALL PIPE AND FITTINGS SHALL BE 4" OR 6" UNLESS OTHERWISE SPECIFIED.
4. ALL DI PIPE SHALL HAVE AN INTERIOR LINING OF CERAMIC EPOXY (PROTECTO 401). THE ENTIRE DI LATERAL SHALL BE COMPRISED OF DI PIPE AND MECHANICAL JOINT FITTINGS.
5. ALL CONNECTIONS SHALL HAVE RUBBER GASKET SEALS INSTALLED.
6. SANITARY SEWER LATERAL CLEANOUT STACK SHALL BE LOCATED 18" FROM WATER LATERAL LOCK VALVE WHEN IN THE SAME DITCH.
7. INSTALLATION OTHER THAN AS SHOWN MUST BE APPROVED BY THE FAYPWC.
8. CONNECTIONS TO THE TOP OF MAIN SHALL NOT BE ALLOWED, UNLESS OTHERWISE APPROVED BY THE FAYPWC PROJECT COORDINATOR.
9. THE DESIGN ENGINEER SHALL DETERMINE THE SLOPE AND DEPTH OF THE LATERAL BASED ON THE TOPOGRAPHY OF THE LOT.
10. LATERAL SHALL CONFORM TO 2% MINIMUM SLOPE FOR 4" OR 1% MINIMUM SLOPE FOR 6". THE MAXIMUM LENGTH OF A SEWER LATERAL SHALL BE 60 FEET, UNLESS OTHERWISE APPROVED BY FAYPWC.
11. SEE INTERIOR DROP STRUCTURE OR SLIDE, MORTAR SLIDE AND SHELF DETAIL FOR VERTICAL DROPS OF MAINS AND LATERALS.
12. LATERALS LESS THAN 3' IN DEPTH OR GREATER THAN 20' DEPTH SHALL UTILIZE DUCTILE IRON PIPE AND FITTINGS WITH CERAMIC EPOXY (PROTECTO 401), OR WHEN SEPARATION REQUIREMENTS CANNOT BE MET.
13. ENTIRE SEWER LATERAL ASSEMBLY SHALL BE AIR TESTED CONCURRENTLY WITH SEWER MAIN.
14. INDIVIDUAL LATERALS SHALL BE CLEANED AND FLUSHED PRIOR TO FLUSHING SANITARY SEWER MAINS.
15. LATERAL SHALL NOT BE BACK-FILLED UNTIL INSPECTED BY THE FAYPWC PROJECT COORDINATOR.
16. WYE CONNECTIONS SHALL NOT BE USED TO TIE LATERALS INTO A MANHOLE.
17. IF BENDS ARE APPROVED BY THE PROJECT COORDINATOR, STONE BEDDING IS REQUIRED TO BE INSTALLED FROM UNDISTURBED (SEE DETAIL S.12) SOIL TO BOTTOM OF BEND.
18. PVC COMBINATION SHALL BE A MOLDED WYE AND BEND, GASKETED, SDR-26, AS MANUFACTURED BY HARCO, GPK, OR APPROVED EQUAL.
19. NO MORE THAN 4, FOUR-INCH LATERALS OR 3, SIX-INCH LATERALS SHALL ENTER A 4' DIAMETER TERMINAL MANHOLE. NO MORE THAN 2 LATERALS (REGARDLESS OF SIZE) SHALL ENTER ALL OTHER 4' DIAMETER MANHOLES. ALL LATERALS SHALL HAVE AN INDIVIDUAL TROUGH. 5' DIAMETER MANHOLES SHALL BE USED IF THE ABOVE CONDITIONS ARE NOT MET.
20. ALL LATERALS (4" AND 6") SHALL UTILIZE A 4" RISER (STACK).
21. REFER TO DETAIL S.12 FOR SEPARATION REQUIREMENTS.
22. FOR SINGLE FAMILY RESIDENTIAL LOTS, CLEANOUT SHALL BE LOCATED 18" FROM RIGHT-OF-WAY OR EASEMENT. FOR ALL NON-SINGLE FAMILY LOTS, CLEANOUT SHALL BE NO CLOSER THAN 10' TO FRONT OF BUILDING, UNLESS OTHERWISE APPROVED BY FAYPWC.

THE FOLLOWING TABLE SUMMARIZES THE MATERIALS TO BE UTILIZED FOR SEWER MAIN TO LATERAL CONNECTIONS:

	PVC Main	DI Main
DI Lateral	DI fitting or approved saddle	MJ fitting or approved saddle
PVC Lateral	PVC fitting or approved saddle	MJ fitting with transition gasket or approved saddle

NOTE: REFER TO FAYPWC TECHNICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION.

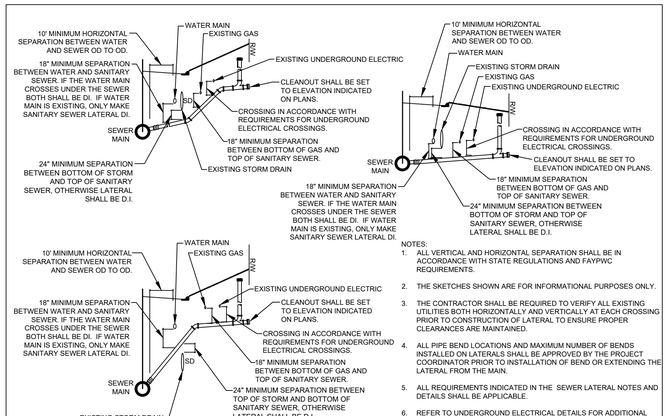
SEWER LATERAL NOTES (4-INCH AND 6-INCH)			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. S.11	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		3	01/13	REVISED NOTES AND ADDED TABLE
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			4	01/15	REVISED NOTE 22, TABLE
					5	07/18	REVISED NOTES 6, 9

S11-RESSLAT-NOTES.dwg

NOTES:
1. SANITARY SEWER REPAIR SHALL BE APPROVED BY FAYPWC PRIOR TO MAKING THE REPAIR. IF THE REPAIR IS WITHIN 20' OF AN EXISTING MANHOLE, THE CONTRACTOR SHALL BE REQUIRED TO REMOVE AND RELAY PIPE TO NEAREST MANHOLE, UNLESS OTHERWISE DIRECTED BY FAYPWC.
2. ALL MATERIALS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE FAYETTEVILLE PUBLIC WORKS COMMISSION.
3. CONTRACTOR SHALL PROVIDE ALL NECESSARY PUMPS, HEADER PIPE, PUMPING EQUIPMENT, ETC. PRIOR TO BEGINNING CONSTRUCTION. DUPLICATE SEWAGE HANDLING PUMPS, PIPING, ETC. SHALL BE ON-SITE AND AVAILABLE FOR IMMEDIATE USE SHOULD PRIMARY PUMP OR FORCE MAIN FAIL. INSURE PUMPS, HEADER PIPING, ETC. ARE PROPERLY SIZED AND OPERATIONAL BEFORE BEGINNING WORK.
4. PIPE REPAIR SHALL EXHIBIT STRAIGHT HORIZONTAL ALIGNMENT AND INVERT SHALL BE THE SAME AS THE EXISTING PIPE SLOPE. DEFLECTIONS OF HORIZONTAL AND VERTICAL ALIGNMENT ARE NOT ACCEPTABLE.
5. PIPE SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH FAYPWC STANDARD SPECIFICATION.
6. REPLACEMENT PIPE SHALL BE PROPERLY BEDDED IN ACCORDANCE WITH FAYPWC STANDARD DETAIL S.13.
7. THERE SHALL BE NO MORE THAN 1/4" SPACE BETWEEN THE EXISTING SEWER MAIN AND THE REPLACEMENT PIPE AT EACH END.
8. DAMAGED SECTION SHALL BE CUT OUT WITHOUT DAMAGING THE PIPE TO REMAIN.
9. DI SEWER PIPE AND FITTINGS SHALL HAVE AN INTERIOR COATING OF PROTECTO 401 OR APPROVED EQUAL.
10. DI PIPE SHALL BE UTILIZED WHEN STATE MINIMUM SEPARATION REQUIREMENTS CANNOT BE MET OR AS DIRECTED BY FAYPWC.
11. PIPE REPAIRS ON MATERIALS OTHER THAN SHOWN, SHALL BE AS DIRECTED BY FAYPWC.
12. THE MINIMUM LENGTH OF REPAIR SHALL BE 5 FEET, UNLESS OTHERWISE DIRECTED BY FAYPWC.

GRAVITY SANITARY SEWER PIPE REPAIR N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 3	DWG. NO. S.15	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	01/05	REVISED REPLACEMENT PIPE
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	07/11	REVISED NOTES

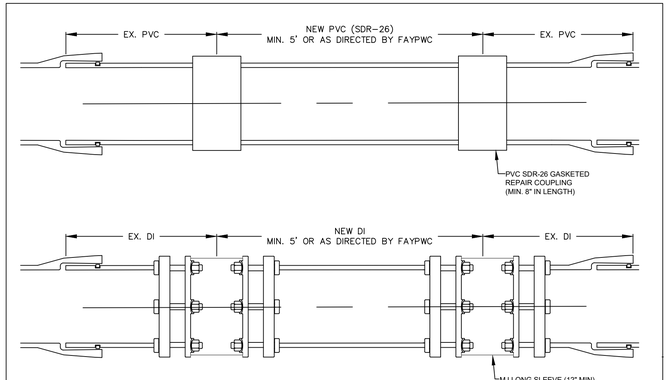
S15-VCP-REPAIR.dwg



NOTES:
1. ALL VERTICAL AND HORIZONTAL SEPARATION SHALL BE IN ACCORDANCE WITH STATE REGULATIONS AND FAYPWC REQUIREMENTS.
2. THE SKETCHES SHOWN ARE FOR INFORMATIONAL PURPOSES ONLY.
3. THE CONTRACTOR SHALL BE REQUIRED TO VERIFY ALL EXISTING UTILITIES BOTH HORIZONTALLY AND VERTICALLY AT EACH CROSSING PRIOR TO CONSTRUCTION OF LATERAL TO ENSURE PROPER CLEARANCES ARE MAINTAINED.
4. ALL PIPE BEND LOCATIONS AND MAXIMUM NUMBER OF BENDS INSTALLED ON LATERALS SHALL BE APPROVED BY THE PROJECT COORDINATOR PRIOR TO INSTALLATION OF BEND OR EXTENDING THE LATERAL FROM THE MAIN.
5. ALL REQUIREMENTS INDICATED IN THE SEWER LATERAL NOTES AND DETAILS SHALL BE APPLICABLE.
6. REFER TO UNDERGROUND ELECTRICAL DETAILS FOR ADDITIONAL INFORMATION WHEN CROSSING UNDERGROUND ELECTRICAL FACILITIES.

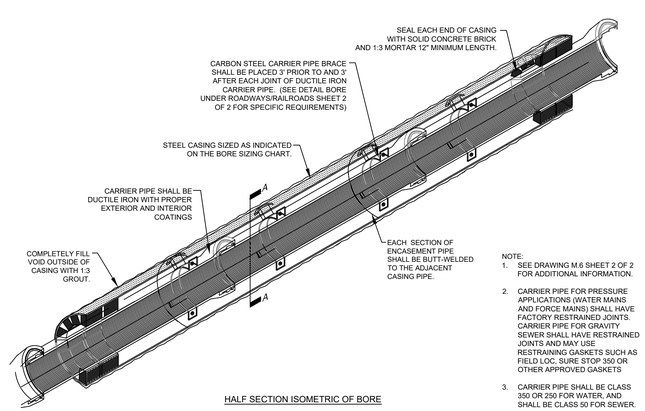
SEWER LATERAL UTILITY CONFLICT SEPARATION REQUIREMENTS N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 1	DWG. NO. S.12	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	11/06	ADDED NOTE ON DI LATERALS
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	03/10	ADDED LATERAL AND VM SEPARATION
					3	11/23	REVISED/CLARIFIED NOTES

S12-UTIL-CONFLICT.dwg



GRAVITY SANITARY SEWER PIPE REPAIR N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 3 OF 3	DWG. NO. S.15	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	01/05	REVISED REPLACEMENT PIPE
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	07/11	REVISED NOTES, REPAIRS

S15-VCP-REPAIR.dwg



HALF SECTION ISOMETRIC OF BORE

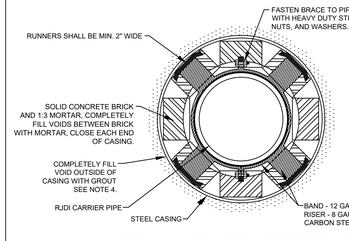
NOTE:
1. SEE DRAWING M.6 SHEET 2 OF 2 FOR ADDITIONAL INFORMATION.
2. CARRIER PIPE FOR PRESSURE APPLICATIONS (WATER MAINS AND FORCE MAINS) SHALL HAVE FACTORY RESTRAINED JOINTS. CARRIER PIPE FOR GRAVITY SEWER SHALL HAVE RESTRAINED JOINTS AND MAY USE RESTRAINING GASKETS SUCH AS FIELD LOC, SURE STOP 350 OR OTHER APPROVED GASKETS
3. CARRIER PIPE SHALL BE CLASS 350 OR 250 FOR WATER, AND SHALL BE CLASS 50 FOR SEWER.

BORE UNDER ROADWAYS/RAILROADS N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 1 OF 2	DWG. NO. M.6	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	01/05	ADDED NOTES 2 AND 3
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	10/09	CLARIFIED RESTRAINT REQUIREMENTS

M6-BORE-ROAD-RAIL.dwg

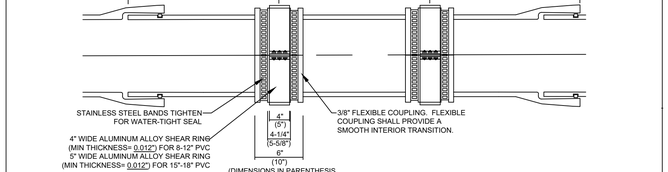
BORE SIZING CHART*			
CARRIER PIPE SIZE	MIN. CASING SIZE	ROADWAYS MIN. WALL THICKNESS	RAILROADS MIN. WALL THICKNESS
4"	10"	0.188"	0.188"
6"	12"	0.25"	0.281"
8"	16"	0.25"	0.281"
12"	24"	0.25"	0.375"
16"	30"	0.312"	0.469"
18"	30"	0.312"	0.469"
24"	36"	0.375"	0.532"
30"	42"	0.500"	0.625"
36"	48"	0.500"	0.688"

*CONTRACTOR MAY SUBSTITUTE A LARGER SIZE CASING PIPE HAVING THE MINIMUM WALL THICKNESS SHOWN FOR SEWER MAINS. ALL ADDITIONAL COSTS SHALL BE INCLUDED IN THE NIT PRICE BID FOR BORING AND JACKING.



SECTION "A-A" CARBON STEEL CARRIER PIPE BRACE

NOTES:
1. INSTALLATION SHALL BE DRY BORE AND JACKING OF SMOOTH WALL STEEL PIPE. JETTING OR WET BORING WITH WATER SHALL NOT BE ALLOWED.
2. SEE BORE SIZING CHART FOR CARRIER PIPE SIZE AND STEEL CASING SIZE, MINIMUM DIAMETER, AND WALL THICKNESS.
3. CASING PIPE SHALL BE IN ACCORDANCE WITH ASTM A-53, GRADE B WITH A MINIMUM YIELD STRENGTH OF 35,000PSI.
4. EACH END OF ENCASEMENT TO BE PLUGGED WITH BRICK. ALL VOIDS OUTSIDE THE CASING PIPE SHALL BE COMPLETELY FILLED WITH 1:3 PORTLAND CEMENT GROUT AT SUFFICIENT PRESSURE TO INSURE NO SETTLEMENT OF ROADWAY/RAILROAD. METHOD OF GROUTING SHALL BE AS APPROVED BY THE PERMITTING AGENCY.
5. IT IS RECOMMENDED THAT THE BORE BE ACCOMPLISHED BEFORE PIPE CONSTRUCTION BEGINS.
6. THE BORING SHALL BE PERFORMED FROM "UPSTREAM" TO "DOWNSTREAM" DIRECTION MAINTAINING THE CRITICAL DOWNSTREAM INVERT ELEVATION. SHOULD THE BORE NOT BE ON GRADE, A REVISED PLAN SHALL BE SUBMITTED TO FAYPWC FOR APPROVAL.
7. THE BORING OPERATION SHALL BE CONDUCTED IN A MANNER THAT THE FLOW OF TRAFFIC IS NOT IMPEDED OR IN SUCH A MANNER SO AS NOT TO CREATE A HAZARD.
8. IF AN OBSTRUCTION IS ENCOUNTERED DURING THE BORING OPERATION, THE AUGER SHALL BE WITHDRAWN, THE EXCESS CASING PIPE CUT-OFF, CAPPED AND THE INTERIOR AND EXTERIOR VOIDS SHALL BE COMPLETELY FILLED WITH 1:3 PORTLAND CEMENT GROUT UNDER PRESSURE. NO SEPARATE PAYMENT FOR UNSUCCESSFUL BORES.
9. CONTRACTOR SHALL FIELD ADJUST AND INSTALL PROPER PIPE BRACES TO ACCOMPLISH GRADE AND INVERTS AS SHOWN ON THE DRAWINGS.
10. A MANUAL CONTROL STEERING HEAD OR OTHER GUIDANCE SYSTEM IS RECOMMENDED FOR BORES 30" DIAMETER AND/OR LARGER AND FOR BORES EXCEEDING 100' IN LENGTH OR AS SPECIFIED.
11. SUBCONTRACTORS SHALL ADHERE TO ALL PERMIT REQUIREMENTS AND SHALL PROVIDE APPROVED INSURANCE CERTIFICATES AS REQUIRED.
12. CONTRACTOR SHALL EXECUTE AND PERFORM ALL REQUIREMENTS AND CONDITIONS STIPULATED BY THE PERMITTING AGENCY.
13. SEE DRAWING M.6 SHEET 1 OF 2 FOR ADDITIONAL INFORMATION.
14. CARRIER PIPE FOR PRESSURE APPLICATIONS (WATER MAINS AND FORCE MAINS) SHALL HAVE FACTORY RESTRAINED JOINTS. CARRIER PIPE FOR GRAVITY SEWER SHALL HAVE RESTRAINED JOINTS AND MAY USE RESTRAINING GASKETS SUCH AS FIELD LOK, SURE STOP 350 OR OTHER APPROVED GASKETS.



GRAVITY SANITARY SEWER PIPE REPAIR N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 2 OF 3	DWG. NO. S.15	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	01/05	REVISED REPLACEMENT PIPE
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	07/11	REVISED NOTES

S15-VCP-REPAIR.dwg

BORE UNDER ROADWAYS/RAILROADS N.T.S.			FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	PWC	NO.	DATE	REVISION
SHEET NO. 2 OF 2	DWG. NO. M.6	DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT		1	02/11/04	ADDED 6" CARRIER PIPE TO BORE SIZING CHART.
	DATE: JULY 01, 2025	APPROVED BY: K.A.H.			2	07/10	REVISED NOTES, SIZING CHART

M6-BORE-ROAD-RAIL.dwg

PWC SANITARY SEWER DETAILS

SHEET NUMBER 30 OF 45

PLAN TYPE: 100% PLANS

Kimley»Horn
© 2024 KIMLEY-HORN AND ASSOCIATES, INC.
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049249 KATHRYN E. HOLLEY REGISTERED 11/25/2025

REVISIONS		
REV. #	DESCRIPTION	REV.BY DATE

ISSUED FOR CONSTRUCTION

PROJECT: TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

DRAWN : JNB
CHECK : NDR
APPROVED : NLH
SCALE: NOT TO SCALE

PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:Tryon Drainage UC Layout:31 PWC SANITARY SEWER DETAILS November 18, 2025 11:13:41am K:\RAL_Roadway\011017025_Tryon_Drainage\Utilities\UC\Plan Sheets\UTILITY PLANS.dwg

1.00 DOCUMENTS AND LIMITATIONS

1.01 THESE STRUCTURAL DOCUMENTS, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, ARE INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.

1.02 1.03 ALL NON-STRUCTURAL ELEMENTS INDICATED ON THE STRUCTURAL DRAWINGS HAVE BEEN SHOWN IN GENERAL TO THE RELATIONSHIP TO THE STRUCTURAL ELEMENTS ONLY. ACCORDINGLY, THEY SHALL NOT BE ASSUMED TO BE ACCURATE AND REFERENCE MUST BE MADE TO THE APPROPRIATE CONSULTANT(S) PLANS AND SPECIFICATIONS.

1.04 IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE LOCATION OF EMBEDDED ITEMS, SLEEVES, ANCHORS, AND PENETRATIONS AS REQUIRED AND/OR FURNISHED BY THE OTHER TRADES.

2.00 STATEMENT OF SPECIAL INSPECTION

2.01 SPECIAL INSPECTIONS SHALL BE PROVIDED IN COMPLIANCE WITH THE STATEMENT OF SPECIAL INSPECTIONS.

2.02 OWNER WILL ENGAGE A SPECIAL INSPECTOR AND QUALIFIED TESTING AND INSPECTING AGENCY TO PERFORM FIELD TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.

2.03 SPECIAL INSPECTIONS ARE REQUIRED FOR SOILS AND CONCRETE RETAINING WALLS. CONTRACTOR SHALL NOTIFY SPECIAL INSPECTOR AND TESTING AGENCY 48 HOURS IN ADVANCE OF ITEMS REQUIRED FOR SPECIAL INSPECTION.

2.04 ALL SPECIAL INSPECTION MONTHLY REPORTS SHALL BE SIGNED AND SEALED BY AN ENGINEER LICENSED IN NORTH CAROLINA, WHO HAS RESPONSIBLE CHARGE OF THE SPECIAL INSPECTIONS PROGRAM.

2.05 A SPECIAL INSPECTIONS MEETING SHALL BE HELD ON SITE WITH DESIGNER, CONSTRUCTION MANAGER, INDEPENDENT TESTING AGENCY, AND SPECIAL INSPECTOR TO CLARIFY ALL SPECIAL INSPECTION REQUIREMENTS PRIOR TO BEGINNING WORK.

3.00 CONSTRUCTION SAFETY

3.01 THE CONTRACTOR IS SOLELY RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK ON THE PROJECT. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE SAFETY OF THE PERSONS INVOLVED AND PROTECT THEM AGAINST INJURY. LIKEWISE, THE CONTRACTOR SHALL PROTECT ALL ADJACENT PROPERTY AGAINST DAMAGE OR LOSS.

3.02 THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES, REGULATIONS, AND ORDERS OF ANY PUBLIC BODY HAVING JURISDICTION FOR THE SAFETY OF PERSONS OR PROPERTY.

3.03 THE CONTRACTOR'S DUTIES AND RESPONSIBILITIES FOR THE SAFETY AND PROTECTION OF THE WORK SHALL CONTINUE UNTIL SUCH TIME AS THE WORK IS SATISFACTORILY COMPLETED, AND THE ENGINEER HAS ISSUED A NOTICE TO THAT EFFECT TO THE OWNER AND THE CONTRACTOR.

3.04 THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY CONDITIONS CREATED DURING THE SCOPE OF WORK AND SHALL TAKE NECESSARY PRECAUTIONS TO STABILIZE THE STRUCTURE AND OPEN EXCAVATIONS WHEN NOT IN THE COMPLETED STATE.

3.05 TEMPORARY CONSTRUCTION PEDESTRIAN AND VEHICULAR BARRICADES ARE TO BE PROVIDED BY THE CONTRACTOR. THE CONTRACTOR MUST PROVIDE FENCING AND BARRIERS AS REQUIRED TO COMPLETE THE WORK AND SAFEGUARD THE PUBLIC.

4.00 FOUNDATIONS, WINGWALLS, AND GEOTECHNICAL NOTES

4.01 FOUNDATION AND RETAINING WALL DESIGN ARE BASED ON GEOTECHNICAL ENGINEERING INFORMATION PROVIDED BY FROEHLING & ROBERTSON, INC. IN THE REPORT DATED JULY 15, 2022 AND FEBRUARY 13, 2025. CONTRACTOR SHALL REFER TO ALL RECOMMENDATIONS INCLUDED.

4.02 EXCESSIVE COMPACTION NEAR THE WALL(S) MAY CAUSE DAMAGE TO THE WALLS; IT IS RECOMMENDED THAT LOW GROUND PRESSURE EQUIPMENT (SUCH AS SMALL, WALK-BEHIND ROLLERS) BE UTILIZED TO COMPACT MATERIAL TO A DISTANCE OF AT LEAST 8 TO 10 FEET BEHIND THE WALLS.

4.03 IT IS RECOMMENDED THAT THE HEADWALL AND WINGWALL FOUNDATIONS BEARING GRADES BE OBSERVED BY A QUALIFIED GEOTECHNICAL ENGINEER OR HIS REPRESENTATIVE. IN ADDITION, HAND AUGERS AND DYNAMIC CONE PENETROMETER (DCP) TESTING SHOULD BE PERFORMED TO VERIFY THE CONSISTENCY OF THE BEARING GRADE AND UNDERLYING SOILS. THE PURPOSE OF THE ENGINEERING OBSERVATION WOULD BE TO DETERMINE THAT THE FOUNDATIONS BEAR ON SUITABLE AND STABLE SOILS AND THE UNSUITABLE, LOOSE MATERIALS ARE UNDERCUT AND BACKFILLED APPROPRIATELY.

4.04 GROUNDWATER WAS ENCOUNTERED IN THE BORINGS AT DEPTHS RANGING FROM APPROXIMATELY 5.9 TO 7.5 FEET BELOW THE EXISTING GROUND SURFACE. ALSO, WET AND/OR SATURATED SOIL CONDITIONS WERE ENCOUNTERED IN THE BORINGS TYPICALLY AT DEPTHS RANGING FROM 2 TO 6.5 FEET BELOW THE EXISTING GROUND SURFACE. BASED ON PROPOSED CULVERT INVERT ELEVATIONS, GROUNDWATER WILL LIKELY BE ENCOUNTERED AT AND/OR 1-4 FEET ABOVE THE INVERTS. AS SUCH, IT SHOULD BE EXPECTED THAT GROUNDWATER WILL LIKELY BE ENCOUNTERED DURING CONSTRUCTION AND DEWATERING WILL LIKELY BE REQUIRED. AS SUCH, EXCAVATION DEWATERING WILL BE REQUIRED IN ORDER TO MAINTAIN A DRAINED, STABLE EXCAVATION AND TO PREVENT SOFTENING/LOOSENING OF THE EXCAVATION SUBGRADE. THE GROUNDWATER SHOULD BE LOWERED TO A DEPTH OF AT LEAST 3 TO 4 FEET BELOW THE BOTTOM OF THE EXCAVATION AND SHOULD BE LOWERED PRIOR TO REMOVAL OF THE FINAL 3 TO 4 FEET OF OVERBURDEN. DEPENDING UPON THE PREVAILING WEATHER CONDITIONS DURING CONSTRUCTION AND FLOW IN THE CHANNEL, PUMPING FROM SUMP PITS MAY BE SUFFICIENT TO MAINTAIN A DRAINED EXCAVATION. HOWEVER DURING PERIODS OF INCLEMENT WEATHER, SUMP PITS AND PUMPING MAY NOT BE SUFFICIENT TO CONTROL BOTH GROUNDWATER AND SURFACE WATER, AND MORE EXTENSIVE DRAINAGE/DEWATERING MEASURES MAY BE REQUIRED. THE METHOD OF SURFACE WATER AND GROUNDWATER CONTROL SHOULD BE DETERMINED AND DESIGNED BY THE CONTRACTOR, BUT MAY REQUIRE WELL POINTS, CREEK DIVERSION, COFFER DAMS, SHEET PILING, OR OTHER MEANS.

4.05 IT SHOULD BE NOTED THAT IF GROUNDWATER LEVELS ARE NOT EFFECTIVELY MAINTAINED BELOW THE BASE OF THE EXCAVATION DURING CONSTRUCTION, UNSTABLE AND LOOSENED/SOFTENED SUBGRADE CONDITIONS COULD DEVELOP, WHICH MAY CAUSE EXCESSIVE SETTLEMENTS TO DEVELOP BENEATH THE COMPLETED STRUCTURE OR REQUIRE ADDITIONAL SUBGRADE REPAIR (E.G., DENSIFICATION, UNDERCUTTING & REPLACEMENT WITH WASHED STONE, ETC.). THEREFORE, EFFORTS SHOULD BE INCORPORATED IN THE CONSTRUCTION SEQUENCE TO PROPERLY CONTROL GROUNDWATER LEVELS DURING CONSTRUCTION. ADDITIONALLY, IT IS RECOMMENDED THAT ONLY EXCAVATION CONTRACTORS EXPERIENCED IN SIMILAR EXCAVATIONS AND GROUNDWATER CONTROL SHOULD BE ALLOWED TO PERFORM THIS WORK.

4.06 DUE TO THE LIMITED CONSTRUCTION AREA AVAILABLE WITHIN THE EASEMENT FOR THE EXISTING CULVERT, WE ANTICIPATE THE EXCAVATIONS MAY NOT BE ABLE TO BE SUFFICIENTLY SLOPED AND WILL REQUIRE TEMPORARY SHORING. TRENCH BOXES OR INTERNALLY-BRACED EXCAVATIONS ARE ANTICIPATED; HOWEVER, THE TYPE OF EXCAVATION STABILIZATION OR SHORING SYSTEM USED SHALL BE SELECTED AND DESIGNED BY THE CONTRACTOR.

4.07 MASS EXCAVATIONS AND OTHER EXCAVATIONS REQUIRED FOR CONSTRUCTION OF THIS PROJECT SHOULD BE PERFORMED IN ACCORDANCE WITH THE UNITED STATES DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) GUIDELINES (29 CFR 1926, SUBPART P, EXCAVATIONS), OR OTHER APPLICABLE JURISDICTIONAL CODES FOR PERMISSIBLE TEMPORARY SIDE-SLOPE RATIOS AND/OR SHORING REQUIREMENTS. THE OSHA GUIDELINES REQUIRE DAILY INSPECTIONS OF EXCAVATIONS, ADJACENT AREAS AND PROTECTIVE SYSTEMS BY A "COMPETENT PERSON" FOR EVIDENCE OF SITUATIONS THAT COULD RESULT IN CAVE-INS, INDICATIONS OF FAILURE OF A PROTECTIVE SYSTEM, OR OTHER HAZARDOUS CONDITIONS. ALL EXCAVATED SOILS, EQUIPMENT, BUILDING SUPPLIES, ETC., SHOULD BE PLACED AWAY FROM THE EDGES OF EXCAVATIONS AT A DISTANCE EQUALING OR EXCEEDING THE DEPTH OF THE EXCAVATION. F&R CAUTIONS THAT THE ACTUAL EXCAVATION SLOPES WILL NEED TO BE EVALUATED FREQUENTLY EACH DAY BY THE "COMPETENT PERSON" AND FLATTER SLOPES OR THE USE OF SHORING MAY BE REQUIRED TO MAINTAIN A SAFE EXCAVATION DEPENDING UPON EXCAVATION-SPECIFIC CIRCUMSTANCES. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE "COMPETENT PERSON" AND ALL ASPECTS OF SITE EXCAVATION SAFETY. F&R CAN EVALUATE SPECIFIC EXCAVATION SLOPE SITUATIONS IF WE ARE INFORMED AND REQUESTED BY THE OWNER, DESIGNER, OR CONTRACTOR'S "COMPETENT PERSON".

4.08 THE IN-SITU SOILS UNDER THE WINGWALLS SHALL BE UNDERCUT TO DEPTHS OF 2-4 FEET BELOW THE BEARING GRADE AND REPLACED WITH NO. 57 WASHED STONE UP TO THE PLANNED BEARING GRADE AND ENCASED WITH A GEOTEXTILE FILTER FABRIC. THE WASHED STONE THICKNESS SHOULD EXCEED TWO FEET BEFORE THE SURFACE OF THE WASHED STONE IS REQUIRED TO BE DENSIFIED WITH A HEAVY VIBRATORY PLATE COMPACTOR TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER OR THEIR REPRESENTATIVE.

4.09 RETAINING WALL DESIGN PARAMETERS:

DESIGN PARAMETER	TYPE OF BACKFILL	DESIGN VALUE	LATERAL EARTH PRESSURE COEFFICIENT
SOLID UNIT WEIGHT		120 PCF	
EQUIVALENT FLUID PRESSURE (ACTIVE CONDITION, CANTILEVERED WALL)	SOIL	40 PSF/FT	0.33
EQUIVALENT FLUID PRESSURE (PASSIVE CONDITION, CANTILEVERED WALL)	SOIL	150 PSF/FT	1.25
NET ALLOWABLE BEARING PRESSURE		2,000 PSF	
ULTIMATE COEFFICIENT OF SLIDING FRICTION		0.25	

5.00 DESIGN LOADS

5.01 AASHTO LRFD BRIDGE DESIGN MANUAL, 9TH EDITION

5.02 LOADING:
A. DEAD: SELF-WEIGHT
B. LIVE: 250 PSF CONSTRUCTION SURCHARGE LOADING
C. WIND: PER AASHTO

6.00 REINFORCED CONCRETE (CAST-IN-PLACE)

6.01 READY-MIX CONCRETE WORK SHALL CONFORM TO ASTM C94.

6.02 STRUCTURAL CONCRETE MATERIALS SHALL CONFORM TO THE FOLLOWING:
A. MAXIMUM WATER-TO-CEMENT RATIO: 0.45
B. TYPE II PORTLAND CEMENT – ASTM C150
C. AGGREGATES (3/4" MAX.) ASTM C33
D. AIR ENTRAINING (4.5% MIN. – 7% MAX.) – ASTM C260
E. WATER REDUCING – ASTM C494
F. FLY ASH (MAX. 25% BY WEIGHT), TYPE F – ASTM C618
G. WATER – CLEAN AND POTABLE – ASTM C1602
H. REINFORCED STEEL – ASTM A615 GRADE 60
I. WELDED WIRE FABRIC – ASTM A1064
J. GROUT SHALL BE NON-SHRINK, NON-METALLIC
K. USE OF CALCIUM CHLORIDE IS NOT PERMITTED

6.03 STRUCTURAL CONCRETE MIX SHALL CONFORM TO THE FOLLOWING:
A. CONCRETE MIXES AND EXPOSURE CLASS ACCORDING TO ACI 318:
WALLS: 4,000 PSI, ACI 318 CLASS F1 SO WO C2
FOUNDATIONS: 4,000 PSI, ACI 318 CLASS F1 SO WO C2

6.04 REQUIRED SLUMP: 2" TO 4" (BEFORE ADDITION OF SUPERPLASTICIZER)

6.05 ALL CONCRETE MATERIALS, PLACING AND HANDLING SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF ACI 318 AND ACI 301. CONCRETE WORK SHALL CONFORM TO THE CURRENT VERSION OF ACI 318.

6.06 SUBMITTALS:
A. DETAILED SHOP DRAWINGS OF REINFORCING BARS SHOWING NUMBER, SIZE, AND LOCATION. INCLUDING BAR LISTS AND BEND DIAGRAMS.
B. MIX DESIGNS FOR EACH TYPE OF CONCRETE SPECIFIED SHALL BE SUBMITTED FOR APPROVAL.
C. PRODUCT DATA AND MATERIAL CERTIFICATES.

6.07 CONCRETE SHALL BE PLACED WITHIN 90 MINUTES OF BATCH TIME.

6.08 ALL CONCRETE SHALL BE CONSOLIDATED IN PLACE USING INTERNAL VIBRATORS.

6.09 CAST-IN-PLACE CONCRETE SHALL BE CONTINUOUSLY CURED FOR 7 DAYS FOLLOWING INITIAL SET.

6.10 CONCRETE SHALL BE CURED IMMEDIATELY AFTER FINISHING OPERATIONS IN ACCORDANCE WITH ONE OF THE FOLLOWING METHODS:
A. APPLY A LIQUID MEMBRANE FORMING CURING COMPOUND IN ACCORDANCE WITH ASTM C309.
B. WET CURE IN ACCORDANCE WITH ACI 301.

6.11 REMOVE LIQUID MEMBRANE FORMING CHEMICAL CURING COMPOUND AFTER CURING PERIOD HAS ELAPSED, REMOVE CURING COMPOUND WITHOUT DAMAGING CONCRETE SURFACES BY METHOD RECOMMENDED BY CURING COMPOUND MANUFACTURER UNLESS MANUFACTURER CERTIFIES CURING COMPOUND DOES NOT INTERFERE WITH BONDING OF SEALERS, COATINGS, ETC. WHICH MAY BE USED ON PROJECT.

6.12 DETAILING OF REBAR SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE ACI DETAILING MANUAL AND CONCRETE REINFORCING INSTITUTE'S LATEST EDITION OF "MANUAL OF STANDARD PRACTICE". ALL SHOP DRAWINGS PERTAINING TO REBAR DETAILS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.

6.13 ALL DIMENSIONS PERTAINING TO LOCATION OF REINFORCING BARS ARE TO CENTERLINE OF BARS EXCEPT WHERE CLEAR DIMENSION IS SHOWN TO FACE OF CONCRETE.

6.14 REINFORCEMENT DETAIL DIMENSIONS SHALL BE OUT-TO-OUT OF BARS.

6.15 PROVIDE 3" CONCRETE COVER OVER REINFORCING BARS EXCEPT AS OTHERWISE NOTED.

6.16 BARS SHALL BE FIELD TIED. WELDING IS NOT PERMITTED.

6.17 SUPPORT REINFORCING IN ITS PROPER POSITION FROM THE FORMWORK DURING CONCRETE OPERATION.

6.18 BAR SUPPORTS, DESIGN, DETAILING, FABRICATION, AND PLACING OF REINFORCING BARS SHALL BE IN ACCORDANCE WITH ACI 318 (BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE).

6.19 PROVIDE 3/4" CHAMFERS AT ALL EXPOSED EDGES OF CONCRETE SURFACES.

6.20 FORM TIES AND REINFORCING BAR SUPPORTS SHALL BE OF NON-CORROSIVE MATERIAL INCLUDING, BUT NOT LIMITED TO, FIBERGLASS, PLASTIC AND/OR CONCRETE BLOCK.

6.21 CONTRACTOR IS RESPONSIBLE FOR THE PROPER DESIGN AND CONSTRUCTION OF ALL FORMWORK AND SHORING. DESIGN SHALL BE PERFORMED BY A PROFESSIONAL ENGINEER LICENSED IN STATE IN WHICH THE WORK IS PERFORMED.

6.22 THE GENERAL CONTRACTOR SHALL ASSIST AND COOPERATE WITH AN INDEPENDENT TESTING LABORATORY (TO BE RETAINED BY THE OWNER) WHICH SHALL CONDUCT THE SPECIFIED TESTS REQUIRED FOR THE CONCRETE WORK AND REPORT THE RESULTS OF THIS TESTING DIRECTLY AND PROMPTLY TO THE ENGINEER FOR REVIEW.

6.23 A QUALIFIED TESTING LABORATORY SHALL BE RETAINED AND ADMINISTERED BY THE OWNER TO PERFORM THE FOLLOWING:
A. FOR EACH 100 CUBIC YARDS OR FRACTION THEREOF PLACED, 5,000 SQUARE FEET OF SURFACE AREA, OR EACH PLACEMENT OF MIX DESIGN OF CONCRETE PLACED IN ANY ONE DAY, THE FOLLOWING SHALL BE PERFORMED:
a. SLUMP: TEST IN ACCORDANCE WITH ASTM C143.
b. AIR CONTENT: TEST IN ACCORDANCE WITH ASTM C231 OR C173.
c. COMPR. STRENGTH: FABRICATE ONE SET OF (5) 6x12 CYLINDERS, TEST IN ACCORDANCE WITH ASTM C39. FABRICATE ONE SET OF (5) CONCRETE TEST SPECIMENS (CYLINDERS) FOR EACH 50 CUBIC YARDS. TEST ONE CYLINDER AT 7 DAYS AND 3 AT 28 DAYS. AND HOLD ONE IN RESERVE.
d. REINF. INSPECTIONS: CONFORM SIZE, QUANTITY, AND LOCATION FOR WALLS GREATER THAN 5' IN HEIGHT.

6.24 ONE COPY OFF ALL TEST REPORTS SHALL BE SENT DIRECTLY TO THE CITY MANAGER, THE GEOTECHNICAL ENGINEER, KIMLEY-HORN, AND THE CONTRACTOR.

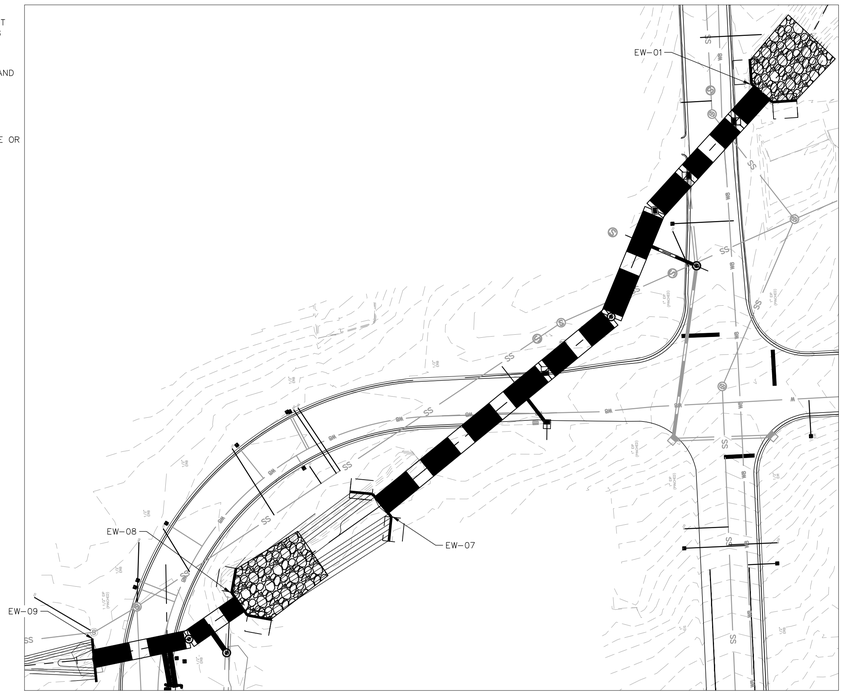
6.25 COLD-WEATHER PLACEMENT: COMPLY WITH ACI 306.1 AND AS FOLLOWS. PROTECT CONCRETE WORK FROM PHYSICAL DAMAGE OR REDUCED STRENGTH THAT COULD BE CAUSED BY FROST, FREEZING ACTIONS, OR LOW TEMPERATURES.
A. WHEN AVERAGE DAILY TEMPERATURE IS EXPECTED TO FALL BELOW 40 DEGREES FAHRENHEIT FOR THREE SUCCESSIVE DAYS, MAINTAIN CONCRETE MIXTURE TEMPERATURE WITHIN TEMPERATURE RANGE REQUIRED BY ACI 301.
B. DO NOT USE FROZEN MATERIALS OR MATERIALS CONTAINING ICE OR SNOW. DO NOT PLACE CONCRETE ON FROZEN SUBGRADE OR ON SUBGRADE CONTAINING FROZEN MATERIALS.
C. DO NOT USE CALCIUM CHLORIDE, SALT, OR OTHER MATERIAL CONTAINING ANT-FREEZE AGENTS OR CHEMICAL ACCELERATORS UNLESS OTHERWISE SPECIFIED AND APPROVED IN MIXTURE DESIGNS.

6.26 HOT-WEATHER PLACEMENT: COMPLY WITH ACI 305 AND AS FOLLOWS:
A. MAINTAIN CONCRETE TEMPERATURE BELOW 90 DEGREES FAHRENHEIT AT TIME OF PLACEMENT.
B. FOG-SPRAY FORMS, STEEL REINFORCEMENT, AND SUBGRADE JUST BEFORE PLACING CONCRETE. KEEP SUBGRADE UNIFORMLY MOIST WITHOUT STANDING WATER, SOFT SPOTS, OR DRY AREAS.

7.00 DRAIN PIPE MATERIALS & INSTALLATION

7.01 PERFORATED DRAIN PIPES AND WEEP PIPES SHALL BE SCHEDULE 40 PVC. ALL PVC PIPE DIMENSIONS AND PHYSICAL PROPERTIES SHALL CONFORM TO ASTM D2729. INSTALLATION SHALL COMPLY WITH MANUFACTURER'S INSTALLATION STANDARD. BURIED DRAIN PIPES AND WEEP PIPES SHALL BE INSTALLED PER ASTM D2321 AND ASTM D2855. SOLVENT CEMENT JOINTS SHALL BE MADE IN A TWO-STEP PROCESS WITH PRIMER CONFORMING TO ASTM F656 AND SOLVENT CEMENT CONFORMING TO ASTM D2564. THE SYSTEM SHALL BE PROTECTED FROM CHEMICAL AGENTS, FIRE-STOPPING MATERIALS, THREAD SEALANT, PLASTICIZED-VINYL PRODUCTS OF OTHER AGGRESSIVE CHEMICAL AGENTS NOT COMPATIBLE WITH PVC COMPOUNDS. PERFORATED PIPES SHALL BE WRAPPED IN GEOTECHNICAL FABRIC TO PREVENT BLOCKAGE.

SUMMARY OF QUANTITIES		
WALL	4 KSI CONCRETE	REINFORCING STEEL
EW-01	59.7 YD^3	7,519 LBS
EW-07	47.6 YD^3	5,549 LBS
EW-08	53.8 YD^3	7,483 LBS
EW-09	21.1 YD^3	2,005 LBS
TOTAL	182.2 YD^3	22,556 LBS



LOCATION SKETCH

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

WINGWALL AND HEADWALL NOTES

SHEET NUMBER S-100

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE NC
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL SEAL 045140 ENGINEER PATRICK D. COOKSEY
11/21/25

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

PROJECT TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

DRAWN : R. GIESEN
DESIGN : T. ORR
APPROVED : P. COOKSEY
SCALE :

PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 - Tryon Layout:RETAINING WALL NOTES November 18, 2025 11:14:45am K:\RDT_Structures_RetainWall_NC\011017032 - Tryon Drive Walls\CAD\S-100 RETAINING WALL NOTES.dwg

Statement of Special Inspections

Project: *Tryon Drive Walls*
Location: *Fayetteville, NC*
Owner: *City of Fayetteville*
Design Professional in Responsible Charge: *Patrick D. Cooksey, PE*

This Statement of Special Inspections is submitted in accordance with Section 1704.3 of the 2015 International Building Code. It includes a *Schedule of Special Inspection Services* applicable to the above-referenced Project as well as the identity of the individuals, agencies, or firms intended to be retained for conducting these inspections. If applicable, it includes *Requirements for Seismic Resistance* and/or *Requirements for Wind Resistance*. This *Statement of Special Inspections* encompass the following disciplines:

☒ Structural ☐ Mechanical/Electrical/Plumbing
☐ Architectural ☐ Other:

Are *Requirements for Seismic Resistance* included in the *Statement of Special Inspections*? ☐ Yes ☒ No

Are *Requirements for Wind Resistance* included in the *Statement of Special Inspections*? ☐ Yes ☒ No

The Special Inspector(s) shall keep records of all inspections and shall furnish interim inspection reports to the Building Official and to the Registered Design Professional in Responsible Charge at a frequency agreed upon by the Design Professional and the Building Official prior to the start of work. Discrepancies shall be brought to the immediate attention of the Contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge prior to completion of that phase of work. A *Final Report of Special Inspections* documenting required special inspections and corrections of any discrepancies noted in the inspections shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge at the conclusion of the project.

Frequency of interim report submittals to the Registered Design Professional in Responsible Charge:

__Weekly __Bi-Weekly _X_Monthly Other; specify:_____

The Special Inspection program does not relieve the Contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Statement of Special Inspections Prepared by:

Patrick D. Cooksey, PE
Type or print name

Patrick D. Cooksey
Signature

04/30/2025
Date

Building Official's Acceptance:

_____
Type or print name

_____
Signature Date

Permit Number: _____

Frequency of interim report submittals to the Building Official:

__Monthly __Bi- Monthly __Upon Completion Other; specify:_____

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

MATERIAL/ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT Y/N	EXTENT	AGENT*	DATE COMPLETED
1704.2.5 Fabricated Items					
Verify fabrication / quality control procedures (unless Exceptions apply to fabricator)	In-plant Review (3)	Y	Periodic		
1705.1.1 Special Cases					
Work unusual in nature including but not limited to alternative materials and systems, unusual design applications, materials and systems with special manufacturer's requirements.	Submittal Review, Shop (3) and/or Field Operations	N			
1705.2.1 Structural Steel					
Fabricator and erector documents (Verify reports and certificates as listed in *AISC 360, chapter N, paragraph 3.2* for compliance with construction documents.)	Submittal Review	N	Each Submittal		
Material verification of structural steel	Shop (3) and Field Inspection	N	Periodic		
Embedments (Verify diameter, grade, type, length, embedment. *See 1705.3 for anchors*)	Field Inspection	N	Periodic		
Verify member locations, braces, stiffeners and application of joint details at each connection comply with construction documents.	Field Inspection	N	Periodic		
Structural steel welding:					
Inspection tasks prior to welding (Observe, or perform for each welded joint or member, the QA tasks listed in *AISC 360, Table N5.4-1*)	Shop (3) and Field Inspection	N	Observe or Perform as Noted (4)		
Inspection tasks during welding (Observe or perform for each welded joint or member, the QA tasks listed in *AISC 360, Table N5.4-2*)	Shop (3) and Field Inspection	N	Observe (4)		
Inspection tasks after welding (Observe or perform for each welded joint or member, the QA tasks listed in *AISC 360, Table N5.4-3*)	Shop (3) and Field Inspection	N	Observe or Perform as Noted (4)		
Nondestructive testing (NDT) of welded joints: see Commentary					
Complete penetration groove welds 5/16" or greater in risk category III or IV	Shop (3) or Field Ultrasonic Testing – 100%	N	Periodic		
Complete penetration groove welds 5/16" or greater in risk category II	Shop (3) or Field Ultrasonic Testing – 10% of Welds Minimum	N	Periodic		
Thermally cut surfaces of access holes when material I>2"	Shop (3) or Field Magnetic Particle or Penetrant Testing	N	Periodic		
Welded joints subject to fatigue when required by *AISC 360, Appendix 3, Table A-3.1*	Shop (3) or Field Radiographic or Ultrasonic Testing	N	Periodic		
Fabricator NDT reports when fabricator performs NDT	Verify Reports	N	Each Submittal (3)		
Structural Steel Bolting:		N			
Inspection tasks Prior to Bolting (Observe, or perform tasks for each bolted connection in accordance with QA tasks listed in *AISC 360, Table N5.6-1*)	Shop (3) and Field Inspection	N	Observe or Perform as Noted (4)		
Inspection tasks during bolting (Observe the QA tasks listed in *AISC 360, Table N5.6-2*)	Shop (3) and Field Inspection	N	Observe (4)		
Pre-tensioned and slip-critical joints					

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

MATERIAL/ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT Y/N	EXTENT	AGENT*	DATE COMPLETED
Turn-of-nut with matching markings		N	Periodic		
Direct tension indicator		N	Periodic		
Twist-off type tension control bolt		N	Periodic		
Turn-of-nut without matching markings		N	Continuous		
Calibrated wrench		N	Continuous		
Snug-tight joints		N	Periodic		
Inspection tasks after bolting (Perform tasks for each bolted connection in accordance with QA tasks listed in *AISC 360, Table N5.6-3*)		N	Perform (4)		
Inspection of steel elements of composite construction prior to concrete placement in accordance to *AISC 360, Table N6.1*	Shop (3) and Field Inspection and Testing	N	Observe or Perform as Noted (4)		
1705.2.2 Cold-formed Steel Deck					
Verify compliance of materials for deck and all deck accessories in accordance with *SDI QA/QC Table 1.1*	*See SDI QA/QC Table 1.1*	N	*See SDI QA/QC Table 1.1*		
Inspect installation and mill certifications of deck and all deck accessories in accordance with *SDI QA/QC Table 1.2*	*See SDI QA/QC Table 1.2*	N	*See SDI QA/QC Table 1.2*		
Verify welding procedure specifications, manufacturer certifications, material identification, and welding equipment in accordance with *SDI QA/QC Table 1.3*	*See SDI QA/QC Table 1.3*	N	*See SDI QA/QC Table 1.3*		
Inspect welder qualifications, enviromental conditions, and welding procedure in accordance with *SDI QA/QC Table 1.4*	*See SDI QA/QC Table 1.4*	N	*See SDI QA/QC Table 1.4*		
Inspect welds for size and location, including support, sidelap, and perimeter welds following *SDI QA/QC Table 1.5*	*See SDI QA/QC Table 1.5*	N	*See SDI QA/QC Table 1.5*		
Verify manufacturer installation instructions, proper tools, and proper storage are available for mechanical fasteners following *SDI QA/QC Table 1.6*	*See SDI QA/QC Table 1.6*	N	*See SDI QA/QC Table 1.6*		
Inspect mechanical fastener positioning and installation, including spacing and type for all fasteners following *SDI QA/QC Table 1.7 & 1.8*	*See SDI QA/QC Table 1.7 & 1.8*	N	*See SDI QA/QC Table 1.7 & 1.8*		
1705.2.3 Open-web Steel Joists and Joist Girders					
Installation of open-web steel joists and joist girders					
End connections – welding or bolted	Field Inspection	N	Periodic		
Bridging – horizontal or diagonal	Field Inspection	N	Periodic		
Standard Bridging	Field Inspection	N	Periodic		
Bridging that differs from the SJI specifications listed in *Section 2207.1*	Field Inspection	N	Periodic		
1705.2.4 Cold-formed steel trusses spanning 60 feet or greater					
Verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field Inspection	N	Periodic		

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

Material / Activity	Service	Applicable to this Project Y/N	Extent	Agent	Date Completed
1705.1 Concrete Construction					
Inspect reinforcement, including prestressing tendons, and verify placement	Shop (3) and Field Inspection	Y	Periodic		
Reinforcing bar welding: Inspect welding and qualifications in accordance with *AWS D1.4*					
Verify weldability of reinforcing bars other than ASTM A706.	Shop (3) and Field Inspection	Y	Periodic		
Inspect single-pass-filet welds, maximum 5/16"	Shop (3) and Field Inspection	Y	Periodic		
Inspect all other welds	Field Inspection	Y	Periodic		
Inspect anchors cast in concrete	Field Inspection	Y	Periodic		
Inspect anchors post-installed in hardened concrete members: Per research reports including verification of anchor type, anchor dimensions, hole cleaning procedures, anchor spacing, edge distances, concrete minimum thickness, anchor embedment and tightening torque.					
Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads	Field Inspection	Y	Continuous		
Mechanical anchors and adhesive anchors not defined above	Field Inspection	Y	Periodic or as required by research report issued by an approved source		
Verify use of approved design mix	Shop (3) and Field Inspection	Y	Periodic		
Prior to concrete placement, fabricate specimens, perform slump and air content tests, and determine temperature of concrete	Shop (3) and Field Inspection	Y	Continuous		
Inspect concrete and shotcrete placement for proper application techniques	Shop (3) and Field Inspection	Y	Continuous		
Verify maintenance of specified curling temperature and techniques	Shop (3) and Field Inspection	Y	Periodic		
Inspect prestressed concrete:					
Application of prestressing force	Shop (3) and Field Inspection	N	Continuous		
Grouting of bonded prestressing tendons	Shop (3) and Field Inspection	N	Continuous		
Inspect erection of precast concrete members		N	Periodic		
Inspect in accordance with construction documents	Field Inspection	N	In accordance with construction documents		
Perform inspection of welding and bolting in accordance with Section *1705.2*	Field Inspection	N	In accordance with Sec. *1705.2*		
Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs	Review Field Testing and Laboratory Systems	N	Periodic		
Inspect formwork for shape, lines, location and dimensions	Field Inspection	Y	Periodic		
Concrete strength testing and verification of compliance with construction documents	Field Testing and Review of Laboratory Reports	Y	Periodic		

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

Material / Activity	Service	Applicable to this Project Y/N	Extent	Agent	Date Completed
1705.4 Masonry Construction					
Level A Quality Assurance					
Prior to construction, verify certificates of compliance used in masonry construction.	Submittal Review	N	Each Submittal		
Level B Quality Assurance					
Verification of f'_m and f_{AM} prior to construction	Testing by unit strength method or prism test method	N	Periodic		
Level C Quality Assurance					
Verification of f'_m and f_{AM} prior to construction and for every 5,000 SF during construction	Testing by unit strength method or prism test method	N	Periodic		
Verification of proportions of materials in premixed or preblended mortar, prestressing grout, and grout other than self-consolidating grout, as delivered to the project site	Field Inspection	N	Continuous		
Verify placement of masonry units	Field Inspection	N	Periodic		
Levels B and C Quality Assurance					
Verification of Slump Flow and Visual Stability Index (VSI) of self-consolidating grout as delivered to the project site	Field Testing	N	Continuous		
Verify compliance with approved submittals	Field Inspection	N	Periodic		
Verify proportions of site-mixed mortar, grout and prestressing grout for bonded tendons	Field Inspection	N	Periodic		
Verify grade, type and size of reinforcement and anchor bolts, and prestressing tendons and anchorages	Field Inspection	N	Periodic		
Verify construction of mortar joints	Field Inspection	N	Periodic		
Verify placement of reinforcement, connectors and prestressing tendons and anchorages	Field Inspection	N	Level B – Periodic Level C – Continuous		
Verify grout space prior to grouting	Field Inspection	N	Level B – Periodic Level C – Continuous		
Verify placement of grout and prestressing grout for bonded tendons	Field Inspection	N	Continuous		
Verify size and location of structural masonry elements	Field Inspection	N	Periodic		
Verify type, size and location of anchors including details of anchorage of masonry to structural members, frames, or other construction	Field Inspection	N	Level B – Periodic Level C – Continuous		
Verify welding of reinforcement (see *1705.3*)	Field Inspection	N	Continuous		
Verify preparation, construction, and protection of masonry during cold weather (temp. below 40F) or hot weather (temp above 90F)	Field Inspection	N	Periodic		
Verify application and measurement of prestressing force	Field Inspection	N	Continuous		

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

Material / Activity	Service	Applicable to this Project Y/N	Extent	Agent	Date Completed
Verify placement of AAC masonry units and construction of thin-bed mortar joints (first 5000 SF of AAC masonry)	Field Inspection	N	Continuous		
Verify placement of AAC masonry units and construction of thin-bed mortar joints (after the first 5000SF of AAC masonry)	Field Inspection	N	Level B – Periodic Level C – Continuous		
Verify properties of thin-bed mortar for AAC masonry (first 5000 SF of AAC masonry)	Field Inspection	N	Continuous		
Verify properties of thin-bed mortar for AAC masonry (after the first 5000SF of AAC masonry)	Field Inspection	N N	Level B – Periodic Level C – Continuous		
Observe preparation of grout and mortar specimens	Field Testing	N N	Level B – Periodic Level C – Continuous		
Observe preparation of prisms	Field Inspection	N N	Level B – Periodic Level C – Continuous		
1705.5 Wood Construction					
Inspection of the fabrication process of wood structural elements and assemblies in accordance with section *1704.2.5*	In-plant Review (3)	N	Periodic		
For high-load diaphragms, verify grade and thickness of structural panel sheathing agree with approved building plans	Field Inspection	N	Periodic		
For high-load diaphragms, verify nominal size of framing members at adjoining panel edges, nail or staple diameter and length, number of fastener lines and that spacing between fasteners in each line and at edge margin agree with approved building plans	Field Inspection	N	Periodic		
Metal-plate connected wood trusses spanning 60 feet or greater: verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field Inspection	N	Periodic		
1705.6 Soils					
Verify materials below shallow foundations are adequate to achieve the design bearing capacity	Field Inspection	Y	Periodic		
Verify excavations are extended to proper depth and have reached proper material	Field Inspection	Y	Periodic		
Perform classification and testing of controlled fill materials	Field Inspection	Y	Periodic		
Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill	Field Inspection	Y	Continuous		
Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly	Field Inspection	Y	Periodic		
1705.7 Driven Deep Foundations					
Verify element materials, sizes and lengths comply with requirements	Field Inspection	N	Continuous		
Determine capacities of test elements and conduct additional load tests, as required	Field Inspection	N	Continuous		

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

Observe driving operations and maintain complete and accurate records for each element	Field Inspection	N	Continuous		
Material / Activity	**Service**	**Applicable to this Project Y/N**	**Extent**	**Agent**	**Date Completed**
Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element	Field Inspection	N	Continuous		
For steel elements, perform additional inspections per *Section 1705.2*	*See Section 1705.2*	N	*See Section 1705.2*		
For concrete elements and concrete-filled elements, perform additional inspections per *Section 1705.3*	*See Section 1705.3*	N	*See Section 1705.3*		
For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge	Field Inspection	N	In accordance with construction documents		
Perform additional inspections and tests in accordance with the construction documents	Field Inspection and Testing	N	In accordance with construction documents		
1705.8 Cast-in-Place Deep Foundations					
Observe drilling operations and maintain complete and accurate records for each element	Field Inspection	N	Continuous		
Verify placement locations and plumbness, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	Field Inspection	N	Continuous		
For concrete elements, perform additional inspections in accordance with Section *1705.3*	*See Section 1705.3*	N	*See Section 1705.3*		
Perform additional inspections and tests in accordance with the construction documents	Field Inspection and Testing	N	In accordance with construction documents		
1705.9 Helical Pile Foundations					
Verify installation, equipment, pile dimensions, tip elevations, final depth, final installation torque and other data as required	Field Inspection	N	Continuous		
Perform additional inspections and tests in accordance with construction documents	Field Inspection and Testing	N	In accordance with construction documents		
1705.11.1 Structural Wood Special Inspections for Wind Resistance					
Inspection of field gluing operations of elements of the main windforce-resisting system	Field Inspection	N	Continuous		
Inspection of nailing, bolting, anchoring and other fastening of components within the main windforce-resisting system	Shop (3) and Field Inspection	N	Periodic		

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

Material / Activity	Service	Y/N	Extent	Agent	Date Completed
1705.11.2 Cold-formed Steel Special Inspections for Wind Resistance					
Inspection during welding operations of elements of the main windforce-resisting system	Shop (3) and Field Inspection	N	Periodic		
Inspections for screw attachment, bolting, anchoring and other fastening of components within the main windforce-resisting system	Shop (3) and Field Inspection	N	Periodic		
1705.11.3 Wind-Resisting Components					
Roof covering, roof deck and roof framing connections	Shop (3) and Field Inspection	N	Periodic		
Exterior wall covering and wall connections to roof and floor diaphragms and framing	Shop (3) and Field Inspection	N	Periodic		
1705.12.1 Structural Steel Special Inspections for Seismic Resistance					
Inspection of structural steel in accordance with *AISC 341*	Shop (3) and Field Inspection	N	In Accordance with *AISC 341*		
1705.12.2 Structural Wood Special Inspections for Seismic Resistance					
Inspection for field gluing operations of elements of the seismic-force-resisting system	Field Inspection	N	Continuous		
Inspection of nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system	Shop (3) and Field Inspection	N	Periodic		
1705.12.3 Cold-forming Steel Light-Frame Construction Special Inspections for Seismic Resistance					
Inspection during welding operations of elements of the seismic-force-resisting systems	Shop (3) and Field Inspection	N	Periodic		
Inspections for screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system	Shop (3) and Field Inspection	N	Periodic		
1705.12.4 Designated Seismic Systems Verification					
Inspect and verify that the component label, anchorage or mounting conforms to the certificate of compliance in accordance with *Section 1705.13.3*	Field Inspection	N	Periodic		
1705.12.5 Architectural Components Special Inspections for Seismic Resistance					
Inspection during the erection and fastening of exterior cladding and interior and exterior veneer	Field Inspection	N	Periodic		
Inspection during the erection and fastening of interior and exterior nonbearing walls	Field Inspection	N	Periodic		
Inspection during anchorage of access floors	Field Inspection	N	Periodic		
1705.12.6 Plumbing, Mechanical and Electrical Components Special Inspections for Seismic Resistance					

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

Inspection during the anchorage of electrical equipment for emergency or standby power systems	Field Inspection	N	Periodic		
Material / Activity	**Service**	**Applicable to this Project Y/N**	**Extent**	**Agent**	**Date Completed**
Inspection during anchorage of other electrical equipment	Field Inspection	N	Periodic		
Inspection during installation and anchorage of piping systems designed to carry hazardous materials and their associated mechanical units	Field Inspection	N	Periodic		
Inspection during the installation and anchorage of HVAC ductwork that will contain hazardous materials	Field Inspection	N	Periodic		
Inspection during the installation and anchorage of vibration isolation systems	Field Inspection	N	Periodic		
1705.12.7 Storage Racks Special Inspections for Seismic Resistance					
Inspection during the anchorage of storage racks 8 feet or greater in height	Field Inspection	N	Periodic		
1705.12.8 Seismic Isolation Systems					
Inspection during the fabrication and installation of isolator units and energy dissipation devices used as part of the seismic isolation system	Shop and Field Inspection	N	Periodic		
1705.12.9 Cold-formed Steel Special Bolted Moment Frames					
Inspection during the installation of cold-formed steel special bolted moment frames within the seismic-force-resisting system	Field Inspection	N	Periodic		
1705.13.1 Structural Steel Testing for Seismic Resistance					
Test in accordance with the quality assurance requirements of *AISC 341*	Shop (3) and Field Testing	N	*Per AISC 341*		
1705.13.2 Nonstructural Components Testing for Seismic Resistance					
Review certificate of compliance for designated seismic system components	Certificate of Compliance Review	N	Each submittal		
1705.13.3 Designated Seismic Systems Testing for Seismic Resistance					
Review certificate of compliance for designated seismic system components	Certificate of Compliance Review	N	Each submittal		
1705.13.4 Seismic Isolation Systems Testing for Seismic Resistance					
Test seismic isolation system in accordance with *ASCE 7, Sec. 17.8*	Prototype Testing	N	*Per ASCE 7*		
1705.14 Sprayed Fire-Resistant Materials					
Verify surface condition preparation of structural members	Field Inspection	N	Periodic		
Verify application of sprayed fire-resistant materials	Field Inspection	N	Periodic		
Verify average thickness of sprayed fire-resistant materials applied to structural members	Field Inspection	N	Periodic		
Verify density of the sprayed fire-resistant material complies with approved fire-resistant design	Field Inspection and Testing	N	*Per IBC Section 1705.14.5*		

SCHEDULE OF SPECIAL INSPECTION SERVICES
PROJECT: Tryon Drive Walls (City of Fayetteville, NC)

Verify the cohesive/adhesive bond strength of the cured sprayed fire-resistant material	Field Inspection and Testing	N	*Per IBC Section 1705.14.6*		

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ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 PATRICK D. COOKSEY 11/24/25

SHEET NUMBER S-101
PLAN TYPE:

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

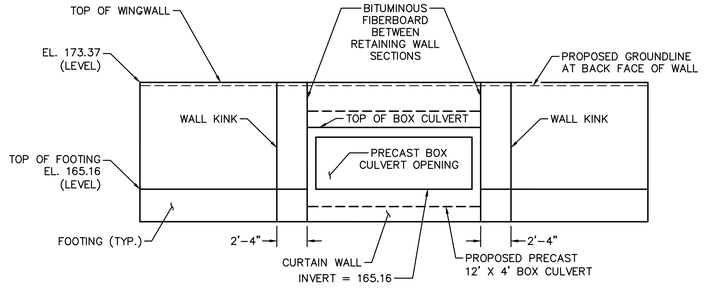
ISSUED FOR CONSTRUCTION

PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

DRAWN : R. GIESEN
DESIGN : T. ORR
APPROVED : P. COOKSEY
SCALE :

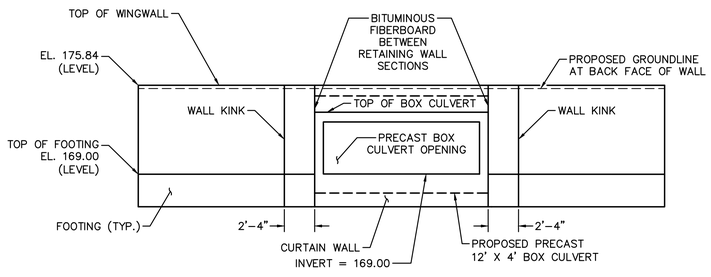
PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 — Tryon Layout:SCHEDULE OF SPECIAL INSPECTIONS November 18, 2025 11:15:11am K:\RDT_Structures_RetainWall_NC\011017032 — Tryon Drive Walls\CAD\S-101 RETAINING WALL LAYOUT.dwg



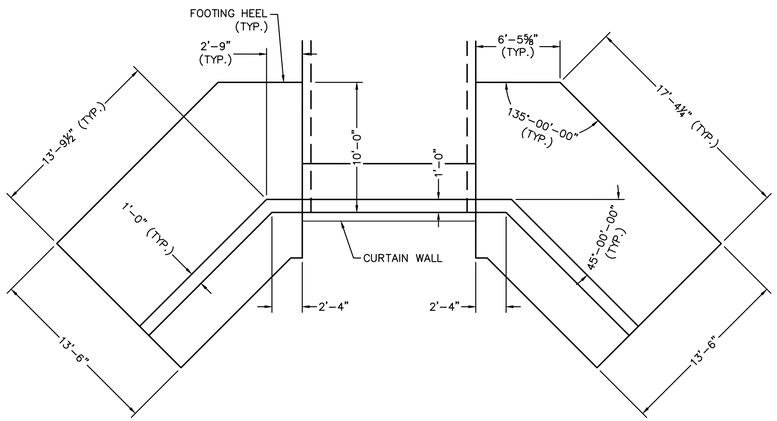
EW-01 ELEVATION

NOTE: DIMENSIONING ALONG FRONT FACE OF WALL

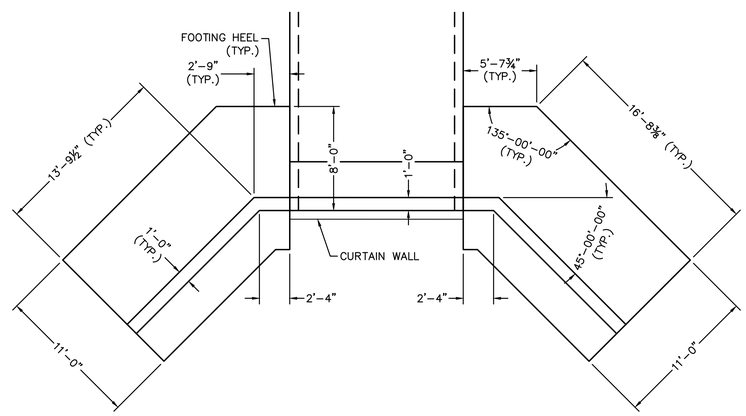


EW-07 ELEVATION

NOTE: DIMENSIONING ALONG FRONT FACE OF WALL



EW-01 CULVERT PLAN



EW-07 CULVERT PLAN

GENERAL NOTES:

1. SEE SHEETS S-104 FOR WALL SECTIONS AND DETAILS.

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NC LICENSE F-0102

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ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 PATRICK D. COOKSEY 11/24/2025

REVISIONS			
REV. #	DESCRIPTION	REV.BY DATE	
1	BID SET		NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN :	R. GIESEN
DESIGN :	T. ORR
APPROVED :	P. COOKSEY
SCALE :	
PROJECT NAME :	TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE :	NOV 2025

PROJECT NO. KH 011017025

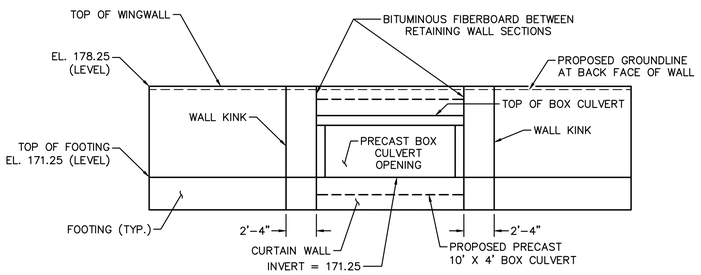
SUB-LEDGER NO.

WINGWALL LAYOUT (1 OF 2)

PLAN TYPE:

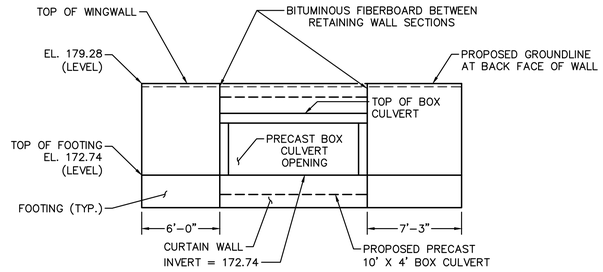
SHEET NUMBER S-102

Plotted By:Anderson, Nolen Sheet Set:011017025 - Tryon Layout:RETAINING WALL LAYOUT (1 OF 2) November 18, 2025 11:15:22am K:\RDT_Structures_RetainWall_NC\011017032 - Tryon Drive Walls\CAD\S-101 RETAINING WALL LAYOUT.dwg



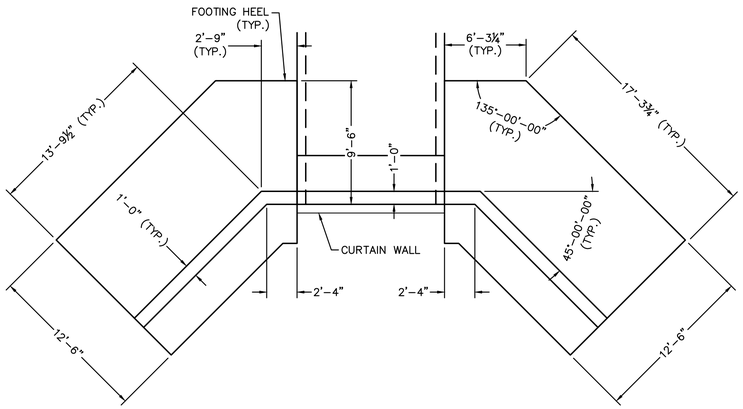
EW-08 ELEVATION

NOTE: DIMENSIONING ALONG FRONT FACE OF WALL

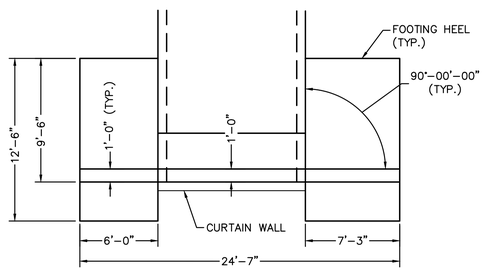


EW-09 ELEVATION

NOTE: DIMENSIONING ALONG FRONT FACE OF WALL



EW-08 CULVERT PLAN



EW-09 CULVERT PLAN

GENERAL NOTES:

1. SEE SHEETS S-104 FOR WALL SECTIONS AND DETAILS.

WINGWALL LAYOUT (2 OF 2)

SHEET NUMBER S-103

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 PATRICK D. COOKSEY DATE

REVISIONS			
REV. #	DESCRIPTION	REV.BY DATE	
1	BID SET		NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN :	R. GIESEN
DESIGN :	T. ORR
APPROVED :	P. COOKSEY
SCALE :	

PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025

SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 - Tryon Layout:RETAINING WALL LAYOUT (2 OF 2) November 18, 2025 11:15:26am K:\RDT_Structures_RetainWall_NC\011017032 - Tryon Drive Walls\CAD\S-101 RETAINING WALL LAYOUT.dwg

WINGWALL SCHEDULE

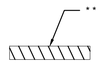
MARK	MAX. FILL HEIGHT	STEM	DEPTH	TOE	LENGTH
EW-01	8'-0"	1'-0"	2'-6"	3'-6"	13'-6"
EW-07	6'-8"			3'-0"	11'-0"
EW-08	6'-9"				12'-6"
EW-09	6'-4"				

HEADWALL SCHEDULE

MARK	FILL HEIGHT	STEM	DEPTH	LENGTH
EW-01	2'-3"	1'-0"	1'-0"	3'-9"
EW-07	10"			
EW-08	1'-0"			
EW-09	7"			

NOTES:

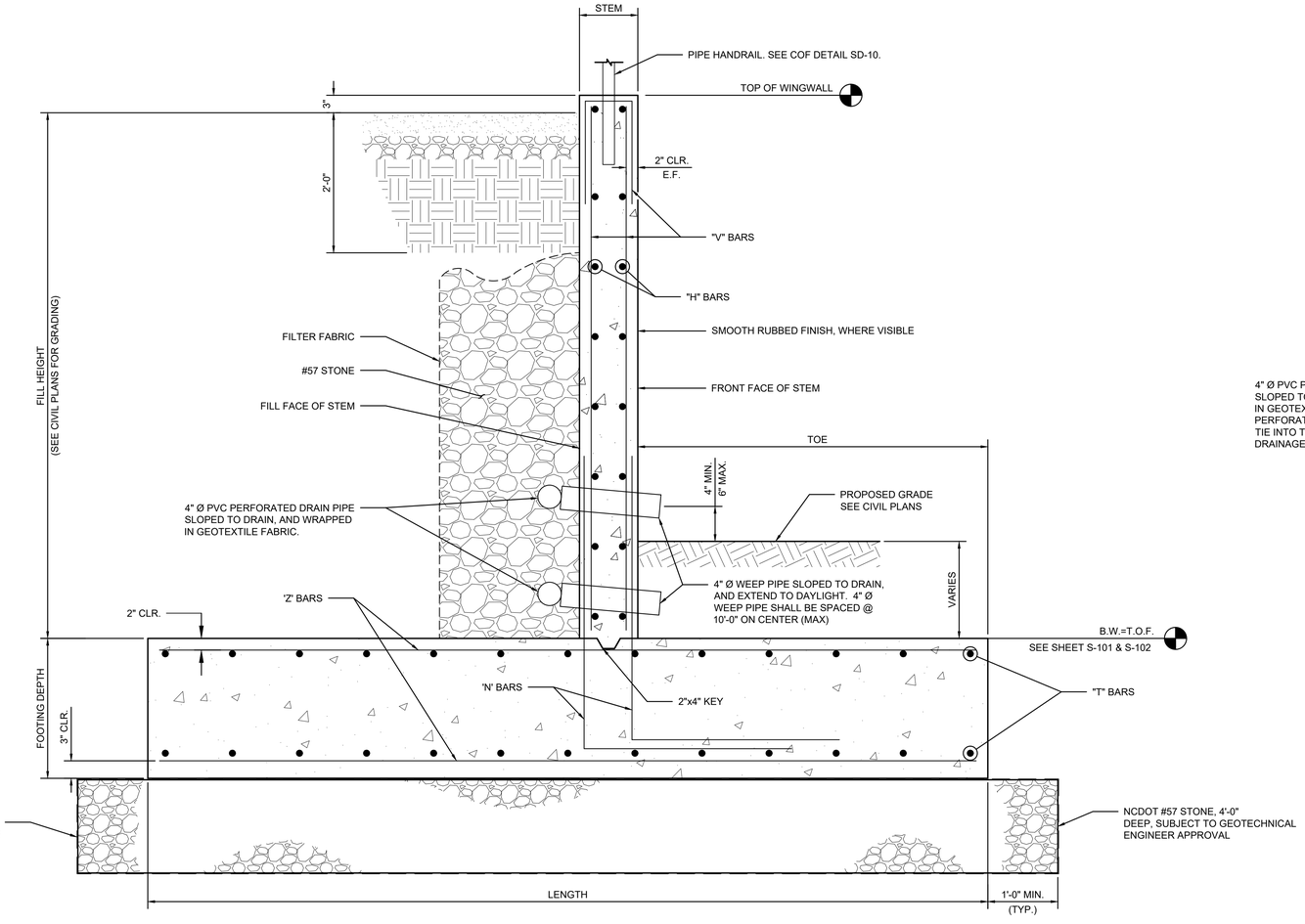
1. CONTRACTOR TO SET TOP OF FOOTING (TOF) ELEV AND CONSTRUCT WALL IN ACCORDANCE WITH THE SCHEDULE ABOVE ACCORDING TO THE MAXIMUM FILL ABOVE FOOTING (H). INTERPOLATION IS NOT ALLOWED. CONTACT THE ENGINEER IF ACTUAL FILL DIMENSION (H) IS GREATER THAN THAT PROVIDED IN SCHEDULE.
2. 4" DIAMETER PVC PERFORATED DRAIN PIPES SHALL BE SLOPED TO DRAIN BEHIND THE RETAINING WALL. 4" DIAMETER WEEPHOLES SHOULD BE PLACED AT 10'-0" ON CENTER (MAX.). AT LEAST TWO (2) WEEPHOLES SHOULD BE PROVIDED IN EACH WINGWALL, WITH THE LAST WEEPHOLE BEING PLACED NO MORE THAN 2'-0" FROM END OF WALL. WEEP PIPES SHOULD SLOPE TO DRAIN AND DAYLIGHT AS SHOWN ON THIS SHEET. DRAINAGE PIPES BEHIND HEADWALL ABOVE CULVERT SHALL BE TIED INTO THE DRAINAGE PIPES AT WINGWALLS ADJACENT TO CULVERT USING 4" DIAMETER PVC DRAIN PIPES.



4 / S-104 DETAIL A

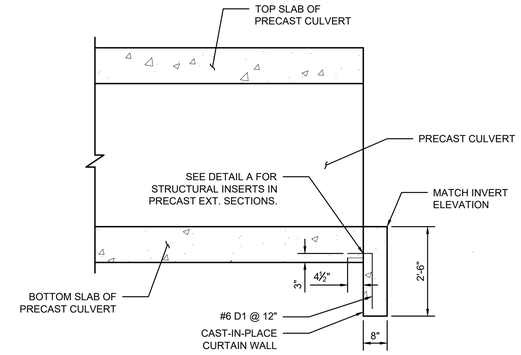
SCALE: NTS

* * STRUCTURAL CONNECTION INSERTS
2 STRUT OR EQUAL:
LENGTH = 4½", INSERT WIDTH = 2",
DIA. = ¾". NO. REQUIRED = 52



1 / S-104 TYPICAL RETAINING WALL DETAIL – CULVERT WINGWALLS

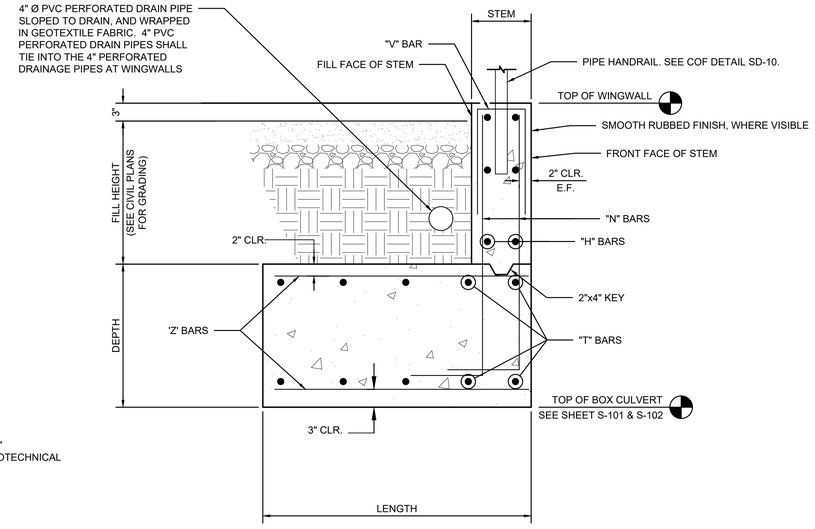
SCALE: NTS



3 / S-104 SECTION VIEW – CURTAIN WALL

SCALE: NTS

OUTLET SHOWN, INLET SIMILAR



2 / S-104 TYPICAL HEADWALL DETAIL

SCALE: NTS

WINGWALL AND HEADWALL DETAILS

SHEET NUMBER S-104

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 11/21/2025 REGISTERED PATRICK D. COOKSEY

REV. #	REVISIONS DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

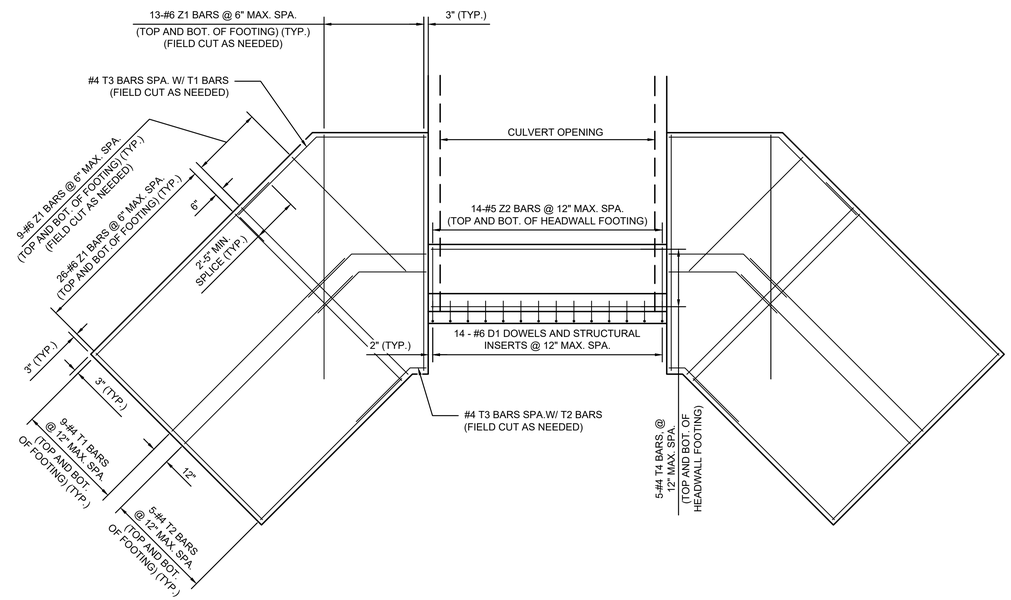
DRAWN :	R. GIESEN
DESIGN :	T. ORR
APPROVED :	P. COOKSEY
SCALE :	

PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

PROJECT NO. KH101017025

SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 – Tryon Layout:RETAINING WALL DETAILS November 18, 2025 11:15:39am K:\RDT_Structures_RetainWall_NC\011017032 – Tryon Drive Walls\CAD\S-103 RETAINING WALL DETAILS.dwg



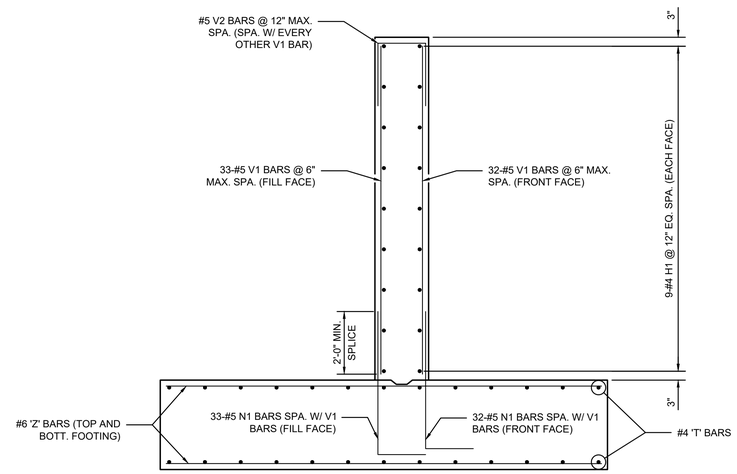
1 S–105 FOOTING AND CURTAIN WALL REINFORCEMENT DETAIL

SCALE: NTS

N BARS NOT SHOWN FOR CLARITY, BUT SHALL BE PLACED PRIOR TO POURING FOOTING CONCRETE

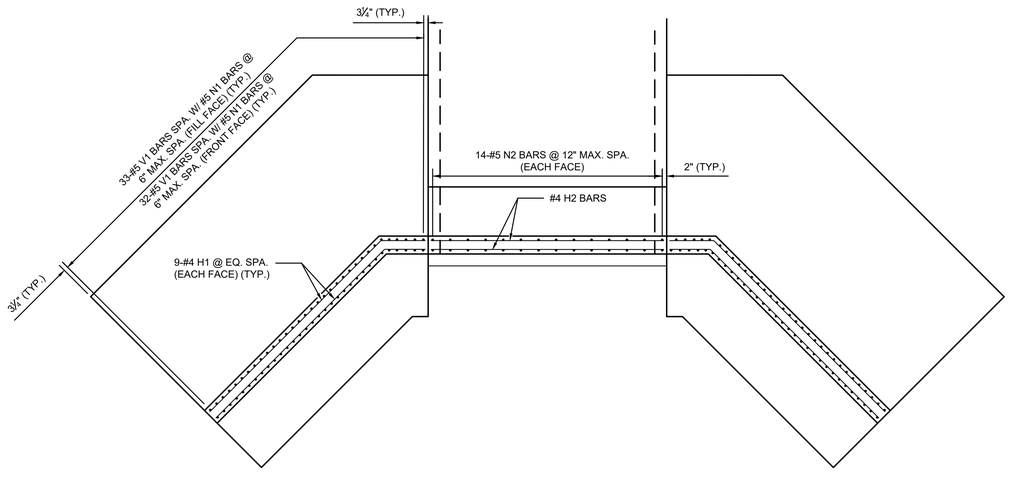
NOTES:

1. WHERE BARS ARE FIELD CUT, THEY SHALL ONLY BE CUT AS NEEDED TO MAINTAIN A MINIMUM OF 2" OF CLEARANCE TO THE NEAREST CONCRETE SURFACE.
2. PRECAST CULVERT MANUFACTURER SHALL ACCOUNT FOR THE DEAD LOAD FROM HEADWALL AND RETAINED SOIL ON PRECAST CULVERT SECTIONS, WHERE APPLICABLE.



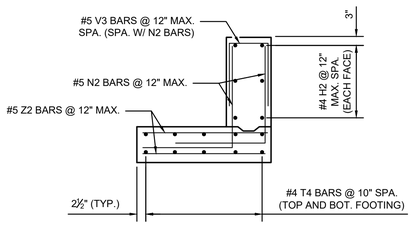
2 S–105 WINGWALL SECTION REINFORCEMENT DETAIL

SCALE: NTS



3 S–105 STEM REINFORCEMENT DETAIL

SCALE: NTS



4 S–105 HEADWALL SECTION REINFORCEMENT DETAIL

SCALE: NTS

EW-01 REINFORCEMENT DETAILS

SHEET NUMBER S–105

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES

ENGINEERING DIVISION

ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045149 PATRICK D. COOKSEY 11-24-2025 DATE

REVISIONS

REV. #	DESCRIPTION	REV.BY	DATE
1	BID SET		NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : R. GIESEN
DESIGN : T. ORR
APPROVED : P. COOKSEY
SCALE :

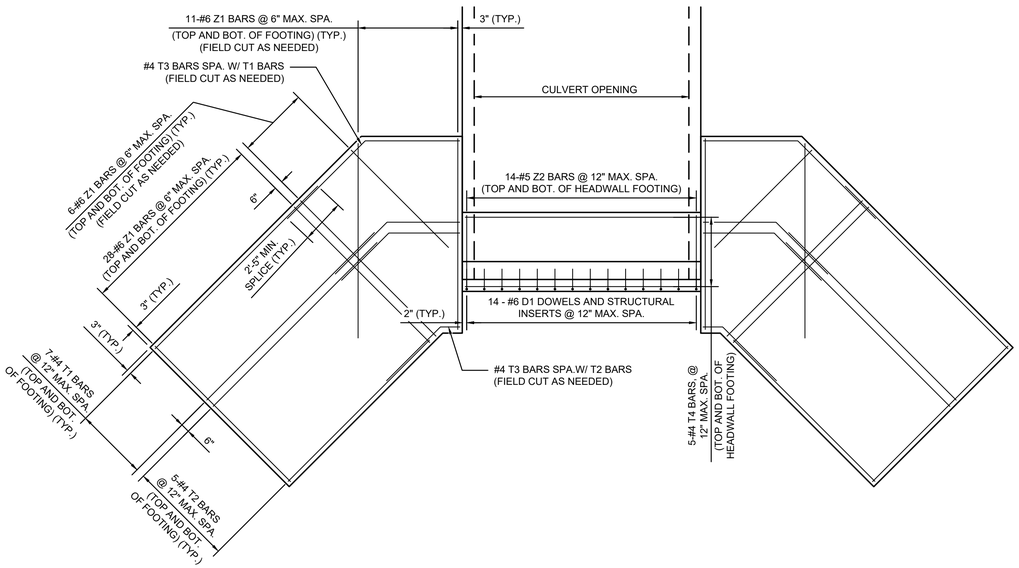
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS

DATE : NOV 2025

PROJECT NO. KH 011017025

SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 – Tryon Layout:EW-01 REINFORCEMENT DETAIL November 18, 2025 11:15:41am K:\RDT_Structures_RetainWall_NC\011017032 – Tryon Drive Walls\CAD\S-103 RETAINING WALL DETAILS.dwg

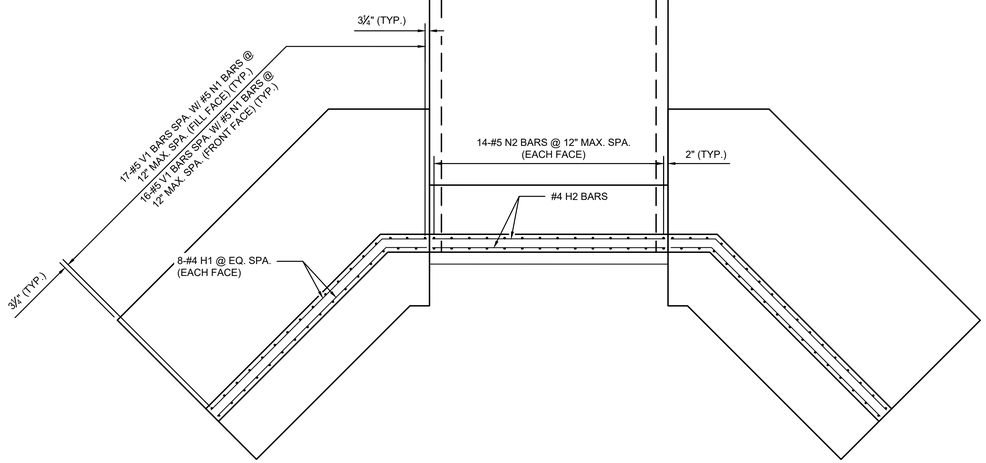


1 S–106

FOOTING AND CURTAIN WALL REINFORCEMENT DETAIL

SCALE: NTS

N BARS NOT SHOWN FOR CLARITY, BUT SHALL BE PLACED PRIOR TO POURING FOOTING CONCRETE



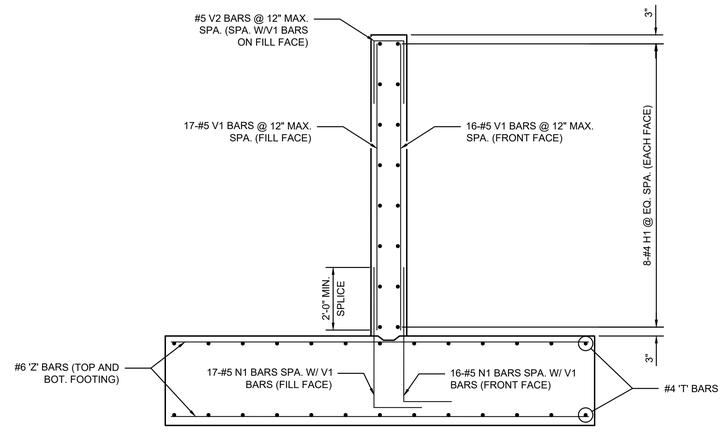
3 S–106

STEM REINFORCEMENT DETAIL

SCALE: NTS

NOTES:

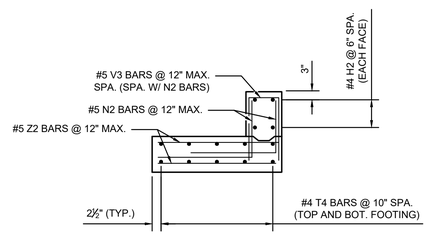
1. WHERE BARS ARE FIELD CUT, THEY SHALL ONLY BE CUT AS NEEDED TO MAINTAIN A MINIMUM OF 2" OF CLEARANCE TO THE NEAREST CONCRETE SURFACE.
2. PRECAST CULVERT MANUFACTURER SHALL ACCOUNT FOR THE DEAD LOAD FROM HEADWALL AND RETAINED SOIL ON PRECAST CULVERT SECTIONS, WHERE APPLICABLE.



2 S–106

WINGWALL SECTION REINFORCEMENT DETAIL

SCALE: NTS



4 S–106

HEADWALL SECTION REINFORCEMENT DETAIL

SCALE: NTS

EW-07 REINFORCEMENT DETAILS

SHEET NUMBER S–106

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES

ENGINEERING DIVISION

ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 PATRICK D. COOKSEY 11/21/2025 DATE

REVISIONS			
REV. #	DESCRIPTION	REV.BY DATE	
1	BID SET		NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN :	R. GIESEN
DESIGN :	T. ORR
APPROVED :	P. COOKSEY
SCALE :	

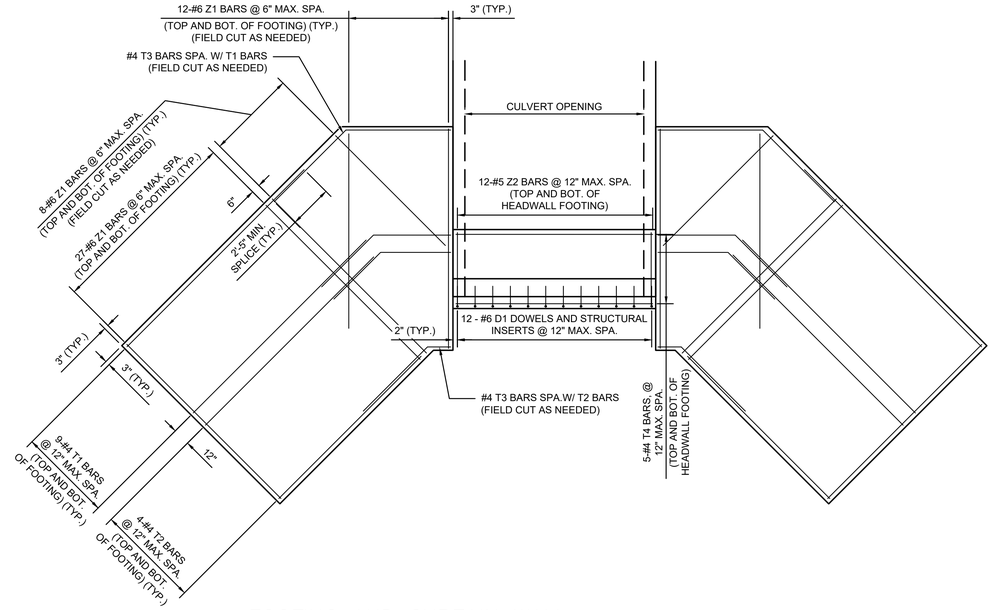
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS

DATE : NOV 2025

PROJECT NO. KH 011017025

SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 - Tryon Layout:EW-07 REINFORCEMENT DETAIL November 18, 2025 11:15:43am K:\RDT_Structures_RetainWall_NC\011017032 - Tryon Drive Walls\CAD\S-103 RETAINING WALL DETAILS.dwg

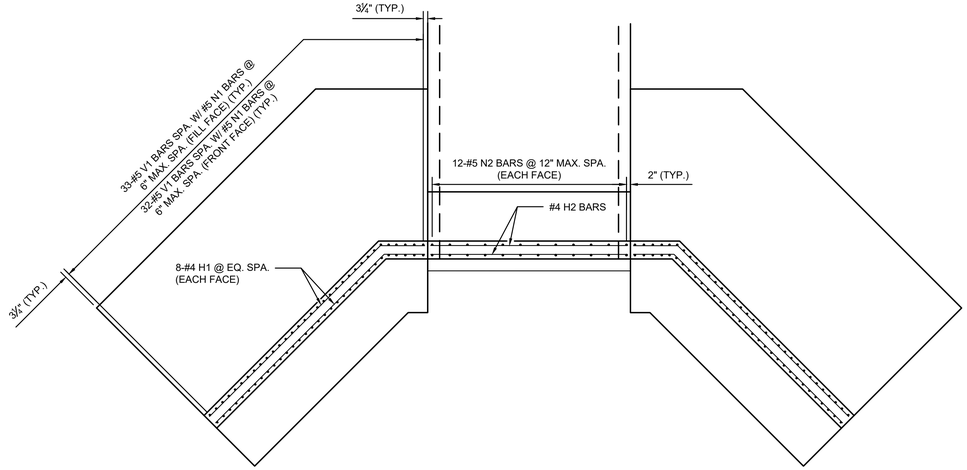


FOOTING AND CURTAIN WALL REINFORCEMENT DETAIL

1 / S–107

SCALE: NTS

N BARS NOT SHOWN FOR CLARITY, BUT SHALL BE PLACED PRIOR TO POURING FOOTING CONCRETE



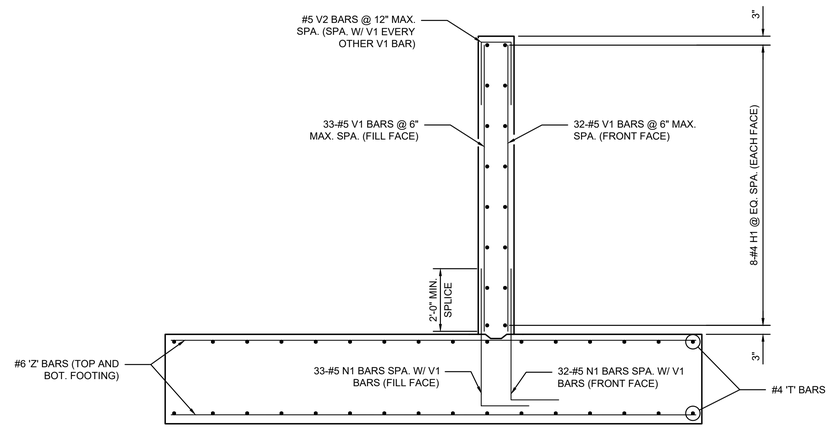
STEM REINFORCEMENT DETAIL

3 / S–107

SCALE: NTS

NOTES:

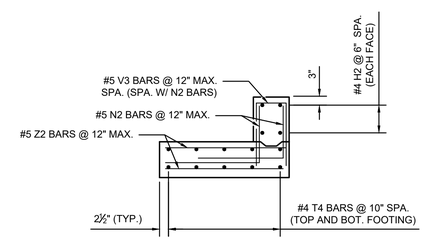
1. WHERE BARS ARE FIELD CUT, THEY SHALL ONLY BE CUT AS NEEDED TO MAINTAIN A MINIMUM OF 2" OF CLEARANCE TO THE NEAREST CONCRETE SURFACE.
2. PRECAST CULVERT MANUFACTURER SHALL ACCOUNT FOR THE DEAD LOAD FROM HEADWALL AND RETAINED SOIL ON PRECAST CULVERT SECTIONS, WHERE APPLICABLE.



WINGWALL SECTION REINFORCEMENT DETAIL

2 / S–107

SCALE: NTS



HEADWALL SECTION REINFORCEMENT DETAIL

4 / S–107

SCALE: NTS

EW-08 REINFORCEMENT DETAILS

SHEET NUMBER S–107

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 PATRICK D. COOKSEY — DATE 11/21/25

REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

REVISIONS

ISSUED FOR CONSTRUCTION

DRAWN :	R. GIESEN
DESIGN :	T. ORR
APPROVED :	P. COOKSEY
SCALE :	

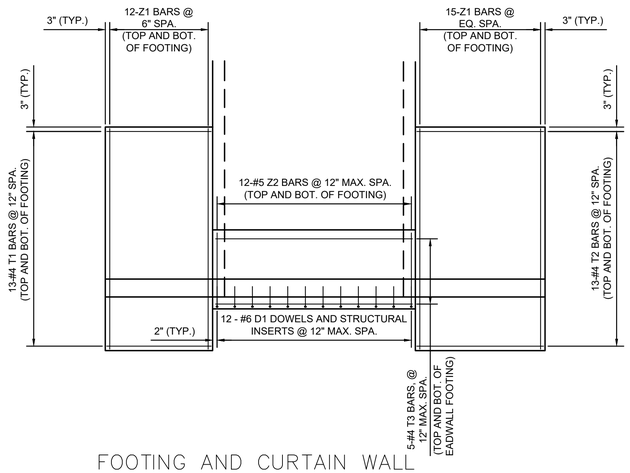
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS

DATE : NOV 2025

PROJECT NO. KH 011017025

SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 - Tryon Layout:EW-08 REINFORCEMENT DETAIL November 18, 2025 11:15:44am K:\RDT_Structures_RetainWall_NC\011017032 - Tryon Drive Walls\CAD\S-103 RETAINING WALL DETAILS.dwg



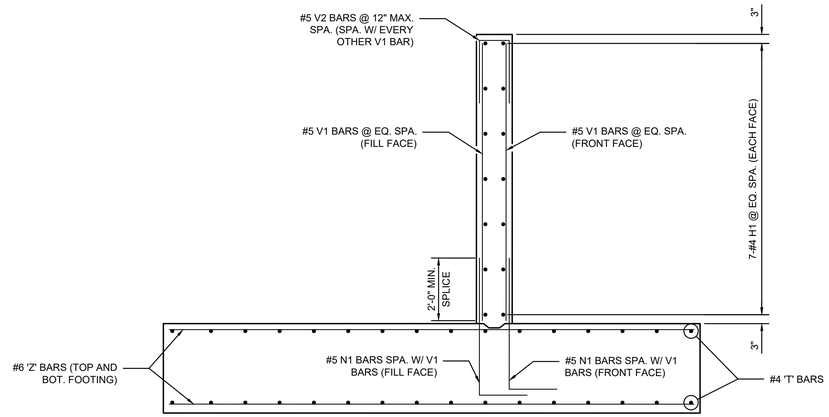
1 S–108 FOOTING AND CURTAIN WALL REINFORCEMENT DETAIL

SCALE: NTS

N BARS NOT SHOWN FOR CLARITY, BUT SHALL BE PLACED PRIOR TO POURING FOOTING CONCRETE

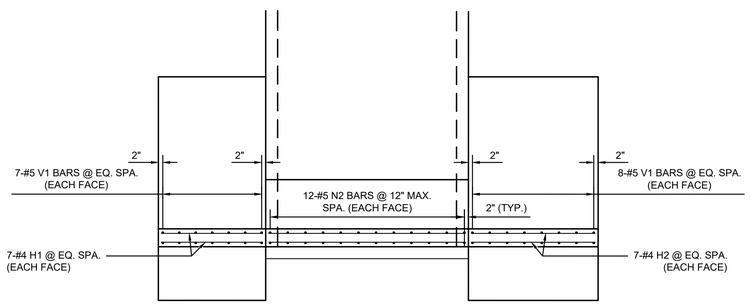
NOTES:

1. WHERE BARS ARE FIELD CUT, THEY SHALL ONLY BE CUT AS NEEDED TO MAINTAIN A MINIMUM OF 2" OF CLEARANCE TO THE NEAREST CONCRETE SURFACE.
2. PRECAST CULVERT MANUFACTURER SHALL ACCOUNT FOR THE DEAD LOAD FROM HEADWALL AND RETAINED SOIL ON PRECAST CULVERT SECTIONS, WHERE APPLICABLE.



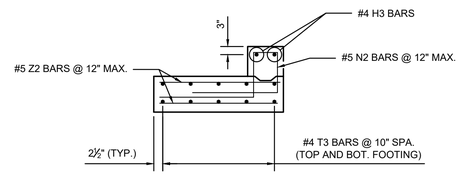
2 S–108 WINGWALL SECTION REINFORCEMENT DETAIL

SCALE: NTS



3 S–108 STEM REINFORCEMENT DETAIL

SCALE: NTS



4 S–108 HEADWALL SECTION REINFORCEMENT DETAIL

SCALE: NTS

EW-09 REINFORCEMENT DETAILS

SHEET NUMBER S–108

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL SEAL 045140 ENGINEER PATRICK D. COOKSEY
DATE: 11/21/2025

REVISIONS

REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN :	R. GIESEN
DESIGN :	T. ORR
APPROVED :	P. COOKSEY
SCALE :	

PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025

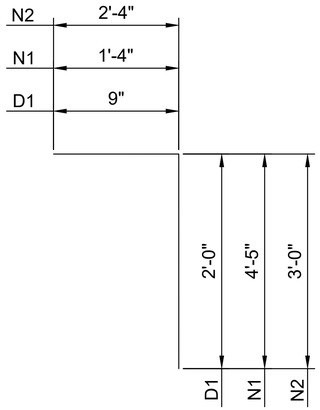
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 – Tryon Layout:EW-09 REINFORCEMENT DETAIL November 18, 2025 11:15:46am K:\RDT_Structures_RetainWall_NC\011017032 – Tryon Drive Walls\CAD\S-103 RETAINING WALL DETAILS.dwg

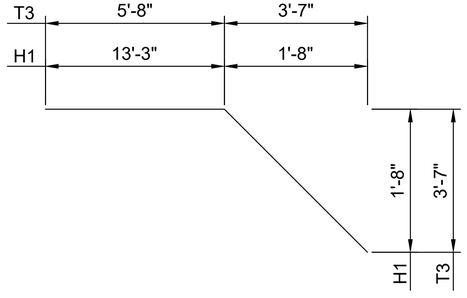
EW-01

BAR TYPES

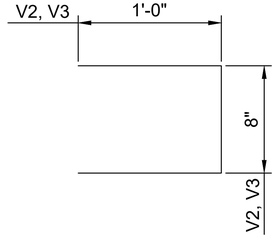
1



2



3



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
D1	14	#6	1	2'-9"	58
H1	36	#4	2	15'-6"	373
H2	6	#4	STR	13'-0"	52
N1	130	#5	1	5'-9"	780
N2	28	#5	1	5'-4"	156
T1	36	#4	STR	13'-10"	333
T2	20	#4	STR	11'-2"	149
T3	56	#4	2	11'-5"	427
T4	10	#4	STR	13'-0"	87
V1	130	#5	STR	7'-11"	1,073
V2	34	#5	3	2'-8"	95
V3	14	#5	3	2'-8"	39
Z1	192	#6	STR	13'-2"	3,797
Z2	28	#5	STR	3'-5"	100

REINFORCING STEEL
FOR 2 WINGS 7,519 LBS.

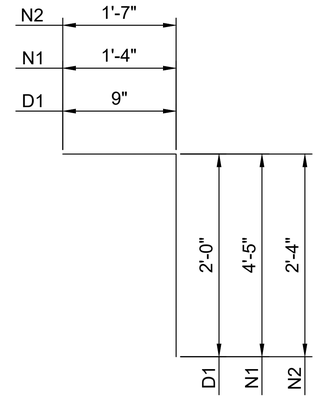
4 KSI A CONCRETE

2 WINGS	55.8 C.Y.
1 HEADWALL	3.1 C.Y.
END CURTAIN WALL	0.8 C.Y.
TOTAL	59.7 C.Y.

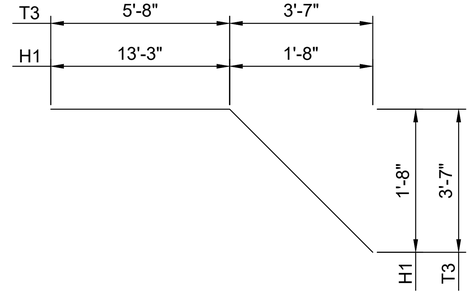
EW-07

BAR TYPES

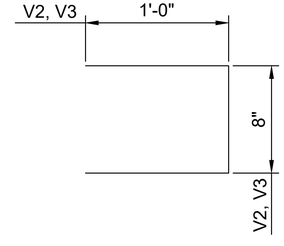
1



2



3



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
D1	14	#6	1	2'-9"	58
H1	32	#4	2	15'-6"	331
H2	4	#4	STR	13'-0"	35
N1	66	#5	1	5'-9"	396
N2	28	#5	1	3'-11"	114
T1	28	#4	STR	13'-10"	259
T2	20	#4	STR	11'-2"	149
T3	48	#4	2	11'-4"	363
T4	10	#4	STR	13'-0"	87
V1	66	#5	STR	6'-6"	447
V2	34	#5	3	2'-8"	95
V3	14	#5	3	2'-8"	39
Z1	192	#6	STR	10'-8"	3,076
Z2	28	#5	STR	3'-5"	100

REINFORCING STEEL
FOR 2 WINGS 5,549 LBS.

4 KSI A CONCRETE

2 WINGS	44.4 C.Y.
1 HEADWALL	2.4 C.Y.
END CURTAIN WALL	0.8 C.Y.
TOTAL	47.6 C.Y.

EW BILL OF MATERIAL
(1 OF 2)

SHEET NUMBER S-109

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL SEAL 045140 ENGINEER PATRICK D. COOKSEY
DATE: 11/21/2025

REVISIONS

REV. #	DESCRIPTION	REV.BY	DATE
1	BID SET		NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : R. GIESEN
DESIGN : T. ORR
APPROVED : P. COOKSEY
SCALE :

PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

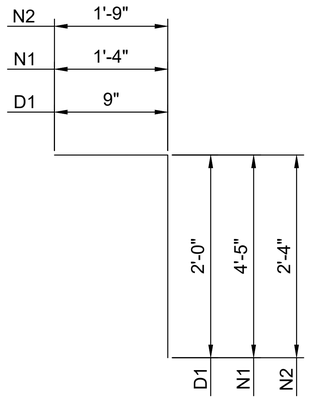
PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By: Anderson, Nolen Sheet Set: 011017025 – Tryon Layout: EW BILL OF MATERIAL (1 OF 2) November 18, 2025 11:15:46am K:\RDT_Structures_RetainWall_NC\011017032 – Tryon Drive Walls\CAD\S-103 RETAINING WALL DETAILS.dwg

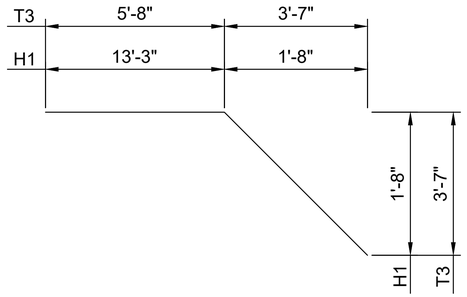
EW-08

BAR TYPES

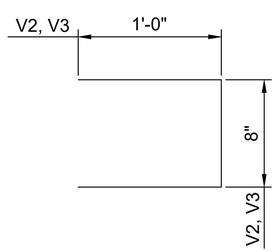
1



2



3



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
D1	12	#6	1	2'-9"	50
H1	32	#4	2	15'-6"	331
H2	4	#4	STR	11'-0"	29
N1	132	#5	1	5'-9"	792
N2	24	#5	1	4'-1"	102
T1	36	#4	STR	13'-10"	333
T2	16	#4	STR	11'-2"	119
T3	52	#4	2	11'-4"	394
T4	10	#4	STR	11'-0"	73
V1	130	#5	STR	6'-8"	904
V2	34	#5	3	2'-8"	95
V3	12	#5	3	2'-8"	33
Z1	188	#6	STR	14'-8"	4,142
Z2	24	#5	STR	3'-5"	86

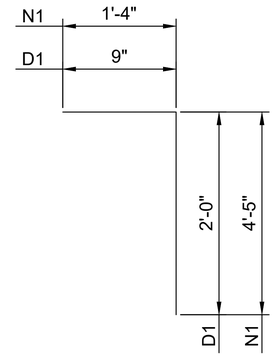
REINFORCING STEEL FOR 2 WINGS 7,483 LBS.

4 KSI A CONCRETE	
2 WINGS	51.0 C.Y.
1 HEADWALL	2.1 C.Y.
END CURTAIN WALL	0.7 C.Y.
TOTAL	53.8 C.Y.

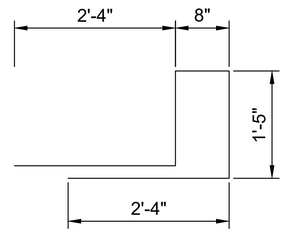
EW-09

BAR TYPES

1



2



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
D1	12	#6	1	2'-9"	50
H1	14	#4	STR	5'-8"	53
H2	14	#4	STR	6'-11"	65
H3	2	#4	STR	11'-0"	15
N1	30	#5	1	5'-9"	180
N2	12	#5	2	8'-2"	102
T1	26	#4	STR	5'-8"	98
T2	26	#4	STR	6'-9"	117
T3	10	#4	STR	11'-0"	73
V1	30	#5	STR	6'-2"	193
Z1	54	#6	STR	12'-0"	973
Z2	24	#5	STR	3'-5"	86

REINFORCING STEEL FOR 2 WINGS 2,005 LBS.

4 KSI A CONCRETE	
2 WINGS	18.5 C.Y.
1 HEADWALL	1.9 C.Y.
END CURTAIN WALL	0.7 C.Y.
TOTAL	21.1 C.Y.

EW BILL OF MATERIAL (2 OF 2)

SHEET NUMBER S-110

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 PATRICK D. COOKSEY 11/21/25

REVISIONS

REV. #	DESCRIPTION	REV.BY	DATE
1	BID SET		NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN : R. GIESEN
DESIGN : T. ORR
APPROVED : P. COOKSEY
SCALE :

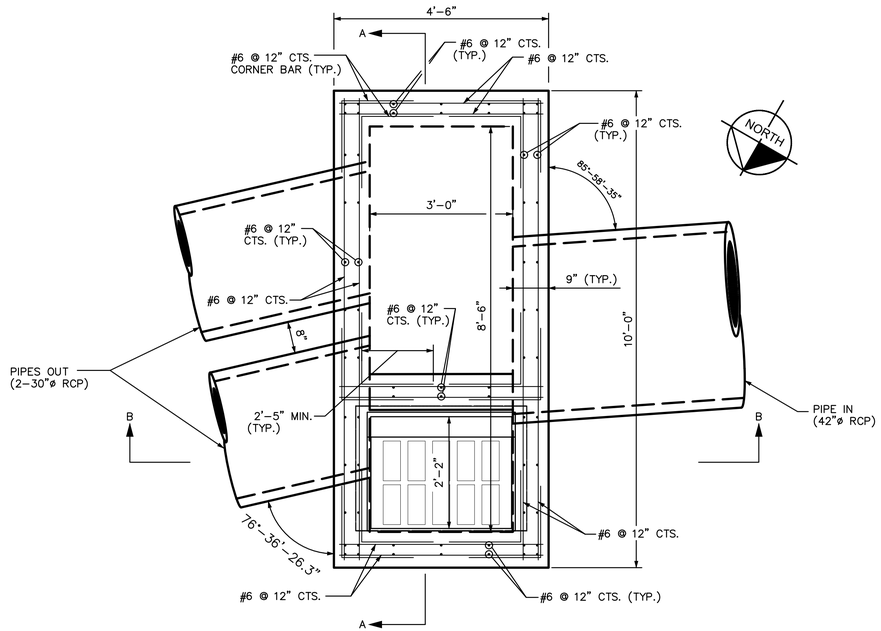
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 - Tryon Layout:EW BILL OF MATERIAL (2 OF 2) November 18, 2025 11:15:48am K:\RDT_Structures_RetainWall_NC\011017032 - Tryon Drive Walls\CAD\S-103 RETAINING WALL DETAILS.dwg

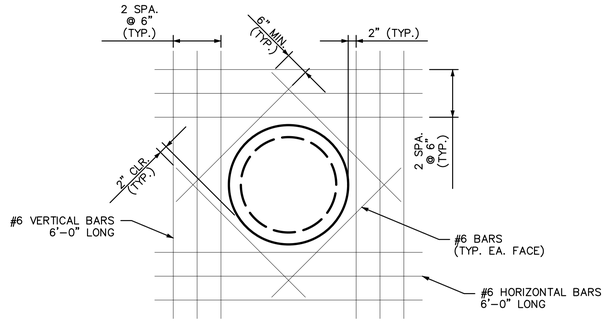
NOTES:

1. USE 4,000 KSI CONCRETE THROUGHOUT.
2. CONSTRUCT CONCRETE BOX IN ACCORDANCE WITH SECTION 825 OF THE STANDARD SPECIFICATIONS.
3. USE FORMS TO CONSTRUCT THE BOTTOM SLAB.
4. ADJUST LENGTH OF STEEL BARS AS NEEDED TO COMPENSATE FOR PIPES AND FRAME AND GRATE OPENINGS.
5. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60.
6. CUT OR BEND STEEL BARS AS NEEDED TO PROVIDE 2" CLEARANCE.
7. LOCATE FRAME AND GRATE AS FIELD CONDITIONS DICTATE AND AS DIRECTED BY THE ENGINEER.
8. DIMENSIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER.
9. FOR INVERT ELEVATIONS OF PIPES, REFER TO DRAINAGE PLAN DETAILS.

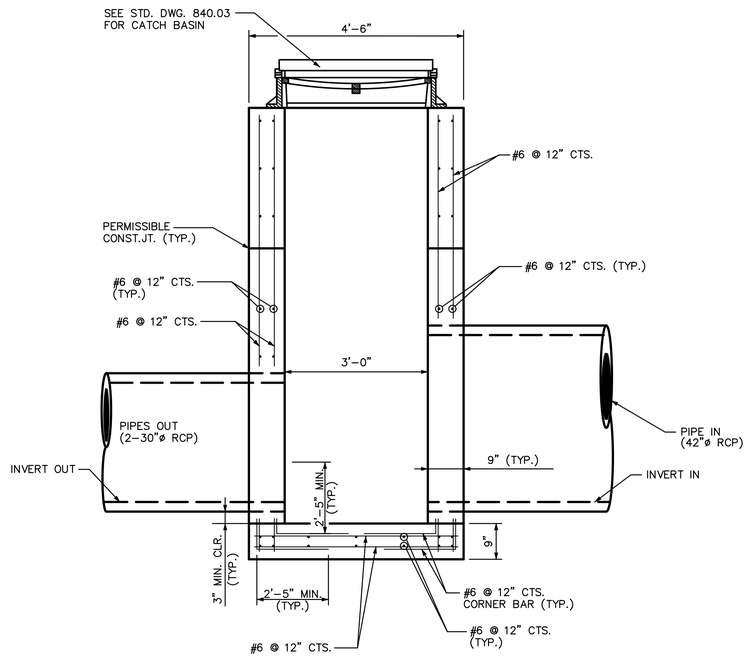


PLAN

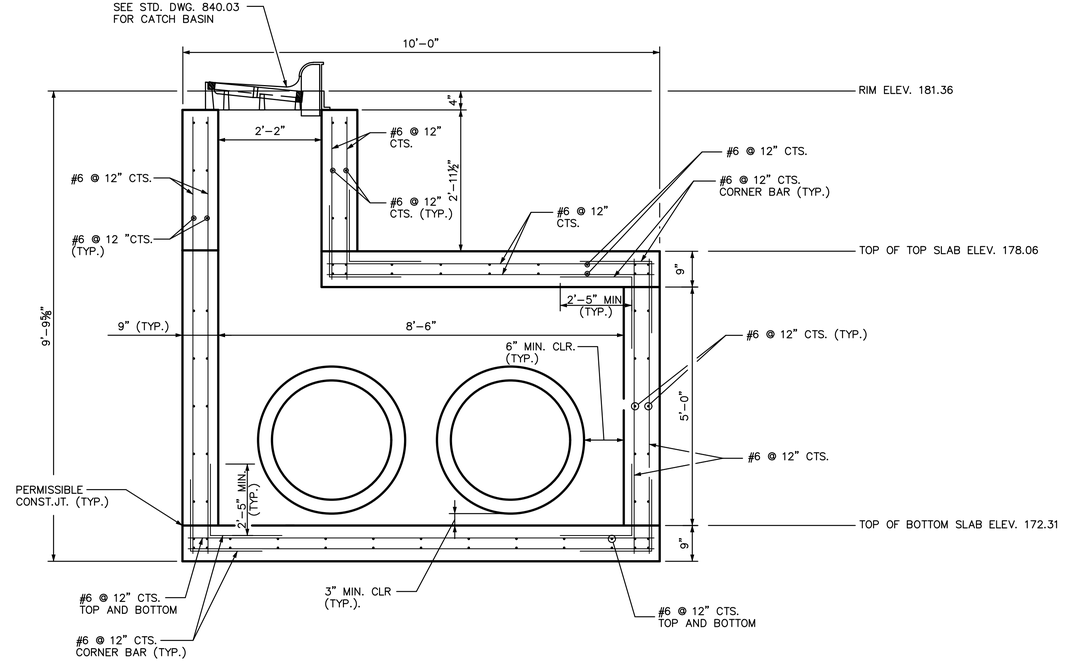
TOP AND BOTTOM SLAB REINFORCING NOT SHOWN FOR CLARITY



DETAIL OF REINFORCING AROUND PIPE



SECTION B-B



SECTION A-A

CATCH BASIN 11

SHEET NUMBER S-201

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F-0102

FAYETTEVILLE NC
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL SEAL 045140 ENGINEER PATRICK D. COOKSEY
DATE: 11/27/2025

REVISIONS

REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

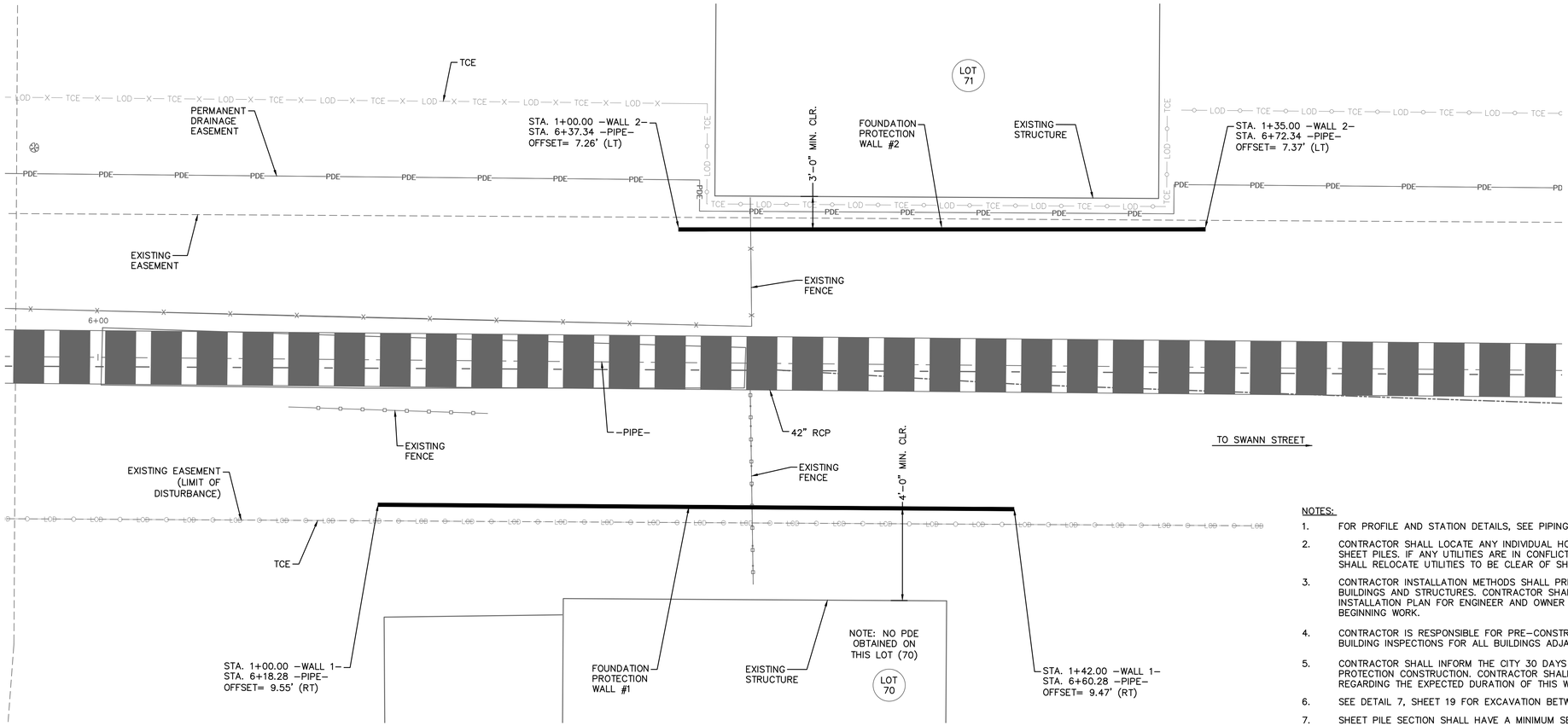
DRAWN : R. GIESEN
DESIGN : T. ORR
APPROVED : P. COOKSEY
SCALE :

PROJECT : TRYON DRIVE DRAINAGE IMPROVEMENTS
NAME :
DATE : NOV 2025

PROJECT NO. KH 011017025

SUB-LEDGER NO.

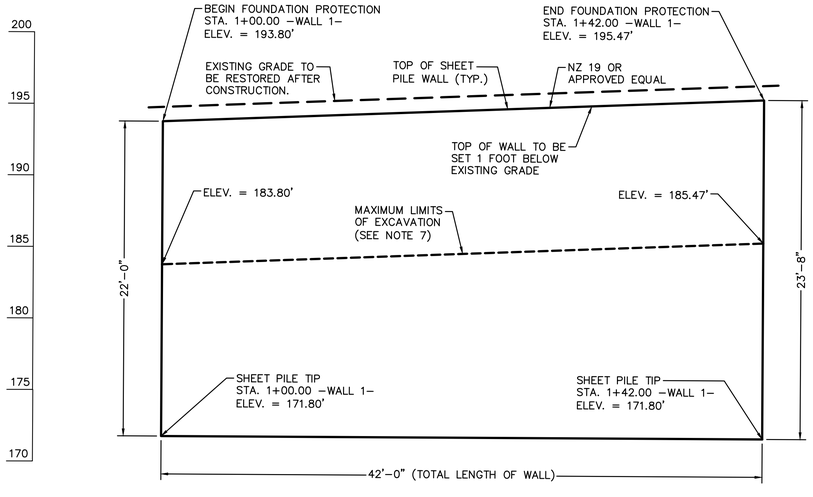
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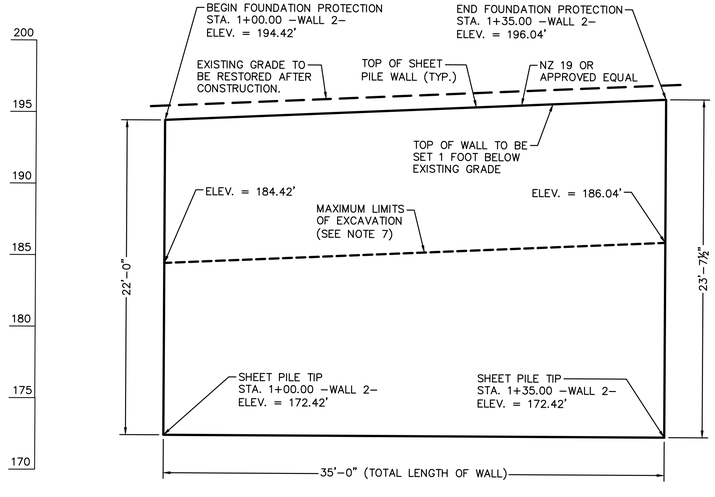
PLAN

NOTES:

1. FOR PROFILE AND STATION DETAILS, SEE PIPING PLAN PROFILE SHEETS.
2. CONTRACTOR SHALL LOCATE ANY INDIVIDUAL HOME UTILITIES PRIOR TO DRIVING SHEET PILES. IF ANY UTILITIES ARE IN CONFLICT WITH SHEET PILES, CONTRACTOR SHALL RELOCATE UTILITIES TO BE CLEAR OF SHEET PILES.
3. CONTRACTOR INSTALLATION METHODS SHALL PREVENT DAMAGE TO THE EXISTING BUILDINGS AND STRUCTURES. CONTRACTOR SHALL SUBMIT FOUNDATION PROTECTION INSTALLATION PLAN FOR ENGINEER AND OWNER REVIEW AND APPROVAL PRIOR TO BEGINNING WORK.
4. CONTRACTOR IS RESPONSIBLE FOR PRE–CONSTRUCTION AND POST–CONSTRUCTION BUILDING INSPECTIONS FOR ALL BUILDINGS ADJACENT TO FOUNDATION PROTECTION.
5. CONTRACTOR SHALL INFORM THE CITY 30 DAYS PRIOR TO BEGINNING FOUNDATION PROTECTION CONSTRUCTION. CONTRACTOR SHALL ALSO INFORM THE CITY REGARDING THE EXPECTED DURATION OF THIS WORK.
6. SEE DETAIL 7, SHEET 19 FOR EXCAVATION BETWEEN SHEET PILE WALLS.
7. SHEET PILE SECTION SHALL HAVE A MINIMUM SECTION MODULUS OF 35.1 IN /FT, A MINIMUM MOMENT OF INERTIA OF 283.1 IN /FT, AND MINIMUM CROSS–SECTIONAL AREA OF 7.07 IN²/FT.



WALL #1



WALL #2

SHEET PILE WALL LAYOUT
(WALL #1& #2)

SHEET NUMBER S–301

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F–0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 PATRICK D. COOKSEY 11/21/2025

REVISIONS

REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

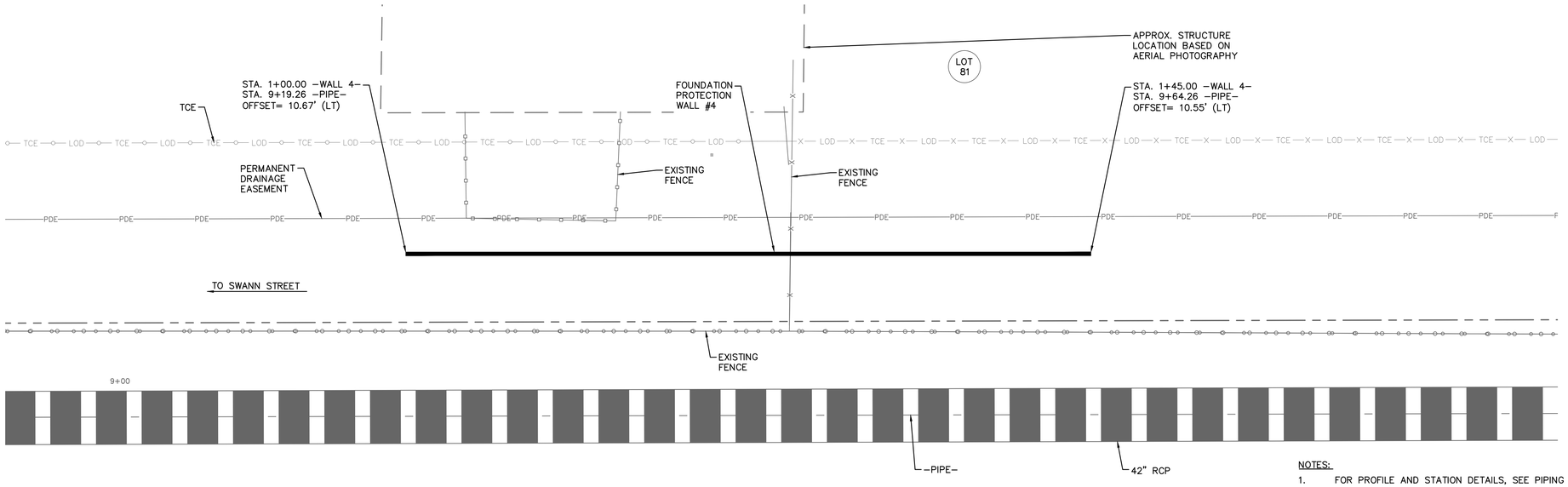
ISSUED FOR CONSTRUCTION

PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

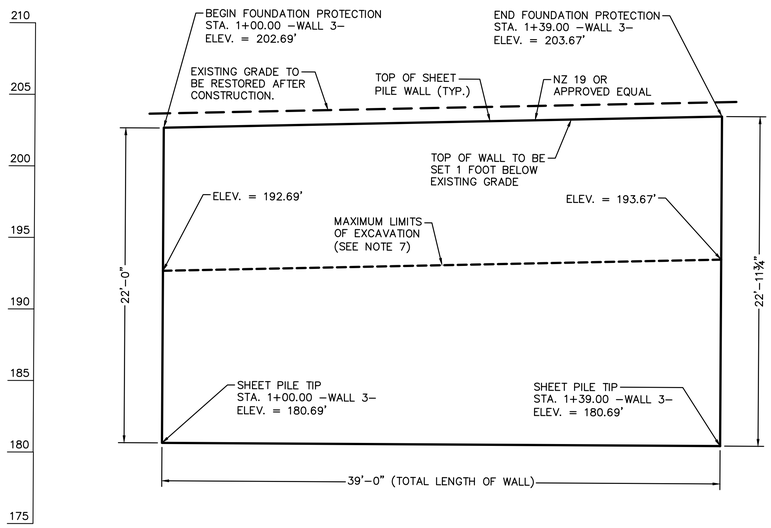
DRAWN : R. GIESEN
DESIGN : T. ORR
APPROVED : P. COOKSEY
SCALE :

PROJECT NO. KH 011017025
SUB-LEDGER NO.

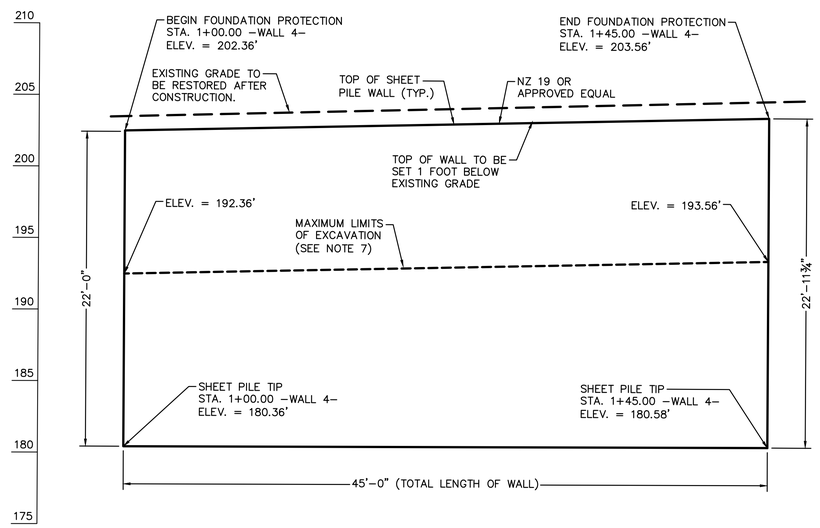
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PLAN



WALL #3



WALL #4

NOTES:

1. FOR PROFILE AND STATION DETAILS, SEE PIPING PLAN PROFILE SHEETS.
2. CONTRACTOR SHALL LOCATE ANY INDIVIDUAL HOME UTILITIES PRIOR TO DRIVING SHEET PILES. IF ANY UTILITIES ARE IN CONFLICT WITH SHEET PILES, CONTRACTOR SHALL RELOCATE UTILITIES TO BE CLEAR OF SHEET PILES.
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6. SEE DETAIL 7, SHEET 19 FOR EXCAVATION BETWEEN SHEET PILE WALLS.
7. SHEET PILE SECTION SHALL HAVE A MINIMUM SECTION MODULUS OF 35.1 IN /FT, A MINIMUM MOMENT OF INERTIA OF 283.1 IN /FT, AND MINIMUM CROSS–SECTIONAL AREA OF 7.07 IN²/FT.

SHEET PILE WALL LAYOUT
(WALL #3 & #4)

SHEET NUMBER S–302

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F–0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 11/24/2025 PATRICK D. COOKSEY
DATE

REVISIONS

REV. #	DESCRIPTION	REV.BY	DATE
1	BID SET		NOV 2025

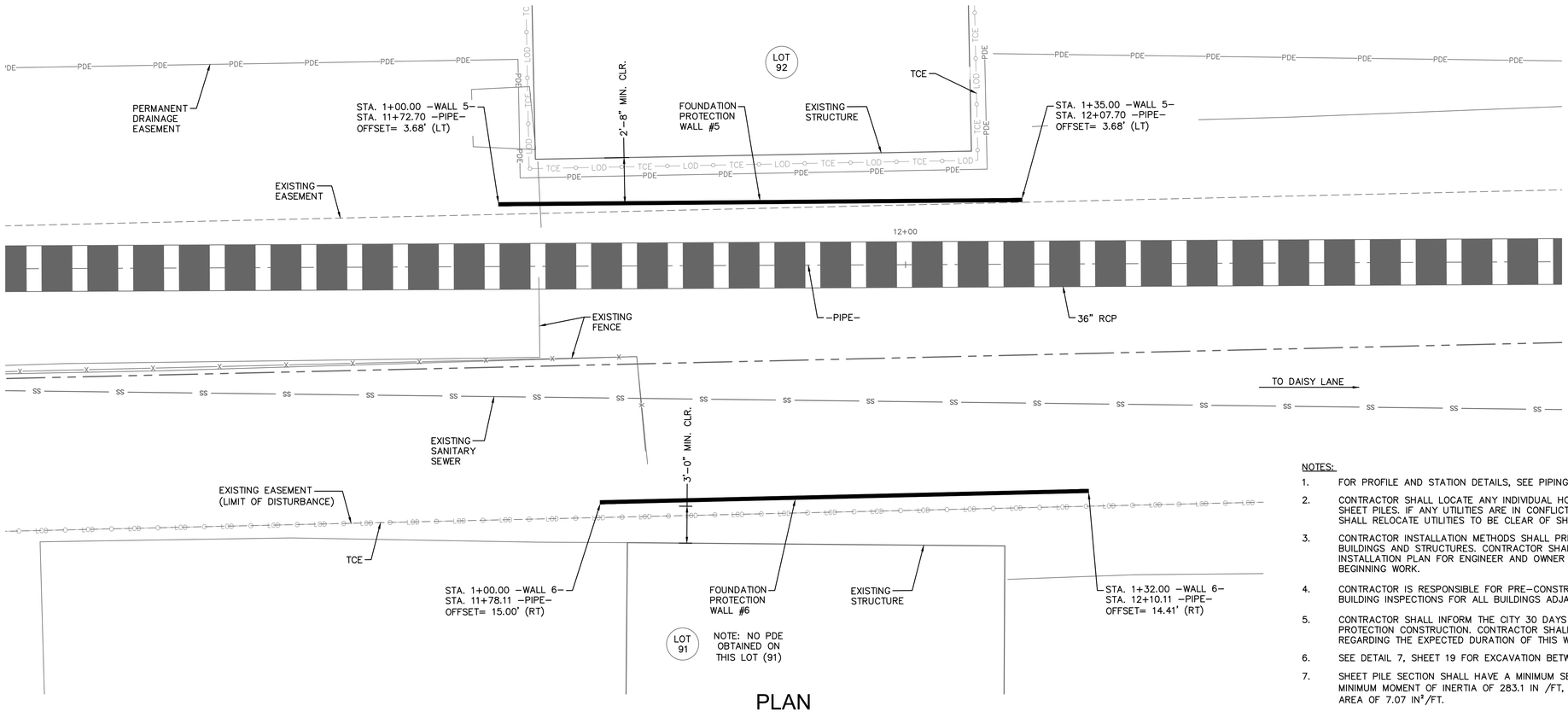
ISSUED FOR CONSTRUCTION

DRAWN : R. GIESEN
DESIGN : T. ORR
APPROVED : P. COOKSEY
SCALE :

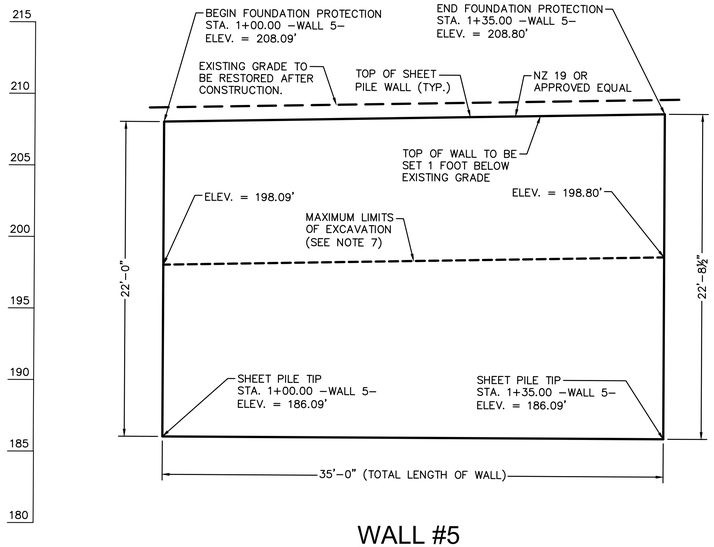
PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

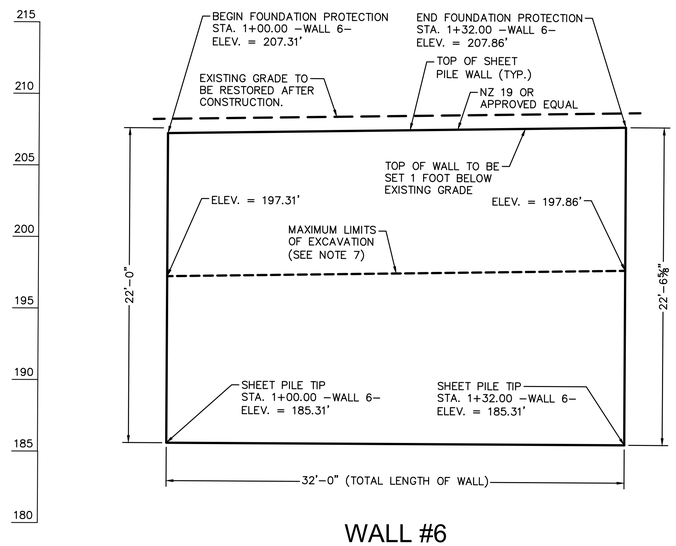
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PLAN



WALL #5



WALL #6

NOTES:

1. FOR PROFILE AND STATION DETAILS, SEE PIPING PLAN PROFILE SHEETS.
2. CONTRACTOR SHALL LOCATE ANY INDIVIDUAL HOME UTILITIES PRIOR TO DRIVING SHEET PILES. IF ANY UTILITIES ARE IN CONFLICT WITH SHEET PILES, CONTRACTOR SHALL RELOCATE UTILITIES TO BE CLEAR OF SHEET PILES.
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6. SEE DETAIL 7, SHEET 19 FOR EXCAVATION BETWEEN SHEET PILE WALLS.
7. SHEET PILE SECTION SHALL HAVE A MINIMUM SECTION MODULUS OF 35.1 IN /FT, A MINIMUM MOMENT OF INERTIA OF 283.1 IN /FT, AND MINIMUM CROSS–SECTIONAL AREA OF 7.07 IN²/FT.

SHEET PILE WALL LAYOUT
(WALL #5 & #6)

SHEET NUMBER S–303

PLAN TYPE:

Kimley»Horn
421 FAYETTEVILLE STREET
SUITE 600
RALEIGH, NC 27601
NC LICENSE F–0102

FAYETTEVILLE
PUBLIC SERVICES
ENGINEERING DIVISION
ENGINEERING & INFRASTRUCTURE DEPARTMENT
433 HAY STREET FAYETTEVILLE, NC 28301

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045140 PATRICK D. COOKSEY
Patrick D. Cooksey
11/17/2025

REVISIONS		
REV. #	DESCRIPTION	REV.BY DATE
1	BID SET	NOV 2025

ISSUED FOR CONSTRUCTION

DRAWN :	R. GIESEN
DESIGN :	T. ORR
APPROVED :	P. COOKSEY
SCALE :	

PROJECT NAME : TRYON DRIVE DRAINAGE IMPROVEMENTS
DATE : NOV 2025

PROJECT NO. KH 011017025
SUB-LEDGER NO.

Plotted By:Anderson, Nolen Sheet Set:011017025 – Tryon Layout:S–303 November 18, 2025 11:18:31am K:\RDT_Structures_RetainWall_NC\011017032 – Tryon Drive Walls\CAD\S–301 SHEET PILE WALL LAYOUT.dwg