NORTH MECKLENBURG PARK GREENWAY

Construction Drawings Specifications

October 15, 2024

Project No. HUN-21002

MCADAMS
2100 South Tryon Street, Suite 400, Charlotte, NC 28203 • 704. 527. 0800

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1.1 DESIGN PROFESSIONALS OF RECORD

A. Landscape Architect:

1. Arthur Nicholas Lowe.
2. License No. NC 1959.
3. Responsible for trailhead designs, placemaking elements and plantings.

B. Greenway Engineer:

1. Andrew J. Hickling.
2. License No. NC 042301.
3. Responsible for greenway design, specifications, and associated special provisions.

C. Hydraulics Engineer:

1. Sergio A. Soria
2. License No. NC 051354.
3. Responsible for drainage design.

D. Structural Engineer:

1. Paul L. Jacob
2. License No. NC 037760.
3. Responsible for boardwalk design.

END OF SECTION 000107

INVITATION TO BID

FOR THE CONSTRUCTION OF NORTH MECKLENBURG PARK GREENWAY PROJECT

Town of Huntersville, North Carolina

Sealed, single prime bids for the construction of a greenway, trailhead, and surrounding hardscape with associated demolition / clearing, grading, erosion control, installation of stormwater conveyance measures, utilities, furnishings, and landscape. Bids for the project will be received by the Town of Huntersville Parks and Recreation Department, in person at: 105 Gilead Road, 3rd Floor Huntersville, NC 28070, or by mail at: P.O. Box 2879, Huntersville, NC, 28070 until **2:00 PM, local time, Tuesday December 10, 2024**, and there at said office, at said time. Bid Proposals will be received for:

THE CONSTRUCTION OF NORTH MECKLENBURG PARK GREENWAY
FOR
HUNTERSVILLE PARKS AND RECREATION

The Bid Package, consisting of the Invitation to Bid, Instructions to Bidders, Bid Proposal Form, Non-collusion Affidavit, Substitution Listing Form, General Conditions of the Contract, and Contract Drawings may be obtained from the Huntersville Parks and Recreation Department, 105 Gilead Road, 3rd Floor, Huntersville, NC, or may be accessed at the following web address: www.huntersville.org. Contract documents will not be mailed to Bidders.

Copies of the Contract Documents may be examined at the Huntersville Department of Recreation, Huntersville, North Carolina 28078.

Each Bid must be accompanied by cash, cashier's check, certified check on a bank or trust company insured by the Federal Deposit Insurance Corporation or Bid Bond in the amount not less than five percent (5%) of the amount of the Bid in the form and subject to the conditions provided in the Information for Bidders.

1. The Contract Drawings for this Project were provided to the Town by McAdams. If awarded, the Project will be awarded to the lowest responsive, responsible Bidder, taking into account quality, performance and time specified in the Contract Documents.

An optional pre-bid meeting shall be held on **Thursday, November 14th, 2024, at 2:00 PM** at the project site located at 16131 Old Statesville Road, Huntersville, NC 28078. Meet at the shelter near the basketball courts / 2nd playground. Any questions regarding this meeting should be directed to Tracy Houk, Assistant Director of Parks and Recreation at 704-766-2227.

The Town of Huntersville ("Town") reserves the right to waive any minor deviations in the Bid Proposal and to reject any or all Bid Proposals.

END OF INVITATION TO BID

INSTRUCTIONS TO BIDDERS

Project Designer: McAdams
2100 South Tryon Street
Suite 400
Charlotte, NC 28203
704.527.0800

PLEASE NOTE: ALL QUESTIONS REGARDING THE CONTRACT DRAWINGS, AND THE CONSTRUCTION SPECIFICATIONS INDICATED ON SAID DRAWINGS SHOULD BE DIRECTED TO THE PROJECT DESIGNER. ALL QUESTIONS AND ANSWERS PROVIDED WILL BE POSTED ON THE TOWN'S WEBSITE AS AN ADDENDUM TO THE CONTRACT DOCUMENTS. BIDDERS WILL BE RESPONSIBLE FOR ENSURING THAT THEY HAVE RECEIVED AND RELIED UPON ALL ADDENDA FOR THE PROJECT IN SUBMITTING THEIR BIDS.

1. FAMILIARITY WITH WORK AND CONDITIONS: Before preparing Bid Proposals, Bidders are urged to visit the site of the Project to inform and familiarize themselves with all conditions involved and under which the Project is to be constructed or apparatus erected or installed. The Town of Huntersville will not be responsible to the Contractor for payments other than as set out in the contract price, should conditions be different than those assumed or contemplated by the Contractor. The Contractor is required to satisfy himself, before bidding, as to the correctness of the site as indicated by the plans.

2. FAMILIARITY WITH LAWS, ETC.: The Bidder is assumed to have made himself familiar with all Federal, State, and Local Laws, ordinances and regulations which may in any manner affect those engaged or employed in work or the materials or equipment in or upon the work, or in any way affect the conduct of the work, and no pleas of misunderstanding will be considered on account of the ignorance thereof. If the Bidder or Contractor shall discover any provisions in the plans, specifications, or contract which are contrary or inconsistent with any such law, ordinance, or regulation, he shall forthwith report it to the Project Designer in writing before the bid opening.

3. INTERPRETATIONS OF PLANS: If any prospective Bidder is in doubt as to the true meaning of any part of the plans, or other proposed contract documents, he may submit to the Project Designer, a written request for an interpretation thereof, who will either answer or secure an answer based upon their relative expertise. The person submitting such request will be responsible for its prompt delivery. Note, requests for clarification or interpretation must be submitted no later than **5:00 PM on November 22nd, 2024**. Any interpretation of the proposed documents will be made only by addendum duly issued and posted on the Town's website. The Project Designer will not be responsible for any other explanations or interpretations of the proposed document. The Contractor shall acknowledge receipt of all addenda in the space provided in the Bid Proposal.

4. CONTRACT DOCUMENTS: The Contract Documents consist of the Invitation to Bid, Instructions to Bidders, Bid Proposal Form, Non-collusion Affidavit, Substitution Listing, all Addenda issued, the Contract Drawings, the Town's Standard Form Contract, the General Conditions of the Construction Contract, and all exhibits and attachments incorporated by reference to any of the Contract Documents.

5. BID PROPOSAL FORM: Each Bidder must submit a Bid Proposal on the blank forms herewith provided including: Bid Proposal Form, Non-collusion Affidavit, and Substitution Listing Form and Bidder's Qualification Form. Each Bidder must include both the Bid Proposal Form and the Non-collusion Affidavit with their Bid Proposal, otherwise the Bid Proposal will not be considered. Each Bidder shall sign his Bid Proposal correctly by one duly authorized and Bid Proposals may be rejected if they show any omissions, alterations of form, additions not called for, or other irregularities of any kind. Conditioning and unbalancing of bids will not be permitted.

6. BID PROPOSAL REPRESENTATIONS: Submission of a Bid Proposal Form shall be a representation of the Bidder of all of the following:

   a. The Bidder has carefully examined the CONTRACT DOCUMENTS and fully understands them.

   b. The Bidder has carefully examined the site or sites of the Project and is familiar with the conditions under which the Work, or any part of it, is to be done, and the conditions which must be fulfilled in the furnishing and/or erection or construction of any or all items of the Project.

   c. The Bidder has the financial means and stability to provide all materials and all necessary tools, machinery, and all means necessary to do all the Work in the manner prescribed in the Contract Documents and according to the Plans and the requirements of the Town of Huntersville, in a workmanlike manner, consistent with the standards of the profession in and around Huntersville.

   d. The Bid has been made without connection with any other person, company, or parties making a similar Bid Proposal, and that it is in all respects fair and in good faith, without collusion or fraud.

   e. The Bidder understands that it is the intention of the Town of Huntersville, North Carolina, to award the Contract on the basis of Bid Proposals received at this letting, however, the Town reserves the right to reject any or all bids.

   f. If the Bid Proposal is made by a Corporation or Contractor, the Bid Proposal Form has been signed by its proper officers or members, as applicable, in a legal manner and its official address stated therein.

   g. The Bidder will enter into the Town's Construction Agreement, included as part of the Contract Documents, and will perform all of the work necessary for the construction of facilities outlined in the CONTRACT DOCUMENTS for the Town of Huntersville, North Carolina, for the bid price stated in the Bid Proposal Form.

   h. The Bidder has received and completely understood the Addenda and the bid price stated in the Bid Proposal Form reflects all Addenda.

7. SUBMISSION OF BID PROPOSALS: It is the responsibility of each Bidder, without excuse, to ensure that their Bid Proposal is submitted at the right place by the deadline. Each Bid Proposal must be submitted in a sealed envelope, to indicate its contents without being opened. The name of the Bidder, his address and his license number must be marked on the outside of the envelope. **This envelope shall be placed in another one** addressed to the attention of Tracy Houk, Town of Huntersville Recreation Department, 105 Gilead Road, P.O. Box 2879, Huntersville, North Carolina, 28070, and if forwarded otherwise than by mail, must be delivered to Ms. Tracy Houk at the above address. If the mail is delayed beyond the date and hour set for the Bid Proposal opening, proposals thus delayed will not be considered. The outer envelope must also state the Project Name and the name of the Bidder. Bid Proposals will be accepted until 2:00 PM on the date of the Bid Proposal Opening. Bid Proposals submitted after this time cannot be accepted.

8. OPENING OF BID PROPOSALS: Bid Proposals will be opened publicly and read promptly at the time, on the date, and at the place set forth in the "Invitation to Bid". Bidders or their authorized agents and other interested parties are invited to be present. The Bid Proposal shall be deemed valid for a period of sixty (60) calendar days after the opening thereof. The Bidder may request to withdraw their Bid Proposal in writing, received prior to the time for opening of the Bid Proposals, directed to the Town of Huntersville. Bid Proposals may be withdrawn after the opening of the Bid Proposals **for unintentional and substantial arithmetic errors or omissions pursuant to N.C.G.S. § 143-129.1 only (not for mistakes in judgment)** if the request is made in writing to and received by Tracy Houk, Huntersville Parks and Recreation Assistant Director, within seventy-two hours after the time for opening Bid Proposals. Such written request of withdrawal must include sufficient documentation of the clerical error or math computational error.

9. AWARDING OF CONTRACT: If awarded, the Town of Huntersville, North Carolina will award the contract conditioned upon funds being made available for such construction. If awarded, the contract will be awarded to the lowest, responsive, responsible Bidder taking into account quality, performance, and time specified in the Contract Documents. Consideration will be given only to Bid Proposals of contractors who are experienced in the class of work proposed and who can refer to projects of similar magnitude and/or character as have been completed by them. The Town also reserves to itself the right to reject any or all Bid Proposals and to waive minor informalities or technicalities, as it may deem to be in the Town's best interest.

10. EXECUTION OF CONTRACT: The successful Bidder will be required to enter into the Town's Standard Form Contract, included as part of this Project Manual, and must execute the Contract no later than ten (10) consecutive calendar days following receipt of the Notice of Award from the Town. Failure of a Bidder to execute the Contract within said ten (10) day period shall result in the forfeiture of the bidder's bid bond as described below.

11. CHECKS, CASH, OR BID BOND: Each proposal must be accompanied by a Bid Bond executed by a corporate surety licensed under the laws of North Carolina to execute such bonds, conditioned that the surety will, upon demand for with make payment to the Owner if the bidder fails to execute the Contract. The Bid Bond shall be in the amount of five percent (5%) of the total bid plus all of the alternates. The Bid Bond shall be valid for a minimum of ninety (90) calendar days. In lieu of a Bid Bond, a deposit equal to five percent (5%) of the total bid plus all alternates in the form of a Cashier's Check or Certified Check on some bank or trust

company insured by the Federal Deposit Insurance Corporation and payable to the Town of Huntersville may be provided. The purpose of the Bid Deposit or Bid Bond is to ensure that the bidder will enter into a Contract with the Owner with the terms stipulated in the Bid Proposal and the bidder guarantees that a Performance, Labor and Material will be executed. If the Contractor fails to execute a Contract, the Bid Bond or Bid Deposit shall be forfeited to the Town. Bid security shall be submitted separately for each project bid.

12. PERFORMANCE BOND: The successful Bidder shall provide a performance bond equal to 100% of the contract sum and shall conform to the Town's requirements. Bond/surety shall be provided in a form as noted in item 11 above.

13. PAYMENT BOND: The successful Bidder shall provide a payment bond equal to 100% of the contract sum and shall conform to the Town's requirements. Bond/surety shall be provided in a form as noted in item 11 above.

14. COORDINATION OF WORK: During the performance of the contract, it shall be the responsibility of the successful Bidder to pursue the orderly progress of all work stages throughout the Project and to assure that all work is completed within the time period stipulated herein as the Contract Period. In executing the duties incurred by these responsibilities, the successful Bidder shall provide sufficient executive and supervisory staff in the field to enable efficient and expeditious progress of the work. The Town relies upon the organization, management, skill, cooperation, and efficiency of the successful Bidder to supervise, direct, control and manage the work and the efforts of the sub-contractors so as to deliver the intended construction to the Contract Documents and within the scheduled time.

15. LIQUIDATED DAMAGES: The successful Bidder is required to complete the Project as outlined in the Project progress schedule and as defined by the Contract Period. Should the successful Bidder fail to assure the completion of the total Project satisfactorily within the time period specified in the contract, the successful Bidder shall be charged with liquidated damages at a rate of **Five Hundred Dollars ($500.00) per calendar day** until the total Project is successfully completed.

    If in the event the successful Bidder is granted substantial completion by the Project Designer and fails to complete and/or correct all of the remaining list of items to be corrected within 30 days of the date of substantial completion, the successful Bidder shall be charged with **liquidated damages at a rate of Five Hundred Dollars ($500.00) per calendar day** until all of the remaining items on the list are completed and corrected and approved by the Project Manager or Project Designer.

    The successful Bidder shall indemnify the Town for any claim or legal action against the Town by any subcontractor or supplier as a result of injury or damages caused by that Contractor to others, including paying judgements against the Town, all costs and expenses, legal or otherwise, incurred by the Town in defending the suit.

16. CONTRACT REDUCTION: The Town retains the exclusive right to reduce any or all of the scope of work within the Contract Documents after award of the contract for budgetary or other reasons. Should the Town choose to reduce any or all of said scope of work, the successful Bidder shall not be allowed any claims for anticipated profit or overhead on such deleted work.

17. CONTRACTOR'S LICENSE: All Bidders must possess a valid North Carolina General Contractors License to do work in North Carolina as required by N.C.G.S. Chapter 87, plus any other applicable licenses. A copy of these requirements is included in the bid documentation.

18. TIME OF CONSTRUCTION: The Successful Bidder shall begin work on the date specified in the Notice to Proceed and shall pursue all necessary phases of construction in order to substantially complete the base bid work within **300 consecutive calendar days**. This time of construction shall be defined as the Contract Period.

19. CONSTRUCTION SCHEDULES: The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Town and Project Designer's information, a construction schedule. The construction schedule shall be a detailed bar chart or Critical Path Method, for the Work to be performed. The schedule shall not exceed time limits current under the Contract Documents and shall include weather delays and delays due to delivery of the equipment. The schedule shall be related to the entire Project to the extent required by the Contract Documents and shall provide for expeditious and practicable execution of Work.

    The Contractor shall maintain the construction schedule, making monthly adjustments, updates, and corrections. The construction schedule shall be reviewed at each construction meeting.

    The Contractor shall also prepare a schedule of submittals which shall be coordinated with the Contractor's construction schedule. The submittal schedule shall also be reviewed at each construction meeting and adjusted as necessary.

    The following chart is the anticipated adverse weather delays for this project.

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
10	10	11	6	6	6	6	5	6	6	7	9

    The construction schedule shall reflect the anticipated adverse weather delays.

    National Oceanic and Atmospheric Administration (NOAA) data shall be used to claim additional construction days beyond the above chart for critical path activities. Weather days occurring on holidays or Sundays will not be considered as delays significant to the Contract completion date. The request for a weather delay must be submitted to the Consultant in writing with supporting data within (20) days following the occurrence.

    The Contractor shall allocate sufficient resources to meet the current construction schedule.

20. TECHNICAL SPECIFICATIONS. Technical specifications are included both on the Contract Drawings themselves, and within the Project Manual and are included in the bid documents. It is up to each Bidder to satisfy themselves that these technical specifications are sufficient to enable them to perform the Work. If a Bidder determines that the technical specifications are not sufficient, the Bidder should pose appropriate questions to the Project Manager who will secure answers from the Project Designer. All such inquiries and answers will be put out in the form of an Addendum prior to the time for opening bids.

21. SUBSTITUTIONS: Requests for approval of substitutions for specified products or “or equal” or “equivalent” submittals other than those listed as acceptable products will be considered only upon submission of samples and manufacturers’ data, in triplicate, of both the product specified and the product intended for substitution. All such requests for substitutions must be received for consideration by the Project Designer no later than 10 business days prior to the Bid Proposal opening. All substitutions approved will be put into an Addendum. The Town reserves the right to consider and accept any and all substitutions proposed in determining the lowest responsible bidder.

END OF INSTRUCTIONS TO BIDDERS

BID PROPOSAL

SINGLE PRIME GENERAL CONSTRUCTION CONTRACT BID PROPOSAL

NORTH MECKLENBURG PARK GREENWAY

ALTERING THE FACE OF THIS FORM IN ANY MANNER, OR PROVIDING INFORMATION NOT SPECIFICALLY REQUESTED SHALL RENDER THIS BID PROPOSAL NON-RESPONSIVE AND INELIGIBLE FOR CONSIDERATION BY THE TOWN.

Date: _____

TO: Town of Huntersville, North Carolina

To Whom It May Concern:

The undersigned Bidder, having examined carefully the site, the Invitation to Bid, Instructions to Bidders, Construction Drawings, the form Construction Agreement, Supplementary Documents (if any) and subsequent Addenda (as acknowledged herein) for the construction of a greenway, trailhead, and pedestrian hardscape areas with associated demolition/clearing, grading, erosion control, installation of utilities, stormwater conveyance measures, and landscaping. Bidder hereby proposes to furnish all labor, materials, equipment, and services necessary to perform the Work required in the Construction Documents and terms of this Proposal for the amounts listed below.

Base Bid Total: $_____

Bid Alternate 1 Total: $_____

Bid Alternate 2 Total: $_____

ITEMIZED PROPOSAL
BASE BID FOR NORTH MECKLENBURG PARK GREENWAY

#	Sec.	Item Code	Item Description	Quantity	Unit	Unit Price	Cost
1	SP		MOBILIZATION	1	LS		
2	SP		CONSTRUCTION SURVEYING	1	LS		
3	226	0057000000-E	UNDERCUT EXCAVATION	50	CY		
4	240	0134000000-E	DRAINAGE DITCH EXCAVATION	15	CY		
5	SP		GEOTEXTILE SEPARATOR FABRIC	4430	SY		
6	310	0402000000-E	48" RC PIPE CULVERTS, CLASS III	40	LF		
7	310	0448200000-E	15" RC PIPE CULVERTS, CLASS IV	44	LF		
8	310	0448300000-E	18" RC PIPE CULVERTS, CLASS IV	220	LF		
9	310	0448600000-E	36" RC PIPE CULVERTS, CLASS IV	32	LF		
10	520	1121000000-E	AGGREGATE BASE COURSE	1660	TON		
11	610	1491000000-E	ASPHALT CONC BASE COURSE, TYPE B25.0C	290	TON		
12	610	1503000000-E	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	240	TON		
13	610	1519000000-E	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	650	TON		
14	620	1575000000-E	ASPHALT BINDER FOR PLANT MIX	75	TON		
15	838	2220000000-E	REINFORCED ENDWALLS	16.2	CY		
16	840	2286000000-N	MASONRY DRAINAGE STRUCTURES	3	EA		
17	840	2374000000-N	FRAME WITH GRATE & HOOD, STD 840.03, TYPE E	1	EA		
18	840	2374000000-N	FRAME WITH GRATE & HOOD, STD 840.03, TYPE F	1	EA		
19	840	2374000000-N	FRAME WITH GRATE & HOOD, STD 840.03, TYPE G	1	EA		
20	SP		2'-6" CONCRETE CURB & GUTTER	620	LF		
21	SP		4" CONCRETE SIDEWALK	440	SY		
22	SP		CONCRETE CURB RAMPS	2	EA		
23	858	2830000000-N	ADJUSTMENT OF MANHOLES	1	EA		
24	876	3628000000-E	RIP RAP, CLASS I	69	TON		
25	876	3649000000-E	RIP RAP, CLASS B	219	TON		
26	876	3656000000-E	GEOTEXTILE FOR DRAINAGE	371	SY		

27	901	4025000000-E	CONTRACTOR FURNISHED, TYPE E SIGN	27	SF		
28	903	4072000000-E	SUPPORTS, 3-LB STEEL U-CHANNEL	96	LF		
29	904	4102000000-N	SIGN ERECTION, TYPE E	6	EA		
30	SP		TEMPORARY TRAFFIC CONTROL	1	LS		
31	SP		PORTABLE CONCRETE BARRIER	350	LF		
32	1205	4685000000-E	THERMOPLASTIC PAVEMENT MARKINGLINES (4", 90 MILS)	290	LF		
33	1205	4725000000-E	THERMOPLASTIC PAVEMENT MARKINGSYMBOL (90 MILS)	2	EA		
34	1615	6015000000-E	TEMPORARY MULCHING	7	ACR		
35	1620	6018000000-E	SEED FOR TEMPORARY SEEDING	900	LB		
36	1620	6021000000-E	FERTILIZER FOR TEMPORARY SEED-ING	4.5	TON		
37	SP		COIR FIBER MAT	1870	SY		
38	1639	6070000000-N	SPECIAL STILLING BASINS	2	EA		
39	SP		COIR FIBER WATTLE	16	EA		
40	1660	6084000000-E	SEEDING & MULCHING	13	ACR		
41	SP		IMPERVIOUS DIKE	55	LF		
42	SP		CONCRETE WASHOUT STRUCTURE	5	EA		
43	455	8802031000-E	PRECAST GRAVITY RETAINING WALLS	365	SF		
44	SP		SKIMMER SEDIMENT BASIN	1	LS		
45	SP		HIGH HAZARD TEMPORARY SILT FENCE	21710	LF		
46	SP		SILT FENCE OUTLET OPTION 2	39	EA		
47	SP		STABILIZED CONSTRUCTION ENTRANCE	1	EA		
48	SP		CATCH BASIN INLET PROTECTION	4	EA		
49	SP		ROCK PIPE INLET SEDIMENT TRAP, TYPE B	9	EA		
50	SP		TREE PROTECTION FENCE	1000	LF		
51	SP		COMPREHENSIVE GRADING - TRAILHEAD-	1	LS		
52	SP		COMPREHENSIVE GRADING - GREENWAY-	1	LS		
53	SP		6" REINFORCED CONCRETE	1000	SY		
54	SP		6" CONCRETE APRON FOR MOUNTAIN BIKE TRAIL	33	SY		
55	SP		HANDRAIL	612	LF		
56	SP		FARM FENCE	266	LF		

57	SP		CONCRETE CAP	3	CY		
58	SP		PERMANENT BOLLARD	2	EA		
59	SP		COLLAPSIBLE BOLLARD	2	EA		
60	SP		TEMPORARY STREAM CROSSING (MUD MAT)	2	EA		
61	SP		15" FLARED-END SECTION	1	EA		
62	SP		2'-0" VALLEY GUTTER	50	LF		
63	SP		TREE PIT W/ GRATE	2	EA		
64	SP		CONCRETE WHEEL STOP	2	EA		
65	SP		AS-CONSTRUCTED SURVEY	1	LS		
66	SP		STORMWATER CONTROL MEASURE	1	LS		
67	SP		BOARDWALK #1	1	LS		
68	SP		BOARDWALK #2	1	LS		
69	SP		BOARDWALK APPROACH RAIL	8	EA		
70	SP		CONCRETE APPROACH SLAB	4	EA		
71	SP		LANDSCAPING (BASE BID)	1	LS		
72	SP		HARDSCAPING (BASE BID)	1	LS		
73	SP		FURNISHINGS (BASE BID)	1	LS		
74	270	0196000000-E	GEOTEXTILE FOR SOIL STABILIZATION	450	SY		
75	275	0223000000-E	ROCK PLATING	325	SY		
76	840	2308000000-E	MASONRY DRAINAGE STRUCTURES	2	LF		
77	1630	6030000000-E	SILT EXCAVATION	30	CY		
78	SP	6045000000-E	12” TEMPORARY PIPE	190	LF		
79	SP	6071013000-E	COIR FIBER WATTLE BARRIER	427	LF		
80	SP		18” FLARED-END SECTION	1	EA		
81	SP		BUFFER MITIGATION PLANTING	1	LS		

SUBTOTAL _____

CONTINGENCY @ 10% _____

BASE BID AMOUNT _____

ITEMIZED PROPOSAL
BID ALTERNATE 1 FOR NORTH MECKLENBURG PARK GREENWAY

#	Sec.	Item Code	Item Description	Quantity	Unit	Unit Price	Cost
82	SP		FITNESS STATIONS (LANDSCAPING, HARDSCAPING, & FURNISHINGS)	1	LS		

SUBTOTAL _____

CONTINGENCY @ 10% _____

BID ALTERNATE 1 AMOUNT _____

ITEMIZED PROPOSAL
BID ALTERNATE 2 FOR NORTH MECKLENBURG PARK GREENWAY

#	Sec.	Item Code	Item Description	Quantity	Unit	Unit Price	Cost
83	SP		SHADE STRUCTURE PAVILION (LANDSCAPING, HARDSCAPING, & FURNISHINGS)	1	LS		

SUBTOTAL _____

CONTINGENCY @ 10% _____

BID ALTERNATE 2 AMOUNT _____

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the base bid quantity of the work all in accordance with the contract documents.

The undersigned further agrees that this Bid Proposal shall be valid for a period of sixty (60) days from the date of receipt of the Bid Proposal and that if this Bid Proposal is accepted by the Town within this period, the Bidder will execute the Construction Agreement provided as part of the Contract Documents.

The undersigned further agrees to begin the work promptly upon receipt of the Notice to Proceed and to pursue the work with an adequate work force to complete the work within 300 calendar days from receipt of the Notice to Proceed. Liquidated Damages of $500.00 per calendar day are hereby agreed upon as an assessment from the Contractor for failure to complete the work within the time period stated herein.

The undersigned Bidder further proposes and agrees to commence the work promptly upon notice, with an adequate force to satisfactorily complete the Project.

The undersigned acknowledges receipt of the following addenda which will be considered as part of the Contract Documents.

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

CONTRACTOR: _____
(Company)

Contractor □ is or □ is not a historically underutilized business, registered with the North Carolina Office of Historically Underutilized Businesses. (Must be completed by all Bidders.)

ADDRESS: _____

_____

_____

BY: _____
(Signature) (Typed Name)

TITLE: _____

NC General Contractor's License No. _____

NC State Sales and Use Tax Registration _____

□ Non-collusion Affidavit has been completed and is attached to this Bid Proposal Form (Required)
Note: Inclusion of the non-collusion affidavit is mandatory. A bid will be rejected as non-responsive if not included in the bid submission.

Select One (one or the other must be chosen by the Bidder):

□ Substitution Listing (if substitutions are being proposed) is attached to this Bid Proposal Form.
Note: Failure to include the Substitution Listing with this Bid Proposal will render the substitutions ineligible for consideration by the Town.

OR

□ Substitution Listing is not attached to this Bid Proposal Form (No substitutions are proposed.)

SUBSTITUTION LISTING

TO: Town of Huntersville, North Carolina
Hereinafter called "Owner"

1. A Bidder requesting a substitution must submit this form to the Project Manager and Project Landscape Architect at least five (5) business days prior to the time stated for Bid Opening.

2. Pursuant to bidding requirements for the Work titled:

   NORTH MECKLENBURG PARK GREENWAY

   The Contract Sum proposed by the under signed on the Bid Proposal form is for the Work as shown on the Drawings, and otherwise defined in the Contract Documents. However, the undersigned proposes the following substitutions for the Owner's consideration. Should the Owner accept any or all of the proposed substitutions, the Bidder's proposed contract sum will be reduced by the amount shown.

3.

Specified Product Or Material	Drawing Number	Proposed Substitution	Proposed Reduction In Contract Sum

PROVIDE SIGNATURE IDENTICAL TO THAT SHOWN ON THE BID FORM

BIDDER: _____

BY: _____

Standard Form Contract

NON-COLLUSION AFFIDAVIT

I, on behalf of the Bidder, being first duly sworn or as the Contractor, do hereby represent on behalf of the Bidder that the Bid Proposal submitted was made without collusion or fraud and that neither I, nor anyone else affiliated with the Bidder to my knowledge, have offered or received any kickbacks or inducements from any other supplier, manufacturer or subcontractor in connection with their Bid Proposal, and neither I, nor anyone else affiliated with the Bidder to my knowledge, have conferred on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, deposit of money, services or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value was exchanged.

This the _____ day of _____, 2024.

BIDDER:_____

_____

Print Name:

_____

Print Title:

State of _____

County of _____

Sworn to or subscribed before me this the _____ day of _____,2024.

(Official Seal)

_____

Notary Public:

_____

Print Name:

BIDDER'S QUALIFICATION REQUIREMENTS FORM

In order to be considered for this project, the Contractor must meet the following minimum qualification requirements.

A. The companying bidding on the project shall have been in business for at least 5 years, and been the prime contractor, and have performed similar types of greenway construction projects.

B. Possess a North Carolina General Contractors License

C. Company and/or principals of firm must not have been accessed liquidated damages on similar type of projects in the past 3 years.

D. Be capable of providing required performance and payment bonds as specified in the contract.

E. Be able to provide the insurance required by the Contractor and all the subcontractors that will be on site.

F. Provide at least three (3) greenway projects completed by the Contractor with reference names and phone numbers.

I have read and understand all sections of the Bidder's Qualifications. This page must be submitted with bid.

Signed By: _____

Title: (Owner, Partner or Corporate President or Vice President only) _____

Parks and Recreation
105 Gilead Road, Suite 300
Huntersville, NC 28078
(704) 766-2220

CONTRACT FOR CONSTRUCTION SERVICES

CONTRACTOR: Contractor Name
Address 1
City, State Zip
Contact Email

PROJECT: North Mecklenburg Park Greenway
SITE LOCATION: 16131 Old Statesville Rd.
Huntersville, NC 28078

This Contract for Construction and Repair, and all exhibits, (collectively this "Contract") is entered into this _____day of _____, 20_____ by and between the Town of Huntersville, a municipal corporation of the State of North Carolina (the "Town") and _____ located at _____ (the Contractor").

WITNESSETH:

That for and in consideration of the mutual promises set forth in this Contract, the sufficiency of which is acknowledged by the parties hereto, the parties do mutually agree as follows:

1. Scope of Services: The Contractor agrees to perform for the Town the services according to the following construction design drawings, plans, and specifications, which is incorporated herein by reference as Exhibit C. The Contractor agrees to provide the labor, service, equipment, and materials, and other services included in Exhibit C, which shall constitute the "Work." The Contractor warrants that the Contractor has visited the location of the project and is familiar with all field conditions bearing upon the Contractor's performance of the Work; that the materials and equipment furnished under the Contract are of good quality and new (unless otherwise permitted); that the Work meets or exceeds the standards ordinarily observed in the industry; and that the Work conforms to the requirements of the Contract and to all applicable codes, ordinances, laws, or regulations. The Contractor further warrants and promises that the Work shall be free from defects and nonconformities in materials and workmanship for a period of one year from the later of the "Date of Completion" or such date as the Contractor actually completes all the Work. During such period, the Contractor will remedy at Contractor's expense any nonconformities or defects in the Work within a reasonable time after receiving notice thereof from the Town.

2. Fees: Fees for the Work shall be specified in a fee schedule attached hereto as Exhibit D, (the "Contract Price").

3. Change Orders: The Contractor agrees that the Town may order changes to the general scope of the Work, including additions, deletions, and similar revisions ("Change Orders"). The parties agree to adjust the Contract Price to reflect the effects of such changes. These changes shall be authorized only upon execution of a written Change Order. The amount of any increase or decrease in the Contract Price shall be by mutual acceptance of a total amount supported by sufficient data and information to substantiate the change. If the Town and Contractor do not mutually agree on the amount of the change in the Contract Price, the Contractor will proceed with the Work described in the Change Order and the Town will pay the reasonable costs of any additional work as determined by the Town, including a reasonable amount for the Contractor's overhead and profit. Any decrease in Contract Price for a decrease in the Work will be the reasonable costs of the Work deleted as determined by the Town, including a reasonable amount for the decrease in the Contractor's overhead. The Contractor may submit claims for an increase in the Contract Price or an extension of the Date of Completion by means of a written Change Request. The Contractor agrees to submit the Change Request within a reasonable time after the event giving rise to the requested change and before the Contractor undertakes any additional work. Upon receipt of a Change Request, the Town, at its sole discretion, shall inform the Contractor whether to proceed with the additional work and shall approve any adjustment in the Contract Price or Date of Completion by issuing a Change Order as provided above. The timely submission of a written Change Request shall be a condition precedent to the issuance of a Change Order, and the Town will have no obligation to pay the Contractor for additional work performed by the Contractor without a Change Order approved in writing by the Town.

4. Historically Underutilized Businesses (HUB): It is the policy of the Town of to provide minorities and women equal opportunity for participating in all aspects of the Town's contracting and procurement programs, including but not limited to employment, construction development projects, materials/services contracts and/or lease agreements, consistent with the laws of the State of North Carolina.

5. Personal Protective Equipment (PPE): The Contractor and his/her employees will wear the proper equipment such as, but not limited to, high visibility clothing, safety glasses, hearing protection, etc. at all times when performing the Work at the Site Location(s). Failure to be in the appropriate PPE will result in removal from the project site.

6. Contract Insurance: Contractor shall be required to purchase and maintain, during its performance under this Contract, insurance coverage as shown on the Insurance Requirements as stated in Exhibit B, which is incorporated herein by reference. All insurance purchased shall have a specific endorsement, copy of which shall be provided to the Town, naming the Town as an additional insured and providing that such insurance will not be cancelled without providing thirty (30) days advance written notice to the Town.

7. Coordination with Others: The Contractor agrees to coordinate the Work with the work of any other unaffiliated contractors or with the work of the Town's own forces to avoid delaying or interfering with their work.

8. Working Drawings and Specifications at the Job Site: The Contractor shall maintain, in readable condition at his job site one complete set of working drawings and specifications for his work including all shop drawings. Such drawings and specifications shall be available for use by the owner, designer, or his authorized representative. The Contractor shall also maintain at the job site, a day-to-day record of work-in-place that is at variance with the contract documents. Such variations shall be fully noted on Project drawings by the Contractor and submitted to the designer upon Project completion and no later than 30 days after acceptance of the Project.

9. Materials, Equipment, Employees: The Contractor shall, unless otherwise specified, supply and pay for all labor, transportation, materials, tools, apparatus, lights, power, fuel, heat, sanitary facilities, water, scaffolding and incidentals necessary for the completion of the work, and shall install, maintain and remove all equipment of the construction, other utensils or things, and be responsible for the safe, proper and lawful construction, maintenance and use of same, and shall construct in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the plans, stated in the specifications, or reasonably implied therefrom, all in accordance with the contract documents. All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards of recognized organizations or institutes of the respective trades except as exceeded or qualified by specifications.

10. Cleaning Up and Restoration of Site: The Contractor shall keep the sites and surrounding area reasonably free from rubbish at all times and shall remove debris from the site from time to time or when directed to do so by the Owner. Before final inspection and acceptance of the Project, the Contractor shall thoroughly clean the sites, and completely prepare the Project and site for use by the Owner. At the end of construction, the Contractor shall oversee and implement the restoration of the construction site to its original state. Restoration includes but not limited to walks, drives, lawns, trees and shrubs, corridors, stairs, and other elements shall be repaired, cleaned, or otherwise restored to their original state.

11. Protection of Work, Property, the Public, and Safety: The Contractor shall be solely responsible for the entire site and the building or construction of the same and provide all the necessary protections, as required by the owner or designer, and by laws or ordinances governing such conditions. The Contractor shall be responsible for any damage to the owner's property or of that of others on the job, by them, their personnel, or their subcontractors, and shall make good such damages. The Contractor shall be responsible for and pay for any damages caused to the owner.

12. As-Built Marked-Up Construction Documents: Contractor shall provide one complete set of legible "as-built" marked-up construction drawings and specifications recording any and all changes made to the original design during the course of construction. In the event no changes occurred, submit construction drawings and specifications set with notation "No Changes." The Designer/Owner must receive "As-built" marked-up construction drawings and specifications before the final pay request can be processed.

13. Retainage: Retainage on periodic or final payments on public construction contracts in which the total project costs are $100,000 or more are allowed pursuant to N.C.G.S. § 143-134.1.

14. Addendums: If applicable, Contractor acknowledges that it has received, executed, and shall abide by any addendums issued by the Town prior to this Contract.

15. Standard Terms and Conditions: The Standard Terms and Conditions, attached hereto as Exhibit A, shall be a part of this Contract. The Standard Terms and Conditions are hereby incorporated by reference, and all parties agree to be bound thereby.

16. Contract Term: Work will begin within ten (10) days of receipt of the Notice to Proceed from the Town. The Contractor and the Town recognize that time is of the essence for completion of the Work. Any Notice to Proceed shall also contain a date that the Contractor shall complete the Work by (the "Date of Completion"). The terms of this Contract shall apply to every Notice to Proceed issued by the Town. The Contractor shall complete all necessary phases of construction in order to substantially complete the base bid work within 300 consecutive calendar days. This time of construction shall be defined as the Contract Period.

17. Liquidated Damages: Contractor and Town recognize that time is of the essence and that Town will suffer financial and other losses if the Work is not completed by the Date of Completion, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Town if the Work is not completed on time. Accordingly, instead of requiring any such proof, Town and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Town $500 for each day that expires after the end of the Date of Completion (as duly adjusted pursuant to the Contract) until the Work is complete.

18. Payment for Work: In consideration of the above Work, the Town will pay the Contractor the sum as further described on Exhibit D.

In witness thereof, the contracting parties, by their authorized agents, affix their signatures and seals at Huntersville, North Carolina, this _____day of _____, 20_____.

Contractor

Name:

_____
Name of Contractor (type or print)

By:

_____
(Signature)

Title:
_____

Attest:

_____
(Secretary, if a corporation)

Town of Huntersville

_____
Town Manager

Attest: _____
Town Clerk

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act

_____
Finance Director

EXHIBIT A
STANDARD TERMS & CONDITIONS

1. **Acceptance**. Contractor's acknowledgment of the terms of this Contract constitutes an agreement to: (i) all terms and conditions set forth or referenced herein, (ii) on any attachments hereto, (iii) any applicable solicitation documentation related to this Contract (including without limitation any request for proposals or invitation for bids or Contractor's response thereto) that deal with the same subject matter as this Contract, and (iv) any other terms and conditions of a written agreement signed by Contractor and the Town that deals with the same subject matter as this Contract (collectively, the "Contract Documents"). The terms and provisions set forth in the Contract Documents shall constitute the entire agreement between Contractor and the Town with respect to the purchase by the Town of the: (i) goods ("Goods") and/or (ii) services provided or work performed ("Services") as described in the Contract Documents. The agreements set forth in the Contract Documents are sometimes referred to herein as the "Contract." In the event of any conflict between any terms and conditions of the Contract Documents, the terms and conditions most favorable to the Town shall control. No additional or supplemental provision or provisions in variance herewith that may appear in Contractor's quotation, acknowledgment, invoice, or in any other communication from Contractor to the Town shall be deemed accepted by or binding on the Town. The Town hereby expressly rejects all such provisions which supplement, modify, or otherwise vary from the terms of the Contract Documents, and such provisions are superseded by the terms and conditions stated in the Contract Documents, unless and until the Town's authorized representatives expressly assent, in writing, to such provisions. Stenographic and clerical errors and omissions by the Town are subject to correction.

2. **Entire Agreement**. These terms and conditions and any other specifications contained in any other documents referenced shall constitute and represent the complete and entire agreement between the Town and Contractor and supersede all previous communications, either written or verbal with respect to the subject matter of this Contract.

3. **Changes, Additions, Deletions**. No changes, additions, deletions, or substitutions of scope of work, specifications, terms and conditions, quantity, unit of issue, delivery date, delivery charges or price will be permitted without the prior written approval from the Town.

4. **Relationship of the Parties**. The Contractor is an independent contractor and not an employee of the Town. The conduct and control of the work will lie solely with the Contractor. The Contract shall not be construed as establishing a joint venture, partnership, or any principal-agent relationship for any purpose between the Contractor and the Town. Employees of the Contractor shall remain subject to the exclusive control and supervision of the Contractor, which is solely responsible for their compensation.

5. **Prices**. If Contractor's price or the regular market price of any of the Goods or Services covered hereunder is lower than the price stated in the Contract Documents on the date of shipment of such Goods or performance of such Services, Contractor agrees to give the Town the benefit of such lower price on any such Goods or Services. In no event shall Contractor's price be higher than the price last quoted or last charged to the Town unless otherwise agreed in writing. No charges for transportation, boxing, crating, etc. are allowable unless such charges are included in the Contract Documents.

6. **Taxes**. Any applicable taxes shall be invoiced as a separate item.

7. **Substitutions**. No substitutions or cancellations shall be permitted without prior written approval from the Town.

8. **Indemnification.** To the greatest extent allowed by North Carolina law the Contractor shall indemnify and hold harmless the Town, its officers, agents, employees and assigns from and against all claims, losses, costs, damages, and expenses including expenses of litigation and attorneys' fees ("Claims"). In the event that any portion of the Work performed under the Contract shall be defective in any respect whatsoever, the Contractor shall indemnify and save harmless the Town, its officers, agents, employees, and assigns from and against all Claims as defined herein, but only to the extent allowed by law. Nothing contained in this Contract shall waive the Constitutional limitation on the Town indemnifying obligations of other parties.

9. **Invoices and Payment Terms**. It is understood and agreed that orders will be shipped at the established Contract prices in effect on dates orders are placed. Invoicing that does not comply with this provision will subject the Contract to cancellation. Upon satisfactory delivery of the Goods or satisfactory completion of the Work, all invoices and statements shall reference the Contract number and be submitted to: Town of Huntersville, Accounts Payable, PO Box 664, Huntersville, North Carolina, 28070. Payment terms are Net 30 days after receipt of correct, undisputed invoice or acceptance of Goods or Services, whichever is later.

   When the Contract is for construction services, the Contractor will submit monthly Requests for Payment for Work performed, for review. The Request for payment shall be based upon the Contractor's estimate of the percentage of the total Work completed during the period represented on the Request for Payment. The Contractor must certify that the Work represented in the Contractor's Request for Payment has been completed in accordance with the Contract Documents and certify that the Request for Payment is appropriate for payment before the Town shall be obligated to make such payment to the Contractor. If any Request for Payment is disputed by the Town, in whole or in part, the Town shall provide a written explanation for such dispute to Contractor within five days of receipt of the certified Request for Payment and shall pay all undisputed amounts therein.

10. **Anti-Discrimination and Equal Employment**. During the performance of the Contract, Contractor shall comply with all federal and state requirements concerning fair and equal employment and shall not discriminate against or deny the Contract's benefits to any person on the basis of race, religion, color, creed, national origin, age, sex (including sexual orientation, gender identity, and pregnancy), disability or handicapping condition, or genetic information.

11. **Insurance**. The Contractor shall provide the insurance coverages shown on Exhibit B, attached hereto and incorporated herein by reference. The Contractor shall provide the Town with a North Carolina Certificate of Insurance and such endorsements as may be required by the Contract Documents prior to the commencement of any work under the Contract and agrees to maintain such insurance until the completion of the Contract. Such certificates of insurance shall be considered part of the Contract.

12. **Ethics in Public Contracting**. By submitting their prices and acceptance of this Contract, all Contractors certify that their bids are made without collusion or fraud and that they have not offered or received any kickbacks or inducements from any other supplier, manufacturer, or subcontractor in connection with their offer, and that they have not conferred on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, deposit of money, services or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value was exchanged.

13. **Applicable Laws and Courts**. All Town Contracts shall be governed in all respects by the laws of the State of North Carolina. All matters, whether sounding in contract or tort relating to the validity, construction, interpretation, and enforcement of the Contract, shall be governed in all respects by the laws of the State of North Carolina and venue shall be proper only in a court of competent jurisdiction located in Mecklenburg County, North Carolina. The Contractor represents and warrants that it shall comply with all applicable federal, state, and local laws, regulations, and orders, including, not limited to, licensure requirements.

14. **Codes and Permits**. When applicable, the Contractor shall obtain all required permits, give all required notices, and comply with all laws, ordinances, codes, rules, and regulations bearing on the conduct of the work under this contract. If the Contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the designer in writing. All work under this contract shall conform to the current North Carolina Building Code and other state and national codes as are applicable. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, codes, rules, and regulations, and without such notice to the Town, Contractor shall bear all cost arising therefrom.

15. **License Requirement**. If applicable, the Contractor must be a licensed General Contractor as required by North Carolina General Statutes Section 87-1 and must have a good ethical and professional standing with the North Carolina General Contractor's Licensing Board. The Contractor will be responsible for providing properly qualified, licensed (if required) personnel to complete the Work in accordance with the standard of care ordinarily used by members of the Contractor's profession practicing under similar circumstances and at the same time in Mecklenburg County.

16. **Strict Compliance**. The Town may at any time insist upon strict compliance with these terms and conditions notwithstanding any previous course of dealing or course of performance between the parties to the contrary.

17. **Assignment**. Contractor may not assign, pledge, or in any manner encumber Contractor's rights under this Contract or delegate the performance of any of its obligations hereunder, without Town's prior, express written consent.

18. **General Provisions**. The Town's remedies as set forth herein are not exclusive. Any delay or omission by the Town in exercising any right hereunder, or any waiver by the Town of any single breach or default hereunder, shall not be deemed to be a waiver of such right or of any other right, breach, or default.

19. **Warranties**. The Contractor warrants it shall adhere to all laws, codes, ordinances, and regulations of the United States, the State of North Carolina, the County of Mecklenburg, and the Town in the performance of the Work outlined in this Contract and any attached specifications. Contractor warrants that any finished Work completed hereunder shall also adhere to all laws, codes, ordinances, and regulations of the United States, the State of North Carolina, the County of Mecklenburg, and the Town. Contractor warrants that all Work delivered hereunder will be free from defects in materials and workmanship and will conform strictly to the specifications, drawings, or samples specified or furnished. This warranty shall survive any inspection, delivery, acceptance, or payment by the Town for the Work and shall run to the Town and any user of the Work. Contractor warrants that all Work will be performed in a professional and workman like manner in accordance with best industry practices. This express warranty is in addition to Contractor's implied warranties of merchantability and fitness for a particular purpose which shall not be disclaimed. In addition to any other rights available at law or in equity, the Town shall be entitled to consequential and incidental damages.

20. **Quality and Workmanship**. All Work shall be performed to the satisfaction of the Town. The Work shall not be considered complete nor applicable payments rendered until the Town is satisfied with the Work provided.

21. **Default**. The Town may terminate the Contract, in whole or in part, immediately and without prior notice upon breach of the Contract by the Contractor. In addition to any other remedies available to the Town in law or equity, the Town may procure upon such terms as the Town shall deem appropriate, Work substantially similar to those so terminated, in which case the Contractor shall be liable to the Town for any excess costs for such similar supplies or services and any expenses incurred in connection therewith.

22. **Termination for Convenience**. The Town shall have the right, without assigning any reason therefore, to terminate any Work under the Contract, in whole or in part, at any time at its complete discretion by providing 10 days' notice in writing from the Town to Contractor. If the Contract is terminated by the Town in accordance with this paragraph, the Contractor will be paid in an amount which bears the same ratio to the total compensation as does the Work actually delivered or performed to the total originally contemplated in the Contract. The Town will not be liable to the Contractor for any costs for materials acquired or contracted for if such costs were incurred prior to the date of this Contract.

23. **Risk of Loss.** Risk of Loss for all supplies, materials, the Work performed, and the Project as it is being constructed, shall be on the Contractor until such time as substantial completion is achieved, and approved by the Town.

24. **No Third-Party Beneficiaries**. There shall be no intended nor incidental third-party beneficiaries of this Contract. Contractor shall include in all contracts, subcontracts, or other agreements relating to the Contract an acknowledgment by the contracting parties that the Contract creates no third-party beneficiaries.

25. **Exclusivity.** Nothing in this Contract shall require the Town to use the Contractor or prohibit the Town from soliciting third parties for the good or services provided in this Contract.

26. **Confidentiality**. The Contractor acknowledges the Town is subject public records law and no term shall be inconsistent with N.C.G.S. §132 et al.

27. **Valid Contract for Services**. In order for a Contract for Services of the Town to be valid, it must be executed by the Town Manager or his or her authorized designee and must be pre-audited in that manner required by the Local Government Budget and Fiscal Control Act, as the same may be amended.

28. **Verification of Work Authorization.** Contractor shall comply with, and require all contractors and subcontractors to comply with, the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes, "Verification of Work Authorization," sometimes known as E-verify, for all contractors and subcontractors.

29. **Iran Divestment List.** With the execution hereof, Contractor, certifies that they are not on the Iran Final Divestment List created by the N.C. State Treasurer pursuant to N.C.G.S. § 147-86.58, and will not contract with anyone on such List in performance of the work hereunder.

30. **Buyer.** All references to Buyer or Town, throughout these terms and conditions, shall refer to the Town of Huntersville, North Carolina

31. **Contractor.** All references to Contractor, Seller, or Firm throughout these terms and conditions shall refer to the contractor identified on page 1 of this Contract.

32. **Availability of Funds**. Any and all payments to the Contractor are dependent upon and subject to the availability of funds to the Town for the purpose set forth in this agreement.

33. **Severability**. If any provision of this Contract is found to be invalid or unlawful, then remainder of this Contract shall not be affected thereby, and each remaining provision shall be valid and enforced to the fullest extent permitted by law.

34. **Companies that Boycott Israel**. With the execution hereof, Contractor, certifies that they are not on the Companies that Boycott Israel List created by the N.C. State Treasurer pursuant to N.C.G.S. § 147-86.80, and will not contract with anyone on such List in performance of the work hereunder.

35. **Governmental Immunity**. Nothing contained in this Contract shall constitute a waiver of the Town's governmental immunity or of any limitation on liability or damages created by law.

EXHIBIT B
INSURANCE AND BOND REQUIREMENTS

1. The Work under this Contract shall not commence until the Contractor has obtained all required insurance and verifying certificates of insurance have been approved in writing by the Town. The Contractor shall furnish the Town with satisfactory proof of carriage of the insurance required before written approval is granted by the Town.

2. The insurance coverage shall be provided and maintained for the duration of the Contract.

3. Except for Worker's Compensation and Professional Liability policies, the Town shall be named as additional insured on all policies with coverage at least as broad as that provided to the named insureds.

4. The verifying certificates shall document that coverages afforded under the policies will not be cancelled, reduced in amount, or coverages eliminated until at least thirty (30) days after mailing written notice, by certified mail, return receipt requested, to the insured and the Town of such alteration or cancellation.

5. If endorsements are needed to comply with the notification or other requirements of this Agreement, copies of the endorsements shall be submitted with the certificates.

6. Any deductible, if applicable to loss covered by insurance provided, is to be borne by the Contractor.

7. The Contractor is required to provide and maintain the following minimum insurance coverage:

   a. **Worker's Compensation and Employer's Liability.**

      The Contractor shall provide and maintain, until final acceptance, Workers' Compensation insurance, as required by law, as well as employer's liability coverage with minimum limits of $1,000,000.

   b. **Commercial General Liability (CGL) Insurance.**

      The Contractor shall provide and maintain, commercial general liability insurance, including coverage for premises operations, independent contractors, completed operations, products and contractual exposures, as shall protect such contractors from claims arising out of any bodily injury, including accidental death, as well as from claims for property damages which may arise from operations under this contract, whether such operations be by the Contractor or by any subcontractor, or by anyone directly or indirectly employed by either of them and the minimum limits of such insurance shall be as follows:

Bodily Injury:	$1,000,000 per occurrence/$2,000,000 aggregate
Property Damage:	$1,000,000 per occurrence/$2,000,000 aggregate
Products/ Completed Operations:	$1,000,000 per occurrence/$2,000,000 aggregate

Such coverage for completed operations must be maintained for at least two (2) years following final acceptance of the Work performed under the contract.

The commercial general liability insurance policy shall provide that such insurance is primary to and non-contributory with any liability insurance carried by the additional insureds and provide a severability of interests clause.

c. **Automobile Liability.**

The Contractor shall provide and maintain automobile liability coverage including coverage for owned, hired, and non-owned vehicles, with limits no less than $1,000,000 per accident for bodily injury and property damage.

d. **Builder's Risk/Course of Construction.**

For construction projects, the Contractor shall provide and maintain builder's risk coverage utilizing an "All Risk" (Special Perils) coverage form, with limits equal to the completed value of the project and no coinsurance penalty provisions.

This coverage is not required for road maintenance projects.

e. **Professional Liability.**

The Contractor shall provide and maintain professional liability coverage with limits no less than $2,000,000.

f. **Pollution Liability.**

The Contractor shall provide and maintain pollution liability coverage with minimum limits of $1,000,000 per occurrence/aggregate.

g. **Umbrella Coverage.**

The Contractor shall provide and maintain umbrella coverage with minimum limits of no less than $1,000,000 per occurrence/aggregate.

h. **Other Insurance.**

The Contractor shall obtain such additional insurance as may be required by the Town or by the General Statutes of North Carolina including motor vehicle insurance, in amounts not less than the statutory limits.

8. If the Contractor maintains broader coverage and/or higher limits than the minimum limits shown above, the Town requires and shall be entitled to the broader coverage and/or high limits maintained by the Contractor. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the Town.

9. The policies shall provide that any failure to comply with reporting provisions of the policies shall not affect coverage provided to the Town or its officers, officials, employees, agents, or volunteers.

10. All liability and Workers' Compensation insurance policies shall provide that the insurance company waives all rights of recovery by way of subrogation against the Town and other insureds.

11. The insurance providers shall be North Carolina admitted insurers (licensed to do business in North Carolina) with a current A.M. Best's rating of no less than A-VIII. Notwithstanding the foregoing, if no North Carolina admitted insurance company provides the required insurance, it is acceptable to procure the required insurance from a United States domiciled carrier that meets the required Best's rating.

12. The Town reserves the right to modify these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other circumstances.

13. The limits of insurance described herein shall not limit the liability of the Contractor and Contractor's officers, employees, agents, representatives, and subcontractors. The Contractor's obligation to defend, indemnify, and hold the Town and its officers, officials, employees, agents and volunteers harmless under the provisions of this paragraph are not limited to or restricted by any requirement in the Contract for Contractor to procure and maintain a policy of insurance.

14. For construction projects only, the Contractor shall require and verify that all subcontractors maintain insurance meeting all the requirements stated herein, and Contractor shall ensure that Town is an additional insured on insurance required from subcontractors.

15. For construction projects only, the Contractor shall provide a payment bond and a performance bond in a sum equal to 100% of the contract price.

EXHIBIT C – PLANS AND SPECIFICATIONS

(insert plans and specs)

EXHIBIT D – FEE SCHEDULE

Service	Unit Cost	Quantity	Total
		Total Cost =	

_____

Company Name Date

_____

Print Name Title

_____

Signature

SECTION 011000 – SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS and REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: North Mecklenburg Park Greenway

B. Consultant Identification: The Contract Documents, dated 10-15-2024, were prepared for the Project by McAdams.

C. The Work consists of the construction of a greenway, trailhead, and pedestrian hardscape areas with associated demolition/clearing, grading, erosion control, installation of utilities, stormwater conveyance measures, and landscaping.

1. Contractor shall furnish all material, labor, tools, supplies, equipment, transportation, superintendence, temporary construction of every nature, insurance, taxes, contributions and all services and facilities, unless specifically excepted, and install all materials, items and equipment required to complete the construction of the Project, as set forth in the Contract Documents and as required to provide complete and operational systems.

2. The Contractor shall act as the Project Expediter and be responsible for coordinating the work and schedules of others hired by him.

1.3 CONTRACT

A. Project will be constructed as a Single Prime Contract.

1.4 SPECIFICATION FORMATS AND CONVENTIONS

A. Technical Specifications Format: The Specifications are organized into Divisions and Sections using the 33-division format and “MasterSpec” numbering system.

1. Section Identification: The Technical Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

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

1. Abbreviated Language: Language used in the Technical Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Technical Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

3. Where indicated, references to the NCDOT 2018 Standard Specifications shall supersede other specification indicated in this document.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications whereas all parties agree to the following:

1. A modification in the Work or Contract Documents.
2. The amount of the adjustment in the Contract Sum, if any.
3. The extent of the adjustment in the Contract Time, if any.

1.3 NOTIFICATION TO SURETY

A. The Contractor shall notify the Surety of any modifications to the Work or provisions of the Contract Documents, including, but not limited to, the Contract Price or Contract Time.

1.4 MINOR CHANGES IN THE WORK

A. The Consultant shall have authority to order Minor Changes in the Work not involving adjustment to the Contract Sum or extension of the Contract Time, and consistent with the intent of the Contract Documents. Such changes shall be in a form of a written order and shall be binding for both the Owner and Contractor when fully executed.

1.5 CLAIMS FOR ADDITIONAL COST:

A. No claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph.

Notice: Written notice stating the general nature of each claim shall be delivered by the claimant to the other party to the Contract promptly, but in no event later than thirty (30) days after the start of the event giving rise to the claim.

The responsibility to substantiate a claim shall rest with the party making the claim. The amount or extent of the claim, with supporting data, shall be delivered to the other party to the Contract within fifteen (15) days after the initial Notice of the Claim.

Each claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event.

The opposing party shall submit any response to the claimant within thirty (30) days after receipt of the claimant's last submittal. Prior notice is not required for Claims relating to an emergency endangering life or property.

B. The Contractor shall submit a claim if he believes additional cost is involved for reasons including but not limited to the following:

1. A written interpretation from the Consultant,
2. An order by the Owner to stop the Work where the Contractor was not at fault,
3. A written order for a minor change in the Work issued by the Consultant,
4. A change in the Scope of the Work by the Consultant.

1.6 PROPOSAL REQUESTS

A. The Owner initiated Proposal Requests is generated by the Owner to modify the Work or Contract Documents. The Consultant will issue a detailed description of proposed modifications in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications. The description is for information and shall be considered as a directive to automatically stop work or execute the proposed change.

1. Within ten 10-calendar days after receipt of the Proposal Request, the Contractor shall submit a Proposal Request Form with an estimate to adjust the Contract Sum and the Contract Time if necessary to execute the change. Proposal shall include support documents from Subcontractor, if applicable.

   a. Include a list of quantities of (plus or minus) the materials and/or products required with unit prices, total amount of purchases, and credits to be made. If requested, furnish survey data to substantiate quantities.

   b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

   c. Include costs of labor and supervision directly attributable to the change, including social security, old age and unemployment insurance, fringe benefits, and workmen’s compensation insurance.

   d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start, and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

2. The Contractor may initiate proposals if latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Consultant.

    a. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

    b. Include a list of quantities of (plus or minus) the materials and/or products required with unit prices, total amount of purchases, and credits to be made. If requested, furnish survey data to substantiate quantities.

    c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

    d. Include costs of labor and supervision directly attributable to the change, including social security, old age and unemployment insurance, fringe benefits, and workmen's compensation insurance.

    e. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

    f. Comply with requirements in Division 1 Section, of the Technical Specifications "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

B. An alternative method to price the changes in the work is to utilize current "Mean's Cost Data".

C. Profit and Overhead shall not exceed ten percent (10%) of the cost of the changes to the Work.

D. Use Proposal Request Form provided by Owner. A "Sample is included in the Appendix. The Contractor shall prepare three copies, one for the Consultant, one for the Owner and one for himself and for all parties to sign. Each shall keep a copy.

E. The Contractor shall be responsible for keeping and updating a "Proposal Request Log", listing all Proposal Requests and Minor Changes. The log shall also indicate the date of the Proposal Request, approval date, action taken, running balances, and a complete description of the change.

F. After all parties have signed "The Proposal Request Form", it shall be the Contractor's authorization to proceed with the changes to the Work.

If the Owner and Contractor do not agree with the requested adjustment in the Contract Sum, the Contract Time or the method of determining each, the provisions for Mediation shall be utilized.

1.7 CHANGE ORDER PROCEDURES

A. The Consultant shall issue a Change Order for signatures once all of the Proposal Request(s) amounts exceeds the contingency amount or at the end of the project.

B. The Contractor shall not invoice for the Change Order until it has been executed by all parties.

1.8 CONSTRUCTION CHANGE DIRECTIVE

A. The Consultant may issue a Construction Change Directive that has been signed by the Owner to the Contractor directing a change in the Work. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved. And the Contractor shall advise the Consultant of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

C. The Contractor shall maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PROCESSING CHANGE ORDERS

A. The Change Order will be issued describing the change or changes to the Work and/or Contract Documents and will refer to the Proposal Requests.

B. The Consultant shall issue one copy of the Change Order to the Contractor. The Contractor shall promptly sign the copy and return the copy to the Consultant who will sign the Change Order and forward the Change Order to the Owner to execute.

C. Once the Change Order has been fully executed, a copy shall be forwarded to the Consultant and to the Contractor for their files.

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 1, of the Technical Specifications Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

2. Division 1, of the Technical Specifications Section 013200 "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms AIA G702.
b. Continuation Sheets (example of the Continuation Sheet form is in VIII Forms).

2. Submit the Schedule of Values to the Consultant at earliest possible date but no later than fourteen (14) days before the date scheduled for submittal of initial Applications for Payment.

3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one (1) line item for each of the Technical Specifications Section.

1. Identification: Include the following Project information on the Schedule of Values:

   a. Project name and location.
   b. Name of Consultant.
   c. Contract number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Technical Specifications Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.

3. Group items that are “Non-Tangible & Non-Taxable and Tangible & Taxable Items” on the Schedule of Values (see VIII. Forms, Continuation Sheet).

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include labor and materials and/or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Consultant and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involves additional requirements.

B. Such applications shall not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier because of a dispute or other reason.

C. Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for material and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner’s title to such material and equipment or otherwise protect the owner’s interest, and shall include applicable insurance, storage, and transportation to the site for such material and equipment stored off the site.

    The Contractor warrants that title to all Work covered by an Application and Certificate for payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application and Certificate for payment all work for which Certificates for payment have been previously issued and payment received from the owner shall, to the best of the Contractor’s knowledge, information and belief, be free and clear of claims of liens, claims, security, interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

D. Payment Application Times: Each Month, the County can make a partial payment to the Contractor on the basis of a duly notarized Application and Certification for Payment approved and certified by the Consultant.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. The Consultant will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

3. Retainage shall be retained in accordance with N.C.G.S § 143-134.1. The Town will retain five percent (5%) of each payment up to fifty (50%) completion of the Contract, for public construction contracts in which the total project costs are equal to or greater than one hundred thousand dollars ($100,000). No retainage on periodic or final payments made by the Owner or prime contractor shall be allowed on public construction contracts in which the total project costs are less than one hundred thousand dollars ($100,000).

a. The Owner shall not retain more than five percent (5%) of any periodic payment due to a prime Contractor.

b. When the project is fifty percent (50%) complete, The Owner, with written consent of the surety, shall not retain any further retainage from periodic payments due the Contractor if the Contractor continues to perform satisfactorily and any nonconforming work identified in writing prior to that time by the Consultant or Owner has been corrected by the Contractor and accepted by the Consultant and Owner. If the Consultant determines the Contractor’s performance is unsatisfactory, the owner may reinstate retainage for each subsequent periodic payment application as authorized in this subsection up to the maximum amount of five percent (5%). The project shall be deemed fifty percent (50%) complete when the Contractor’s gross project invoices, excluding the value of materials store off-site, equal or exceed fifty percent (50%) of the value of the contract, except the value of materials store on-site shall not exceed twenty percent (20%) of the Contractor’s gross project invoices for the purpose of determining whether the project is fifty percent (50%) complete.

c. A subcontract on a contract governed by this section may include a provision for the retainage on periodic payments made by the prime contractor to the subcontractor. However, the percentage of the payment retained: (i) shall be paid to the subcontractor under the same terms and conditions as provided in subdivision (E)(3)(b.) of this subsection and (ii) subject to subsection (E)(5.) of this section, and shall not exceed the percentage of retainage on payments made by the owner to the prime contractor. Subject to subsection (E)(5.) of this section, any percentage of retainage on payments made by the prime contractor to the subcontractor that exceeds the percentage of retainage on payments made by the owner to the prime contractor shall be subject to interest to be paid by the prime contractor to the subcontractor at the rate of one percent (1%) per month or fraction thereof.

d. Within sixty (60) days after the submission of a pay request and one of the following occurs, as specified in the contract documents, the Owner with written consent of the surety shall release to the Contractor all retainage on payments held by the Owner:

i. The Owner receives a certificate of substantial completion from the Consultant in charge of the project; or

ii. the Owner receives beneficial occupancy or use of the project.

However, the Owner may retain sufficient funds to secure completion of the project or corrections on any work. If the Owner retains funds, the amount retained shall not exceed two and one-half times the estimated value of the work to be completed or corrected. Any reduction in the amount of the retainage on payments shall be with the consent of the Contractor's surety.

e. The existence of any third-party claims against the Contractor or any additive change orders to the construction contract shall not be a basis for delaying the release of any retainage on payments.

4. Full payment, less authorized deductions, shall also be made for those trades that have reached one hundred percent (100%) completion of their contract by or before the project is fifty percent (50%) complete if the Contractor has performed satisfactorily. However, payment to the early finishing trades is contingent upon the Owner's receipt of an approval or certification from the Consultant of record or applicable engineer that the work performed by the subcontractor is acceptable and in accordance with the contract documents. At that time, the Owner shall reduce the retainage for such trades to five-tenths percent (0.5%) of the contract. Payments under this subsection shall be made no later than sixty (60) days following receipt of the subcontractor's request or immediately upon receipt of the surety's consent, whichever occurs later. Early finishing trades under this subsection shall include structural steel, piling, caisson, and demolition. The early finishing trades for which line-item release of retained funds is required shall not be construed to prevent an Owner or an Owner's representative from identifying any other trades not listed in this subsection that are also allowed line-item release of retained funds. Should the Owner or Owner's representative identify any other trades to be afforded line-item release of retainage, the trade shall be listed in the original bid documents. Each bid document shall list the inspections required by the Owner before accepting the work, and any financial information required by the Owner to release payment to the trades, except the failure of the bid documents to contain this information shall not obligate the Owner to release the retainage if it has not received the required certification from the Consultant of record or applicable engineer.

5. Notwithstanding 3-a & b of this section, following fifty percent (50%) completion of the project, the Owner shall be authorized to withhold additional retainage from a subsequent periodic payment, not to exceed five percent (5%) as set forth in 3-a of this section, in order to allow the Owner to retain two and one-half percent (2.5%) total

retainage through the completion of the project. In the event that the Owner elects to withhold additional retainage on any periodic payment subsequent to release of retainage pursuant to 3-d-i of this section, the General Contractor may also withhold from the subcontractors remaining on the project sufficient retainage to offset the additional retainage held by the Owner, notwithstanding the actual percentage of retainage withheld by the Owner of the project as a whole.

6. Neither the Owner's nor Contractor's release of retainage on payments as part of a payment in full on a line-item of work under 3-d-i of this section shall affect any applicable warranties on work done by the Contractor or subcontractor, and the warranties shall not begin to run any earlier than either the Owner's receipt of a certificate of substantial completion from the Consultant in charge of the project or the Owner receives beneficial occupancy.

7. Nothing in this section shall prevent the prime Contractor at the time of application and certification to the Owner from withholding application and certification to the Owner for payment to the subcontractor for unsatisfactory job progress; defective construction not remedied; disputed work; third party claims filed or reasonable evidence that claim will be filed; failure of subcontractor to make timely payments for labor, equipment, and materials; damage to prime Contractor or another subcontractor; reasonable evidence that subcontract cannot be completed for the unpaid balance of the subcontract sum; or a reasonable amount for retainage not to exceed the initial percentage retained by the Owner.

8. Nothing in this section shall prevent the Owner from withholding payment to the Contractor in addition to the amounts authorized by this section for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the Owner or reasonable evidence that a third-party claim will be filed.

F. Transmittal: Submit two (2) signed and notarized original hard copies, or one (1) signed and notarized electronic copy, of each Application for Payment to the Consultant. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. With each Application and Certification for payment, the Contractor must furnish for themselves, as well as for all Subcontractors, certified statements stating the cost of the property purchased from each vendor and the amount of sales and/or use taxes paid. See General Conditions, Sales, and Use Tax for additional information.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

I. Neither Final payment nor any remaining retained percentage shall become due until the Contractor submits the following to the Consultant for approval:

1. An affidavit that payrolls, bills for material and other indebtedness connected with the Work has been paid or otherwise satisfied,

2. A certificate evidencing that insurance required by the Contract Document to remain in force after Final payment is currently in effect and will not be canceled or allowed to expire until at least thirty (30) days prior written notice has been given to the Owner,

3. Consent of surety to Final payment and

4. If required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases, and waivers of claim of liens, claims security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If the Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such claim of lien. If such claim of lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such claim, including all costs and reasonable attorneys' fees.

5. MWSBE form VI.

6. A list of all suppliers and subcontractors that were involved with the project. As part of the list, the Contractor shall include the address, phone number, what they supplied or Work performed, and a contact name.

7. "As-Builts" Drawings

8. Maintenance and Operation instructions and guarantees.

J. Final Payment Application: Submit with the final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Warranties and Test results required by the Contract Documents.

2. Updated final statement, accounting for final changes to the Contract Sum.

3. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."

4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."

5. AIA Document G707, "Consent of Surety to Final Payment."

6. Additional Evidence that claims has been settled if required by the Owner. An example of the evidence could be a letter from a subcontractor indicating that he has been paid in full for the work that he has performed.

7. Certificates from all local and State Governing Agencies as required by Law.

8. Final liquidated damages settlement statement.

9. List of Sub-Contractors and Suppliers that has contributed to the completion of the

Work. The list shall include:

a. Material they supplied or type of construction they performed.
b. Address.
c. Contact person.
d. Phone number.

10. M/WSBE From VI.

11. Final Sales Tax Form.

PRODUCTS (Not Used)

EXECUTION (Not Used)

END OF SECTION 012900

SECTION 012950 – MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

B. NCDOT Standard specifications shall be incorporated by reference.

1.2 SUMMARY

A. This Section specifies the method of measurement and payment for each of the line items identified in the proposal.

B. Related Sections include the following:

1. Division 0, Section 03, “Bid Proposal” for all associated line items and quantities identified in this section.

1.3 REQUIREMENTS

A. Unit prices submitted by the Contractor in Section 03 shall be full compensation for all labor, materials, equipment, tools, specialties, and incidentals necessary for the Contractor to fully complete the Work as shown on the Drawings and specified in the Contract Documents to be performed under this Contract.

B. Items listed in paragraph 1.4 of this section refer to and are identical to pay items listed in Section 03. Individually and collectively, they represent and constitute all the pay items required for the completion of the Work.

1. There shall be neither direct nor separate payment for providing miscellaneous temporary or accessory works, services, field offices, layout surveys, measurement surveys, job signs, traffic control, access roads (both installing and removing), sanitary requirements, testing, safety devices, construction record drawings, water supplies, power, removal of waste material generated by the Work or shown on the Drawings to be removed, watchmen, and all other requirements of the Contract Documents.

2. Compensation for any and all such services, equipment, materials, and labor shall be included in the unit prices stipulated for the various pay items outlined in Section 03.

3. All Work not specifically set forth as an item for payment shall be considered a subsidiary obligation of the Contractor, and any and all costs associated therewith shall be included in the prices bid by the Contractor.

C. The Owner reserves the right at any time during the Work to make changes in the quantities of items of work as may be necessary in the opinion of the Owner to satisfactorily complete the Work.

1. Such changes in quantities shall neither invalidate the contract nor release the Contractor's surety, and the Contractor shall agree to perform the Work as changed.

D. Restoration is an integral part of the work but is not a separate pay item.

1. All unit and lump sum bid prices shall include the costs associated with restoration necessitated by the work related to that item.

2. Restoration shall include, but shall not be limited to, restoring existing structures and property; paving and stabilizing roads; cleaning of drainage piping and ditches; repairing driveways, lawns, walkways, irrigation systems, and ground areas to the satisfaction of the respective property owner; and, in general, restoring all areas, structures, properties, etc. which were altered by the Contractor during construction to a state equal to or better than existed prior to construction.

E. Estimated quantities stipulated in Section 03 or other parts of the Contract Documents are solely for the purpose of comparing the bids received for the Work and determining an initial contract price.

1. The actual quantities of work done and materials furnished can and will differ from the estimated quantities shown in Section 03.

2. The final contract price will be based upon the final quantities of pay items incorporated into the Work adjusted by these Contract Documents.

F. All Work completed under this contract will be measured by the Owner according to United States standard measures unless otherwise stipulated in the Contract Documents.

1. The method of measurement and computations used in determining the quantity of the various pay items incorporated into the Work will be those methods generally recognized as accepted engineering practice.

G. Certain pay items require the Owner to collect trip tickets in order to determine quantities of these pay items incorporated into the work. The Contractor shall be fully responsible in ensuring that his drivers deliver to the Owner each trip ticket as outlined in this section. The Owner reserves the right to compensate the Contractor only for the quantity of pay items incorporated into the work that can be documented by the trip tickets received by the Owner.

1.4 PAY ITEMS

A. Pay Item 1: MOBILIZATION

1. Measurement

There shall be no measurement for mobilization.

2. Payment

The unit price bid for mobilization shall be full compensation for preparing for work and associated operations, including but not limited to project bonds and insurance, the necessary movement of personnel, equipment, supplies, and incidentals to or near the project site; for establishing offices and facilities as may be required for the work; and the subsequent removal of personnel, equipment, supplies, and incidentals for the work site at the completion of the work; and all other costs which the Contractor may incur for the work which are excluded from other bid items.

B. Pay Item 2: CONSTRUCTION SURVEYING

1. Measurement

There shall be no measurement for Construction Surveying.

2. Payment

The unit price for Construction Surveying shall be full compensation for all construction lay-out, surveying, staking, stakeout, supplemental surveying, and engineering necessary for the proper control of construction operations.

C. Pay Item 3: UNDERCUT EXCAVATION

1. Measurement and Payment

Undercut Excavation shall be measured and paid accordance with NCDOT Standard Specifications section 226.

D. Pay Item 4: DRAINAGE DITCH EXCAVATION

1. Measurement and Payment

Drainage Ditch Excavation shall be measured and paid accordance with NCDOT Standard Specifications section 240.

E. Pay Item 5: GEOTEXTILE SEPARATOR FABRIC

1. Measurement

Geotextile Separator Fabric shall be measured as the number of square yards of separator fabric incorporated into the work.

2. Payment

The unit price for Separator Fabric shall include full compensation for all labor, equipment, and materials, including the cost of furnishing, storing, and installing Separator Fabric reinforcement fabric in accordance with manufacturers' recommendations at locations

beneath pavement where soil stabilization fabric is not utilized.

F. Pay Item 6: 48" RC PIPE CULVERTS, CLASS III

1. Measurement & Payment

48” RC Pipe Culverts, Class III shall be measured and paid in accordance with NCDOT Standard Specifications section 310.

G. Pay Item 7: 15" RC PIPE CULVERTS, CLASS IV

1. Measurement & Payment

15” RC Pipe Culverts, Class IV shall be measured and paid in accordance with NCDOT Standard Specifications section 310.

H. Pay Item 8: 18" RC PIPE CULVERTS, CLASS IV

1. Measurement & Payment

18” RC Pipe Culverts, Class IV shall be measured and paid in accordance with NCDOT Standard Specifications section 310.

I. Pay Item 9: 36" RC PIPE CULVERTS, CLASS IV

1. Measurement & Payment

36” RC Pipe Culverts, Class IV shall be measured and paid in accordance with NCDOT Standard Specifications section 310.

J. Pay Item 10: AGGREGATE BASE COURSE

1. Measurement & Payment

Aggregate Base Course shall be measured and paid in accordance with NCDOT Standard Specifications section 520.

K. Pay Item 11: ASPHALT CONC BASE COURSE, TYPE B25.0C

1. Measurement & Payment

Asphalt Concrete Surface Course, Type B25.0C shall be measured and paid in accordance with NCDOT Standard Specifications section 610.

L. Pay Item 12: ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C

1. Measurement & Payment

Asphalt Concrete Intermediate Course, Type I19.0C shall be measured and paid in accordance with NCDOT Standard Specifications section 610.

M. Pay Item 13: ASPHALT CONC SURFACE COURSE, TYPE S9.5B

1. Measurement & Payment

Asphalt Concrete Surface Course, Type S9.5B shall be measured and paid in accordance with NCDOT Standard Specifications section 610.

N. Pay Item 14: ASPHALT BINDER FOR PLANT MIX

1. Measurement & Payment

Asphalt Binder for Plant Mix shall be measured and paid in accordance with NCDOT Standard Specifications section 620.

O. Pay Item 15: REINFORCED ENDWALLS

1. Measurement & Payment

Reinforced Endwalls shall be measured and paid in accordance with NCDOT Standard Specifications section 838.

P. Pay Item 16: MASONRY DRAINAGE STRUCTURES

1. Measurement & Payment

Masonry Drainage Structures (EA) shall be measured and paid in accordance with NCDOT Standard Specifications section 840.

Q. Pay Item 17: FRAME WITH GRATE & HOOD, STD 840.03, TYPE E

1. Measurement & Payment

Frame with Grate & Hood, Std 840.03, Type E shall be measured and paid in accordance with NCDOT Standard Specifications section 840.

R. Pay Item 18: FRAME WITH GRATE & HOOD, STD 840.03, TYPE F

1. Measurement & Payment

Frame with Grate & Hood, Std 840.03, Type F shall be measured and paid in accordance with NCDOT Standard Specifications section 840.

S. Pay Item 19: FRAME WITH GRATE & HOOD, STD 840.03, TYPE G

1. Measurement & Payment

Frame with Grate & Hood, Std 840.03, Type G shall be measured and paid in accordance with NCDOT Standard Specifications section 840.

T. Pay Item 20: 2'-6" CONCRETE CURB & GUTTER

1. Measurement

   2’-6” Concrete Curb & Gutter shall be measured as the number of linear feet of curb incorporated into the work.

2. Payment

   The unit price for Curb & Gutter shall include full compensation for all labor, equipment, and materials required to install Curb & Gutter at locations identified in the plans.

U. Pay Item 21: 4” CONCRETE SIDEWALK

1. Measurement

   4” Concrete Sidewalk shall be measured as the number of square yards of sidewalk incorporated into the work.

2. Payment

   The unit price for 4” Concrete Sidewalk shall include full compensation for all labor, equipment, and materials required to install sidewalk at locations identified in the plans.

V. Pay item 22: CONCRETE CURB RAMPS

1. Measurement

   Concrete Curb Ramps shall be measured as per each individual curb ramp incorporated into the work.

2. Payment

   The unit price for Concrete Curb Ramps shall include full compensation for all labor, equipment, and materials required to install curb ramps at locations identified in the plans.

W. Pay Item 23: ADJUSTMENT OF MANHOLES

1. Measurement & Payment

   Adjustment of Manholes shall be measured and paid in accordance with NCDOT Standard Specifications section 858.

X. Pay Item 24: RIP RAP, CLASS I

1. Measurement & Payment

   Rip Rap, Class I shall be measured and paid in accordance with NCDOT Standard Specifications section 876.

Y. Pay Item 25: RIP RAP, CLASS B

1. Measurement & Payment

   Rip Rap, Class B shall be measured and paid in accordance with NCDOT Standard Specifications section 876.

Z. Pay Item 26: GEOTEXTILE FOR DRAINAGE

1. Measurement & Payment

   Geotextile for Drainage shall be measured and paid in accordance with NCDOT Standard Specifications section 876.

AA. Pay Item 27: CONTRACTOR FURNISHED, TYPE E SIGN

1. Measurement & Payment

   Contractor Furnished, Type E Sign shall be measured and paid in accordance with NCDOT Standard Specifications section 901.

BB. Pay Item 28: SUPPORTS, 3-LB STEEL U-CHANNEL

1. Measurement & Payment

   Supports, 3-LB Steel U-Channel shall be measured and paid in accordance with NCDOT Standard Specifications section 901.

CC. Pay Item 29: SIGN ERECTION, TYPE E

1. Measurement & Payment

   Sign Erection, Type E shall be measured and paid in accordance with NCDOT Standard Specifications section 901.

DD. Pay Item 30: TEMPORARY TRAFFIC CONTROL

1. Measurement

   There shall be no measurement for Temporary Traffic Control.

2. Payment

   The unit price for Traffic Control shall include full compensation for all labor, equipment, and materials required to associated with installing and maintaining any traffic control as necessary to complete the work, except for Portable Concrete Barriers. Traffic control shall be paid on a Lump Sum basis.

EE. Pay Item 31: PORTABLE CONCRETE BARRIER

1. Measurement

Portable Concrete Barrier shall be measured as the linear feet of barrier installed and maintained over the duration of the project.

2. Payment

The unit price for Portable Concrete Barrier shall include full compensation for all labor, equipment, and materials required to install and maintain the barrier as indicated in the plans, for the life of the project. No payment will be made for additional barrier installed, unless otherwise directed by the engineer.

FF. Pay Item 32: THERMOPLASTIC PAVEMENT MARKINGLINES (4", 90 MILS)

1. Measurement & Payment

Thermoplastic Pavement Marking Lines (4", 90 MILS) shall be measured and paid in accordance with NCDOT Standard Specifications section 1205.

GG. Pay Item 33: THERMOPLASTIC PAVEMENT MARKINGSYMBOL (90 MILS)

1. Measurement & Payment

Thermoplastic Pavement Marking Symbol (90 MILS) shall be measured and paid in accordance with NCDOT Standard Specifications section 1205.

HH. Pay Item 34: TEMPORARY MULCHING

1. Measurement & Payment

Temporary Mulching shall be measured and paid in accordance with NCDOT Standard Specifications section 1615.

II. Pay Item 35: SEED FOR TEMPORARY SEEDING

1. Measurement & Payment

Seed for Temporary Seeding shall be measured and paid in accordance with NCDOT Standard Specifications section 1620.

JJ. Pay Item 36: FERTILIZER FOR TEMPORARY SEED-ING

1. Measurement & Payment

Fertilizer for Temporary Seed-ing shall be measured and paid in accordance with NCDOT Standard Specifications section 1620.

KK. Pay Item 37: COIR FIBER MAT

1. Measurement

Coir Fiber Mat shall be measured as the square yards of mat installed over the duration of

the project.

2. Payment

The unit price for Coir Fiber Mat shall include full compensation for all labor, equipment, and materials required to install and maintain the mat as indicated in the plans.

LL. Pay Item 38: SPECIAL STILLING BASINS

1. Measurement & Payment

Special Stilling Basins shall be measured and paid in accordance with NCDOT Standard Specifications section 1639.

MM. Pay Item 39: COIR FIBER WATTLE

1. Measurement

Coir Fiber Wattle shall be measured as the number of wattles installed and maintained over the duration of the project.

2. Payment

The unit price for Coir Fiber Wattles shall include full compensation for all labor, equipment, and materials required to install and maintain the wattles as indicated in the plans for the duration of the project.

NN. Pay Item 40: SEEDING & MULCHING

1. Measurement & Payment

Seeding & Mulching shall be measured and paid in accordance with NCDOT Standard Specifications section 1660.

OO. Pay Item 41: IMPERVIOUS DIKE

1. Measurement

Impervious Dike shall be measured as the linear feet of dike installed and maintained over the duration of the project.

2. Payment

The unit price for Impervious Dike shall include full compensation for all labor, equipment, and materials required to install and maintain the dike as indicated in the plans for the duration of the project.

PP. Pay Item 42: CONCRETE WASHOUT STRUCTURE

1. Measurement

Concrete Washout Structure shall be measured as the number of washout structures installed and maintained over the duration of the project.

2. Payment

The unit price for Concrete Washout Structure shall include full compensation for all labor, equipment, and materials required to install and maintain the washout structures as indicated in the plans for the duration of the project.

QQ. Pay Item 43: PRECAST GRAVITY RETAINING WALLS

1. Measurement & Payment

Precast Gravity Retaining Wall shall be measured and paid in accordance with NCDOT Standard Specifications section 455.

RR. Pay Item 44: SKIMMER SEDIMENT BASIN

1. Measurement

There shall be no measurement for Skimmer Sediment Basin.

2. Payment

The unit price for Skimmer Sediment Basin shall include full compensation for all labor, equipment, and materials required to install and maintain the sediment basins as indicated in the plans for the duration of the project.

SS. Pay Item 45: HIGH HAZARD TEMPORARY SILT FENCE

1. Measurement

High Hazard Temporary Silt Fence shall be measured as the linear feet of fence installed and maintained over the duration of the project.

2. Payment

The unit price for High Hazard Silt Fence shall include full compensation for all labor, equipment, and materials required to install and maintain the fence as indicated in the plans.

TT. Pay Item 46: SILT FENCE OUTLET OPTION 2

1. Measurement

Silt Fence Outlet Option 2 shall be measured as the number of outlets installed and maintained over the duration of the project.

2. Payment

The unit price for Silt Fence Outlet Option 2 shall include full compensation for all labor, equipment, and materials required to install and maintain the outlets as indicated in the plans.

UU. Pay Item 47: STABILIZED CONSTRUCTION ENTRANCE

1. Measurement

Stabilized Construction Entrance shall be measured as the number of entrances installed and maintained over the duration of the project.

2. Payment

The unit price for Stabilized Construction Entrance shall include full compensation for all labor, equipment, and materials required to install and maintain the entrances as indicated in the plans.

VV. Pay Item 48: CATCH BASIN INLET PROTECTION

1. Measurement

Catch Basin Inlet Protection shall be measured as the number of inlet protections installed and maintained over the duration of the project.

2. Payment

The unit price for Catch Basin Inlet Protection shall include full compensation for all labor, equipment, and materials required to install and maintain the inlet protections as indicated in the plans.

WW. Pay Item 49: ROCK PIPE INLET SEDIMENT TRAP, TYPE B

1. Measurement

Rock Pipe Inlet Sediment Trap, Type B shall be measured as the number of sediment traps installed and maintained over the duration of the project.

2. Payment

The unit price for Rock Pipe Inlet Sediment Trap, Type B shall include full compensation for all labor, equipment, and materials required to install and maintain the sediment traps as indicated in the plans.

XX. Pay Item 50: TREE PROTECTION FENCE

1. Measurement

Tree Protection Fence shall be measured as the linear feet of fence installed.

2. Payment

The unit price for Tree Protection Fence shall include full compensation for all labor, equipment, and materials required to install and maintain the fence as indicated in the plans, for the life of the project. No payment will be made for additional fence installed, unless otherwise directed by the engineer.

YY. Pay Item 51: COMPREHENSIVE GRADING -TRAILHEAD-

1. Measurement

There shall be no measurement for Comprehensive Grading -Trailhead-.

2. Payment

The unit price for Comprehensive Grading -Trailhead- shall be full compensation for all work necessary complete the Trailhead grading as indicated in the plans. Clearing and Grubbing, Unclassified Excavation, Borrow Excavation, and Fine Grading are considered incidental to this item.

ZZ. Pay Item 52: COMPREHENSIVE GRADING -GREENWAY-

1. Measurement

There shall be no measurement for Comprehensive Grading -Greenway-.

2. Payment

The unit price for Comprehensive Grading -Greenway- shall be full compensation for all work necessary complete the Greenway grading as indicated in the plans. Clearing and Grubbing, Unclassified Excavation, Borrow Excavation, and Fine Grading are considered incidental to this item.

AAA. Pay Item 53: 6" REINFORCED CONCRETE

1. Measurement

Measurement of 6” Reinforced Concrete shall be per square yard of Reinforced Concrete incorporated into the work.

2. Payment

Unit price shall include full compensation for all labor, equipment, and materials required to install the 6” Reinforced Concrete as indicated on the plans.

BBB. Pay Item 54: 6" CONCRETE APRON FOR MOUNTAIN BIKE TRAIL

1. Measurement

Measurement of 6” Concrete Apron for Mountain Bike Trail shall be per square yard of Concrete Apron incorporated into the work.

2. Payment

Unit price shall include full compensation for all labor, equipment, and materials required to install the 6” Concrete Apron for Mountain Bike Trail as indicated on the plans.

CCC. Pay Item 55: HANDRAIL

1. Measurement

Handrail shall be measured as the number of linear feet of handrail incorporated into the work.

2. Payment

The unit price for Handrail shall include full compensation for all labor, equipment, and materials, including the cost of furnishing and an installing the handrail as indicated in the plans.

DDD. Pay Item 56: FARM FENCE

1. Measurement

Farm Fence shall be measured as the number of linear feet of fence incorporated into the work.

2. Payment

The unit price for Farm Fence shall include full compensation for all labor, equipment, and materials, including the cost of furnishing and an installing the fence as indicated in the plans.

EEE. Pay Item 57: CONCRETE CAP

1. Measurement

Measurement of Concrete Cap shall be per cubic yard of Concrete Cap incorporated into the work.

2. Payment

Unit price shall include full compensation for all labor, equipment, and materials required to install the Concrete Cap as indicated on the plans.

FFF. Pay Item 58: PERMANENT BOLLARD

1. Measurement

Permanent Bollard shall be measured as the number of individual bollards incorporated into the work.

2. Payment

The unit price for Permanent Bollard shall include full compensation for all labor, equipment, and materials, including the cost of furnishing and an installing the bollards as indicated in the plans.

GGG. Pay Item 59: COLLAPSIBLE BOLLARD

1. Measurement

Collapsible Bollard shall be measured as the number of individual bollards incorporated into the work.

2. Payment

The unit price for Collapsible Bollard shall include full compensation for all labor, equipment, and materials, including the cost of furnishing and an installing the bollards as indicated in the plans.

HHH. Pay Item 60: TEMPORARY STREAM CROSSING (MUD MAT)

1. Measurement

Temporary Stream Crossing (Mud Mat) shall be measured as the number of stream crossings installed and maintained over the duration of the project.

2. Payment

The unit price for Temporary Stream Crossing (Mud Mat) shall include full compensation for all labor, equipment, and materials required to install and maintain the stream crossing as indicated in the plans.

III. Pay Item 61: 15" FLARED-END SECTION

1. Measurement

Measurement of 15” Flared End Section shall be per each end section incorporated into the work.

2. Payment

The unit price for 15” Flared End Section shall include full compensation for all labor, equipment, and materials required to install the End Section as indicated on the plans.

JJJ. Pay Item 62: 2'-0" VALLEY GUTTER

1. Measurement

Measurement of 2’-0” Valley Gutter shall be per linear foot measured along the length of curb incorporated into the work.

2. Payment

Unit price shall include full compensation for all labor, equipment, and materials required to in-stall the Curb and Gutter as indicated on the plans.

KKK. Pay Item 63: TREE PIT W/ GRATE

1. Measurement

Tree Pit with Grate shall be measured as the number of individual tree pits incorporated into the work.

2. Payment

The unit price for Tree Pit with Grate shall include full compensation for all labor, equipment, and materials, including the cost of furnishing and an installing the tree pit as indicated in the plans.

LLL. Pay Item 64: CONCRETE WHEEL STOP

1. Measurement

Concrete Wheel Stop shall be measured as the number of individual wheel stops incorporated into the work.

2. Payment

The unit price for Concrete Wheel Stop shall include full compensation for all labor, equipment, and materials, including the cost of furnishing and an installing the wheel stop as indicated in the plans.

MMM. Pay Item 65: AS-CONSTRUCTED SURVEY

1. Measurement

There shall be no measurement for As-Constructed Survey.

2. Payment

The unit price for As-Constructed Survey shall be full compensation for all post-construction layout, surveying, staking, stakeout, supplemental surveying, and review necessary for the proper development of as-built drawings.

NNN. Pay Item 66: STORMWATER CONTROL MEASURE

1. Measurement

There shall be no measurement for Stormwater Control Measure.

2. Payment

The unit price shall include full compensation for all labor, equipment, and materials required to install the Stormwater Control Measure as indicated on the plans.

OOO. Pay Item 67: BOARDWALK #1 (50 LF)

1. Measurement

There shall be no measurement for Boardwalk #1 (50 LF).

2. Payment

The contract unit price for Boardwalk #1 (50 LF) shall include full compensation for all labor, equipment, and materials, including piles, pre-drilling for piles, dynamic pile testing for timber piles, protective surface treatments, spread footings (if needed), drilling of holes to accept bolts, plates, angles, bolts, nuts, washers, screws, other hardware, concrete decking, girders, joists, blocking, braces, joist hangers, timber caps, cross bracing, railing, timber back walls, and other items for the finished boardwalk.

PPP. Pay Item 68: BOARDWALK #2 (50 LF)

1. Measurement

There shall be no measurement for Boardwalk #2 (50 LF).

2. Payment

The contract unit price for Boardwalk #2 (50 LF) shall include full compensation for all labor, equipment, and materials, including piles, pre-drilling for piles, dynamic pile testing for timber piles, protective surface treatments, spread footings (if needed), drilling of holes to accept bolts, plates, angles, bolts, nuts, washers, screws, other hardware, concrete decking, girders, joists, blocking, braces, joist hangers, timber caps, cross bracing, railing, timber back walls, and other items for the finished boardwalk.

QQQ. Pay Item 69: BOARDWALK APPROACH RAIL

1. Measurement

The quantity of Boardwalk Approach Rail shall be paid by the number of approach rails installed as shown in the Plans. The total quantity of Approach Rail units shall be counted as each individual quadrant of the boardwalk that shows an approach rail system.

2. Payment

The unit price for Boardwalk Approach Rail shall include full compensation for all labor, materials, and equipment, including excavation, compacted stone or sand, forming, placing, finishing and curing of concrete, all screws, nuts, bolts, washers and their respective galvanization, timber members, timber treatment, and all other required items of work associated with the Boardwalk Approach Rail.

RRR. Pay Item 70: CONCRETE APPROACH SLAB

1. Measurement

The quantity of Concrete Approach Slab shall be paid by the number of approach slabs installed as shown in the Plans.

2. Payment

The unit price for Concrete Approach Slab will be full compensation for all items required to construct a Concrete Approach Slab, including the expansion joints at boardwalk terminals.

SSS. Pay Item 71: LANDSCAPING (BASE BID)

1. Measurement

There shall be no measurement for Landscaping (Base Bid).

2. Payment

Lump sum price for Landscaping (Base Bid) shall be fully inclusive and include full compensation for all labor, equipment, and materials required to install the landscape and complete the work as indicated in the L5 Series sheets within the drawings.

TTT. Pay Item 72: HARDSCAPING (BASE BID)

1. Measurement

There shall be no measurement for Hardscaping (Base Bid).

2. Payment

Lump sum price for Hardscape (Base Bid) shall be fully inclusive and include full compensation for all labor, equipment, and materials required to install the hardscape and complete the work as indicated on sheets L2-2 and L2-6, and per details on L4-1 and L4-7.

UUU. Pay Item 73: FURNISHINGS (BASE BID)

1. Measurement

There shall be no measurement for Furnishings (Base Bid).

2. Payment

Lump sum price for Furnishings (Base Bid) shall be fully inclusive and include full compensation for all labor, equipment, and materials required to install the furnishings and complete the work as indicated on sheets L2-2 and L2-6, and as identified on L4-2 through L4-3 and L4-7.

VVV. Pay Item 74: GEOTEXTILE FOR SOIL STABILIZATION

1. Measurement & Payment

Geotextile for Soil Stabilization shall be measured and paid in accordance with NCDOT Standard Specifications section 270.

WWW. Pay Item 75: ROCK PLATING

1. Measurement & Payment

Rock Plating shall be measured and paid in accordance with NCDOT Standard Specifications section 275.

XXX. Pay Item 76: MASONRY DRAINAGE STRUCTURES

1. Measurement & Payment

Masonry Drainage Structures (LF) shall be measured and paid in accordance with NCDOT Standard Specifications section 840.

YYY. Pay Item 77: SILT EXCAVATION

1. Measurement & Payment

Silt Excavation shall be measured and paid in accordance with NCDOT Standard Specifications section 1630.

ZZZ. Pay Item 78: 12” TEMPORARY PIPE

1. Measurement

Temporary pipe shall be measured per linear foot of pipe approved by the Engineer and measured in place from end to end.

2. Payment

The unit price for Temporary Pipe will be full compensation for all work covered including but not limited to furnishing all materials required for installation, construction, maintenance, and removal of temporary pipe.

AAAA. Pay Item 79: COIR FIBER WATTLE BARRIER

1. Measurement

Coir Fiber Wattle Barrier shall be measured as the actual number of linear feet of coir fiber wattle barrier installed and accepted.

2. Payment

The unit price for coir fiber wattle barrier will be full compensation for all work covered including but not limited to furnishing all materials, labor, equipment, and incidentals necessary to install the product.

BBBB. Pay Item 80: 18" FLARED-END SECTION

1. Measurement

Measurement of 18" Flared End Section shall be per each end section incorporated into the work.

2. Payment

The unit price for 18" Flared End Section shall include full compensation for all labor, equipment, and materials required to install the End Section as indicated on the plans.

CCCC. Pay Item 81: BUFFER MITIGATION PLANTING

1. Measurement

There shall be no direct measurement for Buffer Mitigation Planting.

2. Payment

Lump sum price for Buffer Mitigation Planting shall be fully inclusive and include full compensation for furnishing labor, equipment, materials, tools and other incidentals necessary to complete the work as indicated on sheet L1-1.

DDDD. Pay Item 82: FITNESS STATIONS (LANDSCAPING, HARDSCAPING, & FURNISHINGS)

1. Measurement

There shall be no direct measurement for Fitness Stations (Landscaping, Hardscaping & Furnishings).

2. Payment

Lump Sum price for Fitness Stations (Landscaping, hardscaping, and furnishings) shall be fully inclusive and include full compensation for all labor, equipment, and materials required to install the Fitness Stations and complete the work as indicated on sheets L2-3 through L2-6, per details on L4-1, and L4-4 through L4-6, and on sheets L5-5 and L5-7.

EEEE. Pay Item 83: SHADE STRUCTURE PAVILION (LANDSCAPING, HARDSCAPING, & FURNISHINGS)

1. Measurement

There shall be no direct measurement for Shade Structure Pavilion (Landscaping, Hardscaping & Furnishings).

2. Payment

Lump Sum price for Shade Structure Pavilion (Landscaping, hardscaping, & furnishings) shall be fully inclusive and include full compensation for all labor, equipment, and materials required to install the Shade Structure and complete the work as indicated on sheets L2-3, per details on L4-1 and L4-7, and on sheets L5-3 and L5-7.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012950

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Consultant will chair and conduct project meetings and compile an agenda for each meeting throughout the construction period.

B. This Section includes administrative provisions for coordinating construction operations on the Project including, but not limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Coordination Drawings.
4. Administrative and supervisory personnel.
5. Project meetings.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1, of the Technical Specifications Section 013200 "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.

2. Division 1, of the Technical Specifications Section 017300 "Execution" for procedures for coordinating general installation and field- engineering services, including establishment of benchmarks and control points.

3. Division 1, of the Technical Specifications Section 017700 "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in various Sections of the Technical Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components.

2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

B. If necessary, the Consultant shall prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.

1.5 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.

2. Agenda: The Consultant shall prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes:

   a. The Consultant will compile minutes of each project meeting and will distribute copies to the Contractor and required copies to the Owner.
   b. Recipients of copies may make and distribute such other copies as they wish.

4. Attendance:

   a. To the maximum extent practical, assign the same person or persons to represent the Contractor at the project meetings throughout progress of the Work.
   b. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.

5. Minimum agenda:

   a. Review, revise as necessary, and approve minutes of previous meetings.
   b. Review progress of the Work since last meeting, including status of submittals for approval.
   c. Identify problems which impede planned progress.
   d. Develop corrective measures and procedures to regain planned schedule.
   e. Complete other current business.

B. Pre-construction Conference: Schedule a pre-construction conference before starting construction, at a time convenient to Owner and Consultant, but no later than fourteen (14) days after execution of the Construction Contract. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Consultant, and their consultants; Contractor and its superintendent; major subcontractors and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing.
    d. Designation of responsible personnel.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for processing Applications for Payment.
    g. Distribution of the Contract Documents.
    h. Submittal procedures.
    i. Preparation of Record Documents.
    j. Use of the premises.
    k. Responsibility for temporary facilities and controls.
    l. Parking availability.
    m. Office, work, and storage areas.
    n. Equipment deliveries and priorities.
    o. Security.
    p. Working hours.

C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Consultant of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related Change Orders.
    d. Purchases.
    e. Deliveries.
    f. Submittals.
    g. Review of mockups.
    h. Possible conflicts.
    i. Time schedules.
    j. Weather limitations.
    k. Manufacturer’s written recommendations.
    l. Temporary facilities and controls.
    m. Space and access limitations.
    n. Regulations of authorities having jurisdiction.
    o. Testing and inspecting requirements.
    p. Required performance results.
    q. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Attendees: Representatives at the meeting shall be the Owner, Consultant, Subcontractors, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

1. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

2. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

3. Review present and future needs of each entity present, including the following:

   a. Interface requirements.
   b. Sequence of operations.
   c. Status of submittals.
   d. Deliveries.
   e. Access.
   f. Work hours.
   g. Hazards and risks.
   h. Review of Record Drawings
   i. Review of construction defects that has been identified by the Consultant

4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

   a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Daily construction reports.
5. CPM Reports

B. Related Sections include the following:

1. Division 1, of the Technical Specifications Section 012900 "Payment Procedures" for submitting the Schedule of Values.
2. Division 1, of the Technical Specifications Section 013100 "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 1, of the Technical Specifications Section 013300 "Submittal Procedures" for submitting schedules and reports.
4. Division 1, of the Technical Specifications Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.
5. Division 1, of the Technical Specifications Section 017700 "Closeout Procedures" for Project Record Documents at Project closeout.

1.3 SUBMITTALS

A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Consultants and owners, and other information specified. The date shall be submitted for any change of construction personal.

B. Preliminary Construction Schedule: Submit one (1) printed copy; one a single sheet, of the Preliminary Construction Schedule.

C. Contractor's Construction Schedule: Submit one (1) printed copy of initial schedule, large enough to show entire schedule for entire construction period.

1. If required, submit an electronic copy of schedule, using software indicated, on a CD and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

D. Daily Construction Reports: Submit one (1) copy at monthly intervals.

E. Submittals Schedule: Submit one (1) copy of schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Of the Technical Specifications Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Consultant's final release or approval.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and daily construction reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first sixty (60) days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

    a. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.

        i. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed, through the date of Substantial Completion and Final Completion.

1. Contract completion date shall not be changed, unless specifically authorized by Change Order.
2. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
3. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Consultant's administrative procedures necessary for certification of Substantial Completion.

B. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in the schedule and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Environmental control.

3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Submittals.
    b. Purchases.
    c. Mockups.
    d. Fabrication.
    e. Sample testing.
    f. Deliveries.
    g. Installation.
    h. Tests and inspections.
    i. Startup and placement into final use and operation.

C. Milestones: If not included in the Construction Documents, milestones shall be indicated in the Construction Schedule for the Consultant's and Owner's approval and shall be reference points of the construction progress.

D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.

2.1 PRELIMINARY CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: If requested, submit preliminary horizontal bar-chart- type construction schedule within seven (7) days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first sixty (60) days of construction. Include skeleton diagram for the remainder of the Work.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Consultant, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

B. Related Sections include the following:

1. Division 1, of the Technical Specifications Section 012900 "Payment Procedures" for submitting Applications for Payment.
2. Division 1, of the Technical Specifications Section 013100 "Project Management and Coordination" for submitting Coordination Drawings.
3. Division 1, of the Technical Specifications Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals.
4. Division 1, of the Technical Specifications Section "Quality Requirements" for test and inspection reports and Delegated-Design Submittals and for erecting mockups.
5. Division 1, of the Technical Specifications Section 017700 "Closeout Procedures" for submitting warranties Project Record Documents and operation and maintenance manuals.
6. Division 1, of the Technical Specifications Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Consultant's responsive action.

B. Informational Submittals: Written information that does not require Consultant's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. The Contractor shall provide the submittals as required by the Consultant's Submittal Log and the Contract Documents.

B. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Consultant for Contractor's use in preparing submittals.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Consultant reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

D. Submittals Schedule: Comply with requirements in Division 1, of the Technical Specifications Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities. (Submittal Log)

E. Processing Time: Allow enough time for submittal review, including time for re- submittals, as follows. Time for review shall commence on Consultant's receipt of submittal.

1. Initial Review: Allow seven (7) days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Consultant will advise Contractor when a submittal being processed must be delayed for coordination.
2. Concurrent Review: Where concurrent review of submittals by Consultant's consultants, Owner, or other parties is required, allow twenty-one (21) days for initial review of each submittal.
3. If intermediate submittal is necessary, process it in same manner as initial submittal.
4. Allow seven (7) days for processing each re-submittal.
5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

F. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Consultant.

3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Consultant.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Unique identifier, including revision number.
    i. Number and title of appropriate Technical Specifications Section.
    j. Drawing number and detail references, as appropriate.
    k. Other necessary identification.

G. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

H. Additional Copies: Unless additional copies are required for final submittal, and unless Consultant observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Consultant.
2. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.

I. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Consultant will return submittals, without review, received from sources other than Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Consultant on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
3. Transmittal Form: Use on form to be defined by the Consultant.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals with mark indicating action taken by Consultant in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Number of Copies: Submit 6 copies of each submittal, unless otherwise indicated. Consultant will return 5 copies. Mark up and retain three returned copy as a Project Record Document.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operating and maintenance manuals.
k. Compliance with recognized trade association standards.
l. Compliance with recognized testing agency standards.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.
o. Manufacturer’s location.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams and existing conditions.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.

i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
4. Number of Copies: Submit 3 blue- or black-line prints and one (1) electronic file of each submittal, print will be required for operation and maintenance manuals. Consultant will retain two prints; remainder will be returned.

D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."

E. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups. Verify the samples are true presentation of the materials to be used.
2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Consultant's sample where so indicated. Attach label on unexposed side that includes the following:

a. Generic description of Sample.
b. Product name or name of manufacturer.
c. Sample source.

4. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:

a. Size limitations.
b. Compliance with recognized standards.
c. Availability.
d. Delivery time.

5. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.

a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations. The consultant will return submittal with the option selected.
b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

F. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.

G. Delegated-Design Submittal: Comply with requirements in Division 1 Section "Quality Requirements."

H. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

I. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."

J. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."

K. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Consultant will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

B. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

C. Qualification Data: If requested, prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Consultants and owners, and other information specified.

D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

I. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation for the application.

J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

K. Coordinate individual Specification Sections with paragraph below by including specific model code organization in that Section. If all are same, insert name below. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures Operation and Maintenance Data."

L. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

M. Manufacturer's Field Reports: Prepare written information documenting factory- authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

N. Construction Photographs: Comply with requirements in Division 1 Section "Construction Progress Documentation”

O. Material Safety Data Sheets: Submit two copies for the Consultant and the Owner and keep a copy at the job site. Post warning signs when appropriate.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Consultant.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 CONSULTANT'S ACTION

A. General: Consultant will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Consultant will review each submittal, make marks to indicate corrections or modifications required, and return it. Consultant will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

C. Informational Submittals: Consultant will review each submittal and will not return it or will reject and return it if it does not comply with requirements. Consultant will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded unless a justification is also submitted.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's quality- control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Consultant, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1, of the Technical Specifications Section 013200 "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Division 1, of the Technical Specifications Section 017310 "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
3. Divisions 2 through 33, of the Technical Specifications Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction comply with requirements. Services do not include contract enforcement activities performed by Consultant.

C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 SUBMITTALS

A. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Technical Specifications Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent for a second option.

F. Testing Qualifications

1.6 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.

C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1. Testing agency will notify Consultant and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Consultant with copy to Contractor and to authorities having jurisdiction.
3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
5. Testing agency will retest and re-inspect corrected work.

D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services as requested by the Consultant at the Contractor's expense, including retesting and re-inspecting, for construction that revised or replaced Work, at the Contractor's expense, that failed to comply with requirements established by the Contract Documents.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field-curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality- assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within thirty (30) days of date established for the Notice to Proceed.

1. Distribution: Distribute schedule to Owner, Consultant, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Division 1, of the Technical Specifications Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

C. Temporary utilities include, but are not limited to, the following:

1. Water service and distribution.
2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
3. Ventilation.
4. Electric power service.
5. Lighting as required.

D. Support facilities include, but are not limited to, the following:

1. Project identification and temporary signs.
2. Waste disposal facilities.

E. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Security enclosure and lockup.
3. Temporary traffic control.
4. Utility pole protection.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Consultant, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary enclosures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Consultant and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. Testing agencies.
2. Personnel of authorities having jurisdiction.
3. Consultant.
4. Sub-Contractor.
5. Any additional Owner provided Contractor.

B. Water Service: Pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site.

C. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site.

1.5 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure and the requirements of the local Governing agency. Contractor to supply a minimum of 1 fire extinguisher on site at all times.

C. Self-Contained Toilet Units: Single-occupant units of chemical or aerated recirculation or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

D. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

E. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

F. Other Controls:
1. Temporary Traffic Control – Cones or similar devices to be located along driveway during construction to prevent unauthorized access.
2. Portable Concrete Barrier - to be located per plans to prevent unauthorized encroachment into Duke Transmission structures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.

3. If existing easements cannot be used, the Contractor shall consult and coordinate with the Consultant and Owner to secure as necessary to obtain the temporary easement. Add provisions for work not in the Contract but served by temporary facilities if required.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations as required. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
4. Drinking-Water Facilities: Provide drinking-water.

C. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear as required.

D. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: If required, Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Maintain support facilities until approved by the Consultant to be removed.
3. Parking: Parking areas for construction personnel shall be in the existing parking lot onsite.

B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with “Construction and Demolition Waste Management Recycling. Placement of Dumpster/Sanitary Facilities shall only be in locations designated in the Contract Drawings.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Storm water Control: Comply as indicated on the erosion control plan/measures before any earth disturbing activities start.

C. Traffic control: Install and maintain any traffic control devices in compliance with NCDOT 2024 Standard Specifications.

D. Utility pole protection: Install portable concrete barrier to protect utility poles as shown on plans.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1, of the Technical Specifications Section "Closeout Procedures.

END OF SECTION 015000

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2018 Standard Specifications are incorporated by reference.

C. Town of Huntersville Standard Drawings are incorporated by reference.

D. North Carolina Erosion and Sediment Control Planning and Design Manual (NCESCPDM) incorporated by reference.

1.2 SUMMARY

A. The Work of this Section Includes: General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for temporary controls, utilities, support facilities, and temporary site fencing.
2. Section 311000 "Site Clearing" for removing existing trees and shrubs.
3. Section 312500 “Erosion and Sedimentation Control” for other additional erosion and sedimentation control measures.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.

B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches above the ground line.

C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

    a. Construction schedule.
    b. Tree-service firm's personnel and equipment needed to make progress and avoid delays.
    c. Enforcing requirements for protection zones.
    d. Arborist's responsibilities.
    e. Quality-control program.
    f. Coordination of Work and equipment movement with the locations of protection zones.
    g. Trenching by hand or with air spade within protection zones.
    h. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data:

1. General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction

B. Shop Drawings:

1. Include plans showing trees and plants to be protected, locations of protection-zone fencing and signage, and the relationship between equipment-movement routes and material storage locations with protection zones.
2. Indicate extent of utility boring and trenching by hand or with air spade within protection zones.

C. Tree-Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

D. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For arborist and tree service firm.

B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction in accordance with recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

E. Quality-control program.

1.7 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA and Licensed in jurisdiction where Project is located.

B. Tree-Service Firm Qualifications: An experienced tree-service firm that has successfully completed temporary tree- and plant-protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection-zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.8 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

D. Take precautions to protect plants from airborne contaminants, such as paint or fireproofing overspray.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other non-soil materials.

1. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.
2. Stockpiled topsoil from project site and imported or manufactured topsoil complying with ASTM D 5268.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

C. Protection-Zone Fencing (Tree Protection Fence, Bid Item #52): Fencing fixed in position and meeting the following requirements:

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches apart.

    a. Height: 48 inches.
    b. Color: High-visibility orange, nonfading.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:

1. Size and Text: As indicated on Drawings.

2. Lettering: 3-inch-high minimum, black characters on white background.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 TREE PROTECTION

A. Tree-Protection Zones: Mulch areas inside tree-protection zones. Do not exceed indicated thickness of mulch.

1. Apply 4-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.

3.4 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Designer.
2. Plastic Fencing: Stretch fabric taut and secure to posts without bows or sags.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Designer. Install one sign spaced approximately every 50 ft. on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Maintain hydration of plants to assure plant survival.

E. Maintain protection-zone fencing and signage in good condition as acceptable to Designer and remove when construction operations are complete, and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.5 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones in accordance with requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow tine spading forks to comb soil and expose roots.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.6 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.
3. Temporarily support and protect roots from damage until they are permanently covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible in accordance with requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.7 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees in accordance with ANSI A300 (Part 1).

    a. Type of Pruning: Cleaning, raising, reducing, and thinning.
    b. Specialty Pruning: Structural, restoration, vista, and utility.

B. Unless otherwise directed by arborist and acceptable to Designer, do not cut tree leaders.

C. Cut branches with sharp pruning instruments; do not break or chop.

D. Do not paint or apply sealants to wounds.

E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

F. Chip removed branches and dispose of off-site.

3.8 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.9 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.10 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Designer.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours in accordance with arborist's written instructions.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Designer.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Designer determines are incapable of restoring to normal growth pattern.

1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 4 inches or smaller in caliper size.
2. Large Trees: Provide one new tree of 4-inch caliper size for each tree being replaced that measures more than 4 inches in caliper size.

    a. Species: same as those being replaced.

3. Plant and maintain new trees as specified in Section 329300 "Plants."

C. Soil Aeration: Where directed by Designer, aerate surface soil compacted during construction. Aerate 10 ft. beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

END OF SECTION 015639

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility Products salvaged or recycled from other projects are not considered new products.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Form: Tabulate information for each product under the following column headings:

    a. Specification Section number and title.
    b. Generic name used in the Contract Documents.
    c. Proprietary name, model number, and similar designations.
    d. Manufacturer's name and address.
    e. Supplier's name and address.
    f. Installer's name and address.

g. Projected delivery date or time span of delivery period.
h. Identification of items that require early submittal approval for scheduled delivery date.

3. Initial Submittal: Within thirty (30) days after date of commencement of the Work, submit three (3) copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
4. Completed List: Within sixty (60) days after date of commencement of the Work, submit one (1) copy of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
5. Consultant's Action: Consultant will respond in writing to Contractor within fifteen (15) days of receipt of completed product list. Consultant's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Consultant's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Mobilization and Construction layout.
2. Field engineering and surveying.
3. Progress cleaning.
4. Starting and adjusting.
5. Protection of installed construction.
6. Correction of the Work.

B. Related Sections include the following:

1. Division 1, of the Technical Specifications Section 013100 "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 1, of the Technical Specifications Section 013300 "Submittal Procedures" for submitting surveys.
3. Division 1, of the Technical Specifications Section 017310 "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
4. Division 1, of the Technical Specifications Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
5. Division 1, of the Technical Specifications Section “Construction Waste Management” method of disposal of construction waste.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility, Owner, and Consultant that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

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

1. Notify Consultant, Owner, adjacent property owners not less than two (2) days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Consultant's and Owner's written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Consultant. Include a detailed description of problem encountered, together with recommendations for modifications of the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Consultant promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Consultant when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
7. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
8. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
9. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Consultant.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Consultant. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Consultant before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations. Dispose of material accordance to Division 1, Section “Construction Waste Management”.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

1. Thoroughly clean surfaces and similar features before applying paint or other finishing materials.

H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration until Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturers written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017000

SECTION 017310 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Divisions 2 through 33 of the Technical Specifications Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-protection systems.
4. Control systems.
5. Communication systems.
6. Conveying systems.
7. Electrical wiring systems.
8. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or those results in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1. If possible, retain original Installer or Fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or Fabricator, engage another recognized, experienced, and specialized firm.

a. Processed concrete finishes.
b. Stonework and stone masonry.
c. Ornamental metal.
d. Matched-veneer woodwork.
e. Preformed metal panels.
f. Roofing.
g. Firestopping.
h. Window wall system.
i. Stucco and ornamental plaster.
j. Terrazzo.
k. Finished wood flooring.
l. Fluid-applied flooring.
m. Aggregate wall coating.
n. Wall covering.
o. Swimming pool finishes.
p. HVAC enclosures, cabinets, or covers.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of the Technical Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of the Technical Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
6. Fire Rated Assembly: If fire rated assembly is cut, damaged or modified as part of this project, patch or repair fire rated assembly with the correct materials to preserve the assembly’s fire rating.

END OF SECTION 329300

SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this section shall be bound by the documents and general provisions of the Contract, including the General and Supplementary Conditions, Division 00 Procurement and Contracting Requirements and Division 01 General Requirements in their entirety.

1.2 DESCRIPTION

A. The Owner has established that this Project shall include proactive measures for waste management participation by all parties to the contract.

1. The purpose of this program is to ensure that during the course of the Project all diligent means are employed to pursue practical and economically feasible waste management and recycling options.
2. Upon award, each subcontractor shall be required to furnish documentation from suppliers or manufacturers regarding waste management and recycling options for those products and procedures furnished.
3. Waste disposal to landfills shall be minimized.

B. Definitions:

1. Waste: Any material that has reached the end of its intended use. Waste includes salvageable, returnable, recyclable and reusable material.
2. Construction waste: Solid wastes including, but not limited to, building materials, packaging materials, debris and trash resulting from construction operations.
3. Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.
4. Hazardous waste: Any material or byproduct of construction that is regulated by the Environmental Protection Agency and that may not be disposed in any landfill or other waste end-source without adherence to applicable laws.
5. Trash: Any product or material unable to be returned, reused, recycled or salvaged.
6. Landfill: Any public or private business involved in the practice of trash disposal.
7. Waste Management Plan: A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site.

1.3 SUBMITTALS:

A. Project Information:

1. Contractor's Construction Waste Management Plan.

1.4 CONSTRUCTION WASTE MANAGEMENT PLAN

A. Waste Management Plan shall include the following:

1. Solid Waste Disposal and Diversion document.

a. Identification of materials recycled.
b. Identification of materials landfill.
c. Identification of hazardous wastes and disposal.

2. Locations of sorting and waste storage facilities on Site Plan of project.

3. Final documentation of subcontractor/supplier waste management/recycling data.

4. Final documentation of hazardous waste disposal plan.

B. Construction Waste Management Plan Implementation:

1. The Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and documenting the Waste Management Plan.
2. The "Summary of Construction Waste/Recycling" shall be completed each month and submitted as part of Application For Payment.

a. All materials identified in the Summary shall be reported by weight.
b. Where weight is not applicable, Contractor shall report materials by units applicable to material recipient.
c. Contractor shall procure receipts or other validation of waste management procedures and include them as part of the submittal.

3. The Contractor shall distribute copies of the "Summary of Construction Waste / Recycling" to the Consultant, Owner and each subcontractor involved in the plan.
4. The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse and return methods to be used by all parties at appropriate stages of the Work.
5. Separation facilities:

a. Contractor shall define specific areas to facilitate separation of materials for recycling, salvage, re-use or return.
b. Recycle and waste bin areas are to be maintained in an orderly manner and clearly marked to avoid contamination of materials.
c. Do not mix recyclable materials.
d. Store hazardous wastes in secure areas.

6. Hazardous wastes:

   a. Hazardous wastes shall be separated, stored and disposed of in accordance with local and EPA regulations and additional criteria listed below:

      1) Building products manufactured with PVC or containing chlorinated compounds shall not be incinerated
      2) Disposal of fluorescent tubes to open containers is not permitted.
      3) Unused fertilizers shall not be co-mingled with construction waste.

C. Program profits:

   1. All profits from recycling of construction waste shall be granted to the Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017419

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Project As-Builts Documents.
3. Operation and maintenance manuals.
4. Warranties.
5. Instruction of Owner's personnel.
6. Final cleaning.

B. Related Sections include the following:

1. Division 1, of the Technical Specifications Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 1, of the Technical Specifications Section 013200 "Construction Progress Documentation" for submitting Final Completion construction photographs and negatives.
3. Division 1, of the Technical Specifications Section 017000 "Execution Requirements" for progress cleaning of Project site.
4. Division 1, of the Technical Specifications Section 017419 “Construction Waste Management” method of disposal of construction waste.
5. Division 1, of the Technical Specifications Section 017839 “Project Record Documents”.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: The Contractor shall, before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, “As-Builts” drawings operation and maintenance manuals.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Complete startup testing of systems.
8. Submit test/adjust/balance records.
9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
10. Advise Owner of changeover in heat and other utilities.
11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
12. Complete final cleaning requirements, including touchup painting.
13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Consultant will either proceed with inspection or notify Contractor of unfulfilled requirements. Consultant will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Consultant, that must be completed or corrected before certificate will be issued. The Consultant’s Substantial Completion list is composed by verification of the punch list submitted by the Contractor and any additional defects in the work observed by the Consultant.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1, of the Technical Specifications Section "Payment Procedures."
2. Submit certified copy of Consultant's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Consultant. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes if required.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Consultant will either proceed with inspection or notify Contractor of unfulfilled requirements. Consultant will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. The Contactor shall take immediate steps to correct the stated deficiencies, and send a written notice to the Consultant, certifying the Project is complete, at which time the Consultant will re-inspect the Work. This review and additional reviews by the Consultant where the Work is not considered Substantial Completion or Final Completion will be considered an additional service from the Consultant. The Contractor will be charged for these additional services incurred by such failure including travel time, observation time, and administrative time at the Consultant's hourly rate, as well as all expenses associated with the distribution of a written notice stating the reasons for failure to reach final completion.
3. In the event the Contractor is granted Substantial Completion by the Consultant and the Contractor fails to complete and/or correct all of the items listed in the Substantial Completion within thirty (30) calendar days of the date of Substantial Completion, the liquated damages shall start to accrued until all of the items on the Substantial Completion list are completed and/or corrected and have been approved by the Consultant.
4. If the Consultant is required to make more than two (2) inspections for the project to achieve Substantial Completion, the Contractor shall pay for the Consultant's time and expenses.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit one (1) copy of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, use the room number as indicated on the drawings and on the exterior areas include a location diagram indicating the defects.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Consultant.
    d. Name of Contractor.
    e. Page number.

1.6 PROJECT RECORD DOCUMENTS

A. The Contractor shall provide Project Record Documents, O&M, “As-Builts” Drawings, and Warrantees as indicated in Division 1, of the Technical Specifications Section “Project Record Documents.”

1.7 WARRANTIES

A. Submittal Time: Submit written warranties on request of Consultant for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within fifteen (15) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

D. Provide copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision- obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
s. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 01781 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. As-Built Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Sections include the following:

1. Division 1, of the Technical Specifications, Section 017700 "Closeout Procedures" for general closeout procedures.
2. Divisions 2 through 33, of the Technical Specifications, Sections for specific requirements for Project Record Documents of products in those Sections.

1.3 SUBMITTALS

A. As-Built Drawings: Comply with the following:

1. Number of Copies: Submit three (3) sets of marked-up As-Built Drawings to the Consultant for the Consultant to prepare the Record Drawings.

B. Record Specifications: Submit three (3) copies of Project's marked up Specifications, including addenda and contract modifications.

C. Record Product Data: Submit three (3) copies of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 AS-BUILT DRAWINGS

A. As-Built Drawings: Maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark As-Built Drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up As-Built Drawings.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an understandable drawing technique.
    c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Consultant's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.
    o. Clarification Drawings.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
7. Identify and date each As-Builts Drawing; include the designation "PROJECT AS-BUILTS DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

B. Newly Prepared As-Built Drawings: Prepare new Drawings instead of preparing As- Built Drawings where Consultant determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting a substitution or other modification.
2. Consult with Consultant for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared As-Built Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, As-Built Drawings, and Product Data where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, As-Built Drawings, and Product Data where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other of the Technical Specifications Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Consultant's reference during normal working hours.

END OF SECTION 017839

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 012950 "Measurement and Payment."

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site as part of the overall project pre-construction meeting.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

2. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction joints, control joints, isolation joints, and joint-filler strips.
c. Semirigid joint fillers.
d. Vapor-retarder installation.
e. Anchor rod and anchorage device installation tolerances.

f. Cold and hot weather concreting procedures.
g. Concrete finishes and finishing.
h. Curing procedures.
i. Forms and form-removal limitations.
j. Shoring and reshoring procedures.
k. Methods for achieving specified floor and slab flatness and levelness.
l. Floor and slab flatness and levelness measurements.
m. Concrete repair procedures.
n. Concrete protection.
o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
p. Protection of field cured field test cylinders.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement
7. Aggregates.
8. Admixtures:

a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

9. Fiber reinforcement.
10. Vapor retarders.
11. Floor and slab treatments.
12. Liquid floor treatments.
13. Curing materials.
14. Joint fillers.
15. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.

9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Curing process.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.
4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.

11. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor to be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Field Quality-Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests to be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.
f. Permeability.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I, gray.
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, portland blast-furnace slag cement.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.
8. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

F. Water and Water Used to Make Ice: ASTM C94/C94M, potable

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Sheet Vapor Retarder, Class C: ASTM E1745, Class C; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

C. Sheet Vapor Retarder/Termite Barrier: ASTM E1745, Class A, except with maximum water-vapor permeance of 0.03 perms; complying with ICC AC380. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Low-Temperature Flexibility: Pass at minus 15 deg F; ASTM D146/D146M.
2. Puncture Resistance: 224 lbf minimum; ASTM E154/E154M.
3. Water Absorption: 0.1 percent weight-gain maximum after 48-hour immersion at 70 deg F ; ASTM D570.
4. Hydrostatic-Head Resistance: 231 feet minimum; ASTM D5385.

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F: Black.
b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
c. Ambient Temperature Above 85 deg F: White.

D. Curing Paper: 8-feet- wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

E. Water: Potable or complying with ASTM C1602/C1602M.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.

4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
5. Use permeability-reducing admixture in concrete mixtures where indicated.

2.7 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 F0
2. Minimum Compressive Strength: 3500 psi at 28 days.
3. Maximum w/cm: 0.50.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Slump Flow Limit: 22 inches, plus or minus 1.5 inches
6. Air Content:

    a. Exposure Class F1: 5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size] 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size.

7. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.4 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.

a. Continue reinforcement across construction joints unless otherwise indicated.
b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.6 FINISHING FORMED SURFACES

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing.

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

F. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
b. Remove projections larger than 1 inch (25 mm).
c. Tie holes do not require patching.
d. Surface Tolerance: ACI 117 Class D.
e. Apply to concrete surfaces.

3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.8 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

3.9 TOLERANCES

A. Conform to ACI 117.

3.10 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s).
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.

a. Limit cut depth to 3/4 inch.
b. Make edges of cuts perpendicular to concrete surface.
c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
d. Fill and compact with patching mortar before bonding agent has dried.
e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

4. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

    a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    b. Dampen cleaned concrete surfaces and apply bonding agent.
    c. Place patching mortar before bonding agent has dried.
    d. Compact patching mortar and finish to match adjacent concrete.
    e. Keep patched area continuously moist for at least 72 hours.

D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

E. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

    a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

        1) Project name.
        2) Name of testing agency.
        3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
        4) Name of concrete manufacturer.
        5) Date and time of inspection, sampling, and field testing.
        6) Date and time of concrete placement.
        7) Location in Work of concrete represented by samples.
        8) Date and time sample was obtained.
        9) Truck and batch ticket numbers.
        10) Design compressive strength at 28 days.
        11) Concrete mixture designation, proportions, and materials.
        12) Field test results.

13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

C. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

3. Slump Flow: ASTM C1611/C1611M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

    a. One test hourly when air temperature is 40 deg F and below or 80 deg Fand above, and one test for each composite sample.

6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:

    a. Cast and laboratory cure two sets of two 6-inch by 12-inch cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C39/C39M.

    a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
    b. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi , or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

12. Additional Tests:

    a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.13 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wood products.
2. Wood-preservative-treated lumber.
3. Dimension lumber.
4. Miscellaneous lumber.

B. Related Requirements:

1. Section 012950 "Measurement and Payment."
2. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete header serving as edge restraint for unit pavers.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 6 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers Association.
2. SPIB: The Southern Pine Inspection Bureau.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

1.5 QUALITY ASSURANCE

A. Forest Certification: Provide dimensional lumber materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria":

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Dimension Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1, Use categories as follows:

1. UC3A (All Other Commodity Specifications): Coated products excluding sawn products in exterior construction not in contact with ground, exposed to all weather cycles but protected from liquid water. Include all rough carpentry.

2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat all rough carpentry unless otherwise indicated.

2.3 DIMENSION LUMBER

A. Posts, Beams, Rafters, and Purlins:

1. White Cedar; Select Structural No. 1 grade; NeLMA.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

B. For items of dimension lumber size, provide No. 2 grade lumber with 19 percent maximum moisture content and the following species:

1. Mixed southern pine; SPIB.

C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners as follows:
   a. Framing members (joists, beams, blocking) – fasteners with hot-dip zinc coating complying with ASTM A 153
   b. Decking – fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.6 METAL FRAMING ANCHORS

A. Joist Hangers: As indicated.

B. Top Flange Hangers: As indicated with tabs bent to extend over and be fastened to supporting member.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Do not splice structural members between supports, unless otherwise indicated.

D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

H. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

I. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with indicated fastener patterns where applicable. Before fastening decking, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 310519 - GEOTEXTILES AND GEOGRID

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install all Geotextiles and Geogrids including all necessary and incidental items as detailed or required for the Contractor to complete the installation in accordance with the Drawings and these Specifications.

B. Filter fabric, as called out on plans, shall meet the requirements of geotextiles as specified in this section.

C. Geogrid and geotextile shall be installed at locations shown on plans and as specified by the Engineer. Geogrid or geotextile shall be installed at undercut locations as directed by the Engineer.

1.02 SUBMITTALS

A. Prior to shipping to the site, the Contractor shall submit to the Engineer copies of mill certificates or affidavits signed by a legally authorized official of the Manufacturer for each type of Geotextile and Geogrid.

1. The mill certificate or affidavit shall attest that the Geotextile and Geogrid meet the chemical, physical, and manufacturing requirements stated in the specifications.

2. Deviations shall be identified and numerated.

B. The Contractor shall submit a 1 yard square sample of each Geotextile and Geogrid he proposes to use, seamed and unseamed as appropriate.

1 The samples shall be labeled with the manufacturer's lot number, machine direction, date of sampling, project number, specifications, manufacturer, and product name.

PART 2 -- MATERIALS

2.01 MATERIALS

A. Filter Fabric below stone and in other areas shall be a nonwoven, needle punched, synthetic Geotextile fabric.

1. Physical properties of Filter Fabric shall meet the requirements of Type 2, Table 1056-1 of NCDOT Specifications.

B. Fabric for Soil Stabilization shall be a synthetic Geotextile fabric that conforms to Section 1056 of the NCDOT Specifications.

1. Physical properties of Fabric for Soil Stabilization shall meet the requirements of Type 4, Table 1056-1 of NCDOT Specifications.

C. Separator Fabric shall be a synthetic woven geotextile fabric resistant to naturally occurring chemicals, alkalis, and acids.

1. The fabric filaments or yarns shall form a stable network such that dimensional stability of filaments or yarns is retained relative to each other, including selvages.

2. Permittivity shall be 0.02 sec^{-1}.

3. Separator Fabric shall meet the following criteria:

a.	Apparent Opening Size	0.60 mm max
b.	Ultraviolet Stability (after 500 hrs)	50%
c.	Strength	
1).	Grab Tensile Strength	180 pounds[1]
2).	Tear Strength	67 pounds[1]
3).	Puncture Strength	67 pounds[1]
4).	Burst Strength	300 psi[1]

[1] Maximum Elongation less than 50%

D. Geogrid reinforcement fabric shall be polymer grid Geogrid structure.

1. Geogrid shall be specifically manufactured for use as a soil reinforcement.

2. Geogrid shall have high tensile strength in two perpendicular directions.

3. Geogrid shall be U.V. stabilized, capable of withstanding direct exposure to sunlight for not less than 120 days.

a. Geogrid shall exhibit no measurable deterioration when measured by ASTM D 4355.

4. Evaluation of Geogrid shall be based upon testing of the total structure, not simply by adding the values of the individual components.

5. Geogrid shall meet the following criteria.

d.	Aperture size	0.75 to 1.0 inches
e.	Open area	70% minimum
f.	Strength	
1).	at 2% strain	280 foot pounds
2).	at 5% strain	580 foot pounds
3).	In machine and cross machine directions, no offset allowance or preloading permitted.	
4).	Secant aperture stability	3.2 by in-plane rotation

E. Geotextile for drainage shall meet the specifications outlined in NCDOT 2018 Standard Specifications Section 876.

PART 3 -- EXECUTION

3.01 SHIPPING, HANDLING AND STORAGE

A. During shipping and storing, protect all Geotextiles and Geogrids from direct sunlight, temperature greater than 140˚ F, water, mud, dirt, dust, and debris.

B. To the extent possible, the Geotextile and Geogrid shall be maintained wrapped in heavy-duty protective covering until use.

3.03 SEPERATOR FABRIC / GEOTEXTILE INSTALLATION

A. Installation shall be in accordance with manufacturers recommendations.

B. Prohibit tracked vehicles from operating directly on fabric.

C. Place to the lines and grades shown on the Drawings or as directed by the Owner or Engineer.

D. Reject Geotextile if it has defects, rips, holes, flaws, evidence of deterioration, or other damage not visible in the original inspection and exposed during unrolling.

E. Place Geotextiles smooth and free of wrinkles.

F. Overlap not less than 12-feet.

G. Secure in place with ABC.

H. When placed on slopes, lap upslope fabric portion such that it is the upper or exposed Geotextile.

I. Prior to placement of overlying materials, temporarily secure Geotextiles in a manner recommended by the manufacturer and accepted by the Owner or Engineer.

J. Repair or replace any torn or punctured Geotextile.

3.04 GEOGRID INSTALLATION

A. Installation shall be in accordance with manufacturers recommendations.

B. Prohibit tracked vehicles from operating directly on fabric.

C. Embed Geogrid in the middle of the ABC base.

D. Place to the lines and grades shown on the Drawings or as directed by the Owner or Engineer.

1. Reject Geogrid if it has defects, rips, holes, flaws, evidence of deterioration, or other damage not visible in the original inspection and exposed during unrolling.

2. Place Geogrid smooth and free of wrinkles.

3. Overlap not less than 12-feet.

4. Secure in place with ABC.

E. When placed on slopes, lap upslope fabric portion such that it is the upper or exposed Geogrid.

F. Prior to placement of overlying materials, temporarily secure Geogrid in a manner recommended by the manufacturer and accepted by the Owner or Engineer.

G. Repair or replace any torn or punctured Geogrid.

- END OF SECTION 310519 -

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2018 Standard Specifications are incorporated by reference.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Stripping and stockpiling rock.
6. Removing above- and below-grade site improvements.
7. Temporary erosion and sedimentation control.

B. Related Requirements:

1. Section 0312500 "Erosion and Sedimentation Control" for temporary erosion- and sedimentation-control measures.

2. Method of clearing is established by NCDOT 2018 Std Drawing 200.02 – Method of Clearing Method II.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.

D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.

G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.6 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Topsoil stripping and stockpiling program.

C. Rock stockpiling program.

D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 QUALITY ASSURANCE

A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.8 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Utility Locator Service: Notify Call Before You Dig for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

E. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 EXISTING UTILITIES

1. Owner will arrange to shut off indicated utilities when requested by Contractor.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

C. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
3. Use only hand methods or air spade for grubbing within protection zones.
4. Chip removed tree branches and stockpile in areas approved by Architect. dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 6 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.

3.7 STOCKPILING ROCK

A. Remove from construction area naturally formed rocks that measure more than 1 foot across in least dimension. Do not include excavated or crushed rock.

1. Separate or wash off non-rock materials from rocks, including soil, clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

B. Stockpile rock away from edge of excavations without intermixing with other materials. Cover to prevent windblown debris from accumulating among rocks.

1. Limit height of rock stockpiles to 36 inches
2. Do not stockpile rock within protection zones.
3. Dispose of surplus rock. Surplus rock is that which exceeds quantity indicated to be stockpiled or reused.

3.8 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove paving and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Burning tree, shrub, and other vegetation waste is permitted according to burning requirements and permitting of authorities having jurisdiction. Control such burning to produce the least smoke or air pollutants and minimum annoyance to surrounding properties. Burning of other waste and debris is prohibited.

C. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

3.10 MEASUREMENT AND PAYMENT

All site clearing is considered incidental to Comprehensive Grading – See section 312000.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for walks, pavements, turf and grasses, and plants.
3. Excavating and backfilling for buildings and structures.
4. Subbase course for concrete walks, pavements.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.
7. Undercut Excavation
8. Drainage Ditch Excavation

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" and Section 013233 "Photographic Documentation" for recording pre-excavation and earth-moving progress.
2. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Section 315000 "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.
4. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
5. Section 329300 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.2 DEFINITIONS

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

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

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

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices changes in the Work.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, will be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock:

1. Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
   a. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.

2. Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of[100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other fabricated stationary features constructed above or below the ground surface.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

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

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct preexcavation conference at Project site

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.
b. Coordination of Work with utility locator service.
c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
d. Extent of trenching by hand or with air spade.
e. Field quality control.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Geofoam
4. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches.
2. Warning Tape: 12 inches long; of each color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D698.

1.6 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.7 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Utility Locator Service: Notify “Call Before You Dig" for area where Project is located before beginning earth-moving operations.

D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 015000 "Temporary Facilities and Controls" and Section 311000 "Site Clearing" are in place.

E. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

F. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487, Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487 Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200) sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.

J. Sand: ASTM C33/C33M; fine aggregate.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

L. Rock Plating: As defined in Section 275 of the NCDOT 2024 Standard Specifications for Roads and Structures.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

A. Explosives:

1. Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:

    a. 24 inches outside of concrete forms other than at footings.
    b. 12 inches outside of concrete forms at footings.
    c. 6 inches outside of minimum required dimensions of concrete cast against grade.
    d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    e. 6 inches beneath bottom of concrete slabs-on-grade.
    f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

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

2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:

a. 24 inches outside of concrete forms other than at footings.
b. 12 inches outside of concrete forms at footings.
c. 6 inches outside of minimum required dimensions of concrete cast against grade.
d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
e. 6 inches beneath bottom of concrete slabs-on-grade.
f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

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

3.7 EXCAVATION FOR UTILITY TRENCHES

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

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit As indicated.

C. Trench Bottoms:

1. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

a. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

2. Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

a. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.8 UNDERCUT EXCAVATION

A. Shall conform to the standards of NCDOT 2018 Standard Specifications section 226.

3.9 DRAINAGE DITCH EXCAVATION

A. Shall conform to the standards of NCDOT 2018 Standard Specifications section 240.

3.10 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.11 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.12 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.13 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.

6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.14 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

D. Backfill voids with satisfactory soil while removing shoring and bracing.

E. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of subbase material, satisfactory soil], free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

    a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

H. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
2. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

I. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.15 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill

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

3.16 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.17 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 6 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

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

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.18 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.19 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Place and compact impervious fill over drainage backfill in 6-inch- thick compacted layers to final subgrade.

3.20 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.

C. Pavement Shoulders: Place shoulders along edges of subbase course[and base course] to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase[and base] layer to not less than [95] <Insert number> percent of maximum dry unit weight according to [ASTM D698] [ASTM D1557].

3.21 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.22 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.23 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Construction dewatering.

B. Related Requirements:

1. Section 013233 "Photographic Documentation" for recording preexisting conditions and dewatering system progress.
2. Section 015723 "Temporary Storm Water Pollution Control" for temporary storm water pollution controls mandated under the EPA's National Pollutant Discharge Elimination System.
3. Section 312000 "Earth Moving" for excavating, backfilling, site grading, and controlling surface-water runoff and ponding.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review condition of site to be dewatered, including coordination with temporary erosion-control measures and temporary controls and protections.
3. Review geotechnical report.
4. Review proposed site clearing and excavations.
5. Review existing utilities and subsurface conditions.
6. Review observation and monitoring of dewatering system.

1.3 ACTION SUBMITTALS

A. Shop Drawings: For dewatering system, prepared by or under the supervision of a qualified professional engineer.

1. Include plans, elevations, sections, and details.
2. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
3. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
4. Include written plan for dewatering operations, including sequence of well and well-point placement coordinated with excavation shoring and bracings and control procedures to be adopted if dewatering problems arise.

B. Delegated Design Submittals: For dewatering system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Submittals:

1. Field quality-control reports.

B. Qualification Statements: For Installer and land surveyor

C. Delegated design engineer qualifications.

D. Existing Conditions: Using photographs, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by dewatering operations. Submit before Work begins.

E. Record Drawings: Identify locations and depths of capped wells and well points and other abandoned-in-place dewatering equipment.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer: An experienced installer that has specialized in design of dewatering systems and dewatering work.
2. Delegated Design Engineer: A professional engineer who is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of the type indicated.
3. Land Surveyor: A professional land surveyor who is legally qualified to practice in state where Project is located.

1.6 FIELD CONDITIONS

A. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering in accordance with the performance requirements.
2. The geotechnical report is included elsewhere in Project Manual.

B. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design dewatering system.

B. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of groundwater and permit excavation and construction to proceed on dry, stable subgrades.

1. Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, prevention of flooding in excavation, and prevention of damage to subgrades and permanent structures.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with water- and debris-disposal regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades, and from flooding site or surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Provide temporary grading to facilitate dewatering and control of surface water.

D. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 311000 "Site Clearing," during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Place dewatering system into operation to lower water to specified levels before excavating below groundwater level.

C. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

D. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

3.3 OPERATION

A. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

B. Operate system to lower and control groundwater to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

C. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

D. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

3.4 FIELD QUALITY CONTROL

A. Observation Wells: Provide observation wells or piezometers, take measurements, and maintain at least the minimum number indicated; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of groundwater and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

B. Survey-Work Benchmarks: Resurvey benchmarks [regularly] [monthly] <Insert time period> during dewatering and maintain an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

C. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

D. Prepare reports of observations.

3.5 PROTECTION

A. Protect and maintain dewatering system during dewatering operations.

B. Promptly repair damages to adjacent facilities caused by dewatering.

3.6 MEASUREMENT AND PAYMENT

A. See section 312500 – Erosion and Sedimentation Control

END OF SECTION 312319

SECTION 312500 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers work necessary for stabilization of soil to prevent erosion during and after construction and land disturbance activities. The work shall include furnishing all labor, materials, tools, and equipment to perform all work and services necessary for or incidental to the furnishing and installation, complete, of all operations in connection with erosion control as shown on drawings and as specified, in accordance with provisions of the Contract Documents, and completely coordinated with work of all other trades. The Contractor shall insure that all sedimentation features are in place prior to construction as necessary. Contractor shall remove the features as ground cover is established with approval of the Engineer and/or controlling authorities.

B. The minimum areas requiring soil erosion and sediment control measures are indicated on the Drawings. The right is reserved to modify the use, location, and quantities of soil erosion and sedimentation control measures based on activities of the Contractor and as the Engineer considers to be the best interest of the Owner.

C. Any governmental agency standard as noted below should be referenced as the latest, most recent, or current version of the referenced standard.

D. The Contractor shall implement the approved Erosion and Sediment Control plan and follow all state requirements regarding sedimentation and erosion control. Construction methods shall minimize sedimentation and erosion.

E. See additional information noted on the Drawings.

1.2 DEFINITIONS

A. NCDOT: North Carolina Department of Transportation

B. NCDEQ - DEMLR: North Carolina Department of Environmental Quality - Division of Energy, Mineral, and Land Resources.

C. Standard Erosion Control Specification: Town or Huntersville Standard Erosion Control Specifications or North Carolina Erosion and Sediment Control Planning and Design Manual, latest version.

1.3 GENERAL

A. All activities shall conform to the Standard Erosion Control Specification: North Carolina Erosion and Sediment Control Planning and Design Manual, latest version; the approved erosion control permit; the Specifications; and the Drawings. In the event of a conflict, the more stringent requirement shall apply.

B. The Sections of the Town of Huntersville Standard Erosion Control Specifications referenced include, but are not limited to:

Standard & Specification No	Title
500.1	SPECIAL EROSION CONTROL REQUIREMENTS AND NOTES
502.1	SKIMMER SEDIMENT BASIN
505.1	FLEXIBLE PIPE SLOPE DRAIN
508.1	HIGH HAZARD TEMPORARY SILT FENCE
509.1	SILT FENCE OUTLET OPTION 2
511.1	STONE INLET PROTECTION
512.1	HARDWARE CLOTH AND GRAVEL INLET PROTECTION
514.1	STABILIZED CONSTRUCTION ENTRANCE
519.1	CATCH BASIN INLET PROTECTION
521.1	SEEDING SCHEDULE
522.1	SEEDING SCHEDULE (SEASONAL)
525.1	EMBANKMENT MATTING DETAIL

C. Soil erosion stabilization and sedimentation control shall consist of the following elements:

1. Maintenance of existing permanent or temporary storm drainage piping and channel systems, as necessary.
2. Construction of temporary erosion control facilities such as silt fences, inlet protection, etc.
3. Topsoil, Temporary Seeding, and Sod:
   a. Placement and maintenance of Temporary Seeding on all areas disturbed by construction, as necessary
   b. Placement of permanent topsoil, fertilizer, and sod, etc. in areas as specified on the Drawings.
4. It is the intent that all areas in which construction activities have disturbed existing vegetation shall be temporarily seeded, as required, top soiled, and permanently sodded.

D. The Contractor shall be responsible for phasing Work in areas allocated for his / her exclusive use during this Project, including any proposed stockpile areas, to restrict sediment transport. This will include installation of any temporary erosion control devices, ditches, or other facilities that may be required to comply with NCDEQ regulations and requirements.

E. The areas set aside for the Contractor's use during the Project may be temporarily developed to provide satisfactory working, staging, and administrative areas for his / her exclusive use. Preparation of these areas shall be in accordance with other requirements contained within these Specifications and shall be done in a manner to both control all sediment transport from the project area, and to permit the area to be returned to design grades and drainage patterns upon completion of the project.

F. Upon completion of the Project, all areas that have been disturbed by the Contractor shall be stabilized by top-soiling and permanent sodding seeding as shown on the Drawings.

G. All permanent stockpiles, if any, shall be seeded with soil stabilization seed and protected by construction of two (2) rows of silt fence.

H. Sediment transport and erosion from working stockpiles shall be controlled and restricted from moving beyond the immediate stockpile area by construction of temporary silt fence, as necessary. The Contractor shall keep these temporary facilities in operational condition by regular cleaning, re-grading, and maintenance.

I. The Contractor shall maintain all elements of the Soil Erosion Stabilization and Sedimentation Control systems to be constructed during this Project for the duration of his / her activities on this Project. Formal inspections made jointly by the Contractor and the Engineer shall be conducted every week to evaluate the Contractor's conformance to the requirements of both these Specifications and NCDEQ regulations.

J. Maintenance of the Soil Erosion Stabilization and Sedimentation Control systems constructed as part of this project shall be in accordance with the Drawings and NCDEQ Standard Erosion Control Specifications.

K. Contractor shall remove all erosion control measures from the site once permit requirements for vegetation establishment have been met. All areas disturbed during the removal of erosion control measures shall be raked, stabilized, and planted per the Drawings.

1.4 SUBMITTALS

A. Submittals shall be made in accordance with the Specifications, Section 013300, "Submittal Procedures."

B. In addition, the Contractor shall provide the following specific information:

1. If Contractor plans to vary erosion control phasing from the Drawings, then he / she shall submit a written plan, including definition and locations of phased erosion and sediment control for areas that will be disturbed during staged construction sequences. This information shall be provided to the Engineer and Owner, for review, before commencing any Work on the Project.

1.5 QUALITY ASSURANCE

A. Perform Work according to NCDEQ-DEMLR standards.

1.6 INSPECTIONS AND RECORD KEEPING

A. The Contractor is responsible for self-inspection of sedimentation and erosion control devices throughout the life of the Work, including preparation of self-inspection reports and NPDES Self-Monitoring Reports, to make sure the approved erosion and sedimentation control plan is being followed. To simplify documentation of Self-Inspection Reports and NPDES Self-Monitoring Reports, Contractor shall use a combined form available at http://deq.nc.gov/about/divisions/energy-mineral-land-resources/erosion-sediment-control/forms

B.Contractor shall refer to Self-Inspection Reports Reporting Requirements on Drawings.

PART 2 - PRODUCTS

2.1 AGGREGATE

A. Temporary Construction Entrance

1. Furnish according to Standard Erosion Control Specification

B. Silt Fence Outlet

1. Furnish according to Standard Erosion Control Specification

2.2 GEOTEXTILES

A. Sediment Fence Geotextile

1. Furnish according to Standard Erosion Control Specification

B. Construction Entrance Geotextile

1. Furnish according to Standard Erosion Control Specification

C. Rolled Erosion Control Blanket

1. Rolled erosion control blankets shall have a minimum allowable shear stress of 1.5-lbs/ft2 and a minimum longevity of 12 months
2. Anchoring devices for rolled erosion control blankets shall be minimum 11 gauge staples, 1-in wide, and 6-in long or 12-in minimum length wooden stakes.

D. Geotextile for Soil Stabilization

1. Furnish according to Section 270 of NCDOT 2024 Standard Specifications for Roads and Structures.

2.3 TEMPORARY SLOPE DRAINS

A. Furnish according to Standard Erosion Control Specification

2.4 FLEXIBLE PIPE SLOPE DRAINS

A. Furnish according to Standard Erosion Control Specification

2.5 SEDIMENT FENCE STEEL POSTS

A. Furnish according to Standard Erosion Control Specification

2.6 SEDIMENT FENCE FABRIC REINFORCEMENT

A. Furnish according to Standard Erosion Control Specification

2.7 COIR FIBER WATTLE / COIR FIBER WATTLE BARRIER

A. Furnish according to Table 1642-2 in Section 1642 of NCDOT 2024 Standard Specifications for Roads and Structures

2.8 IMPERVIOUS DIKE

A. Furnish according to Standard Erosion Control Specification

2.9 CONCRETE WASHOUT STRUCTURE

A. Furnish according to Standard Erosion Control Specification

2.10 SKIMMER SEDIMENT BASIN

A. Furnish according to Standard Erosion Control Specification

2.11 HIGH HAZARD TEMPORARY SILT FENCE

A. Furnish according to Standard Erosion Control Specification

2.12 SILT FENCE OUTLET OPTION 2

A. Furnish according to Standard Erosion Control Specification

2.13 STONE INLET PROTECTION

A. Furnish according to Standard Erosion Control Specification

2.14 HARDWARE CLOTH AND GRAVEL INLET PROTECTION

A. Furnish according to Standard Erosion Control Specification

2.15 CATCH BASIN INLET PROTECTION

A. Furnish according to Standard Erosion Control Specification

2.16 ROCK PIPE INLET SEDIMENT TRAP, TYPE B

A. Furnish according to NCDOT 2018 Standard Specifications section 1635.

2.17 PLANTING MATERIALS

A. Temporary Seeding and Soil Supplements:

1. Furnish according to Section 1620 of NCDOT 2024 Standard Specifications for Roads and Structures.

B. Permanent Seeding:

1. Furnish according to Section 1660 of NCDOT 2024 Standard Specifications for Roads and Structures.

C. Sod (if used)

1. Furnish according to Owner requirements matching the existing natural turf within the project area.

D. Temporary Mulching

1. Furnish according to Section 1615 of NCDOT 2024 Standard Specifications for Roads and Structures

E. Mulching

1. Furnish according to Section 1660 of NCDOT 2024 Standard Specifications for Roads and Structures.

2.18 2.18 TEMPORARY STREAM CROSSING (MUD MAT)

1. Furnish according to detail shown on plan sheet EC-3D.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall install erosion and sediment control measures and maintain in accordance with the Drawings, the sequence of construction shown on the Drawings are made a part of these Contract Documents.

B. The Contractor shall install any additional measures which the Engineer or Inspector may deem necessary to comply with the Standard Erosion Control Specification general criteria or NCDEQ Erosion Control requirements, at no additional cost to the Owner.

C. The Contractor shall provide and maintain Temporary Seeding at all times.

3.2 SILT FENCE

A. Silt fence to be installed as indicated on Drawings and per the Standard Erosion Control Specification. Silt fence to be placed prior to demolition, trench installations, or other clearing activities. Silt fence may be temporarily removed and replaced to facilitate construction.

B. Maintenance shall be performed per the Standard Erosion Control Specification.

C. After ground cover has been established and approved by Engineer and NCDEQ Erosion Control Inspector, the silt fence shall be removed and disposed of in an approved off-site location at the Contractor's expense.

3.3 SILT FENCE OUTLETS

A. Install silt fence outlets per the details shown on Drawings and per the Standard Erosion Control Specification.

B. Maintenance shall be performed per the Standard Erosion Control Specification.

C. Contractor to verify silt fence outlet placement at low points as they exist or develop. Additional silt fence outlets may be required to prevent erosion during and after construction and land disturbance activities. If additional silt fence outlets are necessary, Contractor to add additional silt fence outlets per Engineer, NCDEQ Erosion Control Inspector, or Owner direction at no additional cost to the Owner.

3.4 TEMPORARY DIVERSION DITCHES AND SLOPE DRAINS

A. Install temporary diversion ditches as shown on the drawings, details and per the Standard Erosion Control Specification.

B. Where shown on the drawings, install rolled erosion control blankets and rock check dams per the details and the Standard Erosion Control Specification.

C. Install temporary slope drains per the drawings and the Standard Erosion Control Specification where runoff from diversion ditches enters the sediment basins, as shown on the drawings.

D. Maintenance shall be performed per the Standard Erosion Control Specification.

3.5 INLET PROTECTION

A. Install Inlet Protection per the detail shown on Drawings and per the Standard Erosion Control Specification.

B. Inlet protection shall be placed at the upstream side of any pipe or structure discharging outside of the disturbed limits. See Drawings for location.

3.6 CONSTRUCTION ENTRANCE

A. Install construction entrance per the detail shown on Drawings and per the Standard Erosion Control Specification.

B. Shall be maintained in a condition to prevent tracking or direct flow of mud onto adjacent roadways.

3.7 STOCKPILES

A. Install stockpiles per the detail shown on Drawings and per the Standard Erosion Control Specification.

B. Stockpile height shall not to exceed 15 feet and side slopes shall be 2 (H) to 1 (V) or flatter.

C. Stockpile shall have a minimum double row of silt fence as shown on Drawings.

3.8 GROUND STABILIZATION

A. Contractor shall provide ground stabilization per the Standard Erosion Control Specification and in accordance with the table below:

Site Area Description	Stabilization Time Frame	Stabilization Time Frame Exceptions
Perimeter Dikes, Swales, Ditches, and Slope	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
Slopes 3:1or Flatter	14 Days	7-Days for slopes greater than 50-ft in length
All other areas with slopes flatter than 4:1	14 Days	None (except for perimeters and HQW zones)

3.9 TEMPORARY SEEDING

A. Temporary Seeding is to be placed and maintained over all disturbed areas prior to Permanent Sodding per the detail shown on Drawings and per the Standard Erosion Control Specification

B. Maintain Temporary Seeding until such time as areas are approved for permanent seeding. As a minimum, maintenance shall include the following:

1. Fix-up and reseeding of bare areas or re-disturbed areas.

2. Mowing for stands of grass or weeds exceeding 6 inches in height.

3.10 TEMPORARY STREAM CROSSING (MUD MAT)

A. Install according to detail shown on plan sheet EC-3D.

END OF SECTION 312500

SECTION 312501 – CLEAN WATER DIVERSION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Clean Water Diversion – Refer to Section 1609 of the NCDOT 2024 Standard Specifications for Roads and Structures

B. Related Requirements:

1. Section 312502 "Cleanwater Bypass Pipe Operation" for bypass operations through pipes.

PART 2 - PRODUCTS

2.01 Geotextile for Soil Stabilization, Type 4 - Refer to Division 10 of the NCDOT 2024 Standard Specifications for Roads and Structures

PART 3 - EXECUTION

3.01 PREPARATION

1. This work consists of installing, maintaining, and removing any and all material required for the construction of clean water diversions. The clean water diversions shall be used to direct water flowing from offsite around/away from specific area(s) of construction.

3.02 INSTALLATION

1. The Contractor shall install the clean water diversions in accordance with the details in the plans and at locations indicated in the plans, and as directed. Upon installation, the excavated material shall be immediately stabilized as provided in Section 1620 of the Standard Specifications. Other stabilization methods may be utilized with prior approval from the Engineer.
2. Line clean water diversion with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury top of slope geotextile edge in a trench at least 5" deep and tamp securely. Make vertical overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile.

3. Secure geotextile with eleven-gauge wire staples shaped into a u shape with a length of not less than 6" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically.

3.03 MEASUREMENT AND PAYMENT

A. Silt Excavation will be measured and paid for in accordance with Article 1630-4 of the Standard Specifications.

B. Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the Standard Specifications.

C. Stabilization of the excavated material will be paid for as Temporary Seeding as provided in Section 312500.

D. Such price and payment shall be considered full compensation for all work covered by this section including all materials, construction, maintenance, and removal of the clean water diversions.

END OF SECTION 312501

SECTION 312502 – CLEAN WATER BYPASS PIPE OPERATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Clean Water Bypass Pipe Operation

B. Related Requirements:

1. Section 312501 "Clean Water Diversion".

PART 2 - PRODUCTS

2.01 See sheet EC-3F for detail defining the elements of clean water bypass pipe operation.

PART 3 - EXECUTION

3.01 PREPARATION

1. This work consists of installing, maintaining, and removing any and all elements required for the construction of the clean water bypass pipe operation. The clean water bypass pipe operation shall be used to direct water flowing from offsite through the site via a temporary pipe installed within proposed permanent storm pipes to deter the mixing of off site clean water and onsite water.

2. Prior to construction, verify grades in the areas calling for the operation to ensure positive drainage is achievable.

3. Ensure limits of disturbance are clearly established and adhered to.

3.02 INSTALLATION

1. The Contractor shall install the clean water bypass pipe operation in accordance with the details in the plans and at locations indicated in the plans, and as directed.

2. Upon installation, the Contractor shall ensure that positive drainage occurs as intended and that off-site water does not mix with water contained within the silt fence limits of proposed trail construction.

3.03 MEASUREMENT AND PAYMENT

A. Temporary 12” Pipe will be measured and paid for in accordance with Section 012950.

B. Impervious Dike will be measured and paid for in accordance with Section 012950.

C. Rock Pipe Inlet Sediment Trap, Type B will be measured and paid for in accordance with Section 012950.

D. Such price and payment shall be considered full compensation for all work covered by this section including all materials, construction, maintenance, and removal of the clean water bypass pipe operation elements.

END OF SECTION 312502

SECTION 321123 – AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Aggregate base.
   2. Subgrade Preparation.

B. Related Sections:
   1. Division 01 Section "General Requirements."
   2. Division 01 Section "Special Procedures."
   3. Division 32 Section "Asphalt Paving".
   4. Division 32 Section "Concrete Paving".

1.3 REFERENCES

A. General:
   1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
   2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
   3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.

B. State of North Carolina – North Carolina Department of Transportation (NCDOT):
   1. Standard Specifications: Section 520 Aggregate Base Course.

1.4 DEFINITIONS

A. Acceptance: Wherever the terms acceptance or accepted are used herein, they mean acceptance of the Resident Engineer in writing.

B. Subgrade: The soil surface on which aggregate base or cement-treated base is placed.

1.5 SUBMITTALS

A. Submit under provisions of Division 01 Section "General Requirements."

B. Test Results:
   1. Compaction Tests.

1.6 QUALITY ASSURANCE

A. Single Source: Furnished from single source throughout Work.

B. Certification: Arrange with Owner to have Owners' Representative or Resident Engineer certify that source of materials for this Work meets these Specifications and provide tests required to prove that Work-in-progress meets requirements of these Specifications.

1.7 DELIVERY, STORAGE, AND HANDLING

A. On Site Storage: Store aggregate-base material on-site covered or in a location where material will not be contaminated.

1.8 SITE CONDITIONS

A. Unfavorable Weather: When weather is such that satisfactory results cannot be secured, suspend operations until the weather is considered favorable.

B. Wet Subgrades: Do not place material on wet or muddy subgrade.

1.9 WARRANTY

A. General Description: In addition to manufacturer's warranties, warrant Work for a period of one year from the Date of Final Completion against defects in materials and workmanship.

B. Additional Items Covered: Warranty shall also cover repair of damage to other materials and workmanship resulting from defects in materials and workmanship.

C. Exceptions: Contractor shall not be held responsible for failures due to ordinary wear, neglect by the Owner, vandalism, or other causes beyond the Contractor's control.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Aggregate Base Course: NCDOT SS Section 1005, table 1005-1, meeting requirements for ABC.

B. Water: Fresh, clean, potable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of General Conditions: Examine site and verify that conditions are suitable to receive Work and that no defects or errors are present which would cause defective installation of products or cause latent defects in workmanship and function.

B. Subgrade: Review to verify that it has been inspected, graded to the correct grades, and compacted as required for correct installation of aggregate base.

C. Notification of Unsuitable Conditions: Before proceeding with Work, notify the Project Manager in writing of unsuitable conditions and conflicts.

3.2 PREPARATION

A. Protection of Existing Conditions:
   1. Use every possible precaution to prevent damage to existing conditions to remain such as structures, utilities, plant materials and walks on or adjacent to the site of the Work.
   2. Provide barricades, fences or other barriers to protect existing conditions to remain from damage during construction.
   3. Do not store materials or equipment, permit burning, or operate or park equipment under the branches of existing plants to remain.
   4. Submit written notification of damaged plants and structures to the Project Manager.

B. Subgrade Preparation:
   1. Meet requirements of Project Geotechnical Report recommendations for subgrade preparation prior to placement of aggregate base course or cement-treated base.
   2. Grade subgrade with uniform slope between points where elevations are given.
   3. Use equipment of proper size and appropriate type to achieve grades required.
   4. Grade subgrade surface to within 0.05-foot (15 mm) of elevations indicated by the Drawing details.
   5. Fill and compact any depressions and remove loose material to finish true to line and grade, presenting a smooth, compacted and unyielding surface, except where indicated otherwise.
   6. Remove debris, loose dirt and other extraneous materials.
   7. Place geotextile separator fabric prior to placing ABC.

3.3 AGGREGATE BASE

A. Hauling:
   1. Use of dragline equipment to transport aggregate from stockpiles to elevators or other loading devices will not be permitted.
   2. Distribute hauling over the area to be paved in such a manner as to be most effective in the compacting of the surfacing.
   3. Hauling over any of the surfacing in process of construction will not be permitted when, in the opinion of the Owner, the effect will be detrimental.
   4. Uniformly load hauling vehicles when it is practicable.

B. Placement of Aggregate Base:
   1. Spread base in an even distribution of material without perceptible segregation.

2. Method of spreading and field operation shall be acceptable to the Owner or Owners' Representative at all times and in accordance with of NCDOT Specifications Section 520-5.
3. Construct base course in lifts not exceeding 6 inches (150 mm) in depth so that when compacted to the specified density, the finished surface will conform to grades and dimensions shown, with proper allowance for subsequent courses where specified.
4. Construct the base course in an orderly manner so that reasonable size areas will be ready for testing and a reasonable length of time will be allowed for the Owner to perform tests and obtain the test results during normal working hours.
5. Equipment such as scrapers, and other equipment essentially used for earth excavation, will not be permitted.
6. Compaction equipment shall be adequate in design and number to obtain the specified density for each layer while still moist.
7. Apply water as needed to obtain the specific densities.

8. Place each layer of base course and compact to the specified density before a succeeding layer is placed.

C. Compacting of Aggregate Base:
1. Compact each lift of base as soon after spreading operations as practicable and continue until a density of 95 percent of the maximum density has been achieved as determined in accordance with ASTM D1557 or by the most recent AASHTO T 180 test or by a Nuclear density gauge as directed by the Resident Engineer.
2. Roll each course of surfacing until the material does not creep under the roller before a succeeding course of surfacing material is applied.
3. At the outer edges of the surfacing and continue toward the center.

D. Correction of Surface Defects: Should irregularities develop in any surface during or after rolling, they shall be remedied by loosening the surface and correcting the defects, after which the entire area, including surrounding surfaces, shall be rerolled until thoroughly compacted. Finished surfaces shall be true to grade and crown before proceeding with surfacing.

E. Patrolling: Surfacing in progress of construction shall be bladed and otherwise worked as may be necessary to maintain proper grade and cross section at all times and to keep the surface smooth and thoroughly compacted.

F. Final Clean-up:
1. After work is completed, the entire area shall be neatly finished and trimmed to lines, grades and cross sections shown.
2. Unused construction material shall be removed, and stockpile areas shall be cleaned of aggregate and left in an acceptable condition.

3.4 TOLERANCES

A. Subgrade Surface: Plus or minus 0.05-foot (15 mm) or elevations indicated by the Drawing details.

B. Aggregate Base Course Variation from Thickness: Plus or minus 0.05-foot (15 mm).

C. Aggregate Base Course Finished Surface Smoothness: Plus or minus 1/4-inch (6 mm).

END OF SECTION 321123

SECTION 321216 – ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2018 Standard specifications are included by reference.

1.2 SUMMARY

A. Section Includes:
   1. Asphalt Paving

PART 2 – MATERIALS

A. THE FOLLOWING ITEMS SHALL CONFORM TO THE SPECIFICATIONS OF NCDOT 2018 STANDARD SPECIFICATIONS SECTION 610:
   1. ASPHALT CONC BASE COURSE, TYPE B25.0C
   2. ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C
   3. ASPHALT CONC SURFACE COURSE, TYPE S9.5B

B. THE FOLLOWING ITEMS SHALL CONFORM TO THE SPECIFICATIONS OF NCDOT 2018 STANDARD SPECIFICATIONS SECTION 620:
   1. ASPHALT BINDER FOR PLANT MIX

PART 3 – EXECUTION (NOT USED)

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2018 Standard Specifications incorporated by reference.

1.2 SUMMARY

A. Section Includes Concrete Paving. Including the Following:

1. Curbs and gutters.
2. Sidewalks.
3. Concrete Curb Ramps
4. Concrete Greenway Trail
5. Concrete Apron
6. Concrete Cap

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site as part of the overall project pre-construction meeting.

1. Review methods and procedures related to concrete paving, including but not limited to, the following:

a. Concrete mixture design.

b. Quality control of concrete materials and concrete paving construction practices.

2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Concrete paving Subcontractor.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.
5. Bonding agent or epoxy adhesive.
6. Joint fillers.

C. Material Test Reports: For each of the following:

1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

D. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

1.9 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, fabricated from steel wire into flat sheets.

B. Epoxy-Coated, Joint Dowel Bars: ASTM A775/A775M; with ASTM A615/A615M, Grade 60 plain-steel bars.

2.4 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150/C150M, gray portland cement Type I.
2. Fly Ash: ASTM C618, Class C.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, portland blast-furnace slag cement.

B. Normal-Weight Aggregates: ASTM C33/C33M, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C260/C260M.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

E. Water: Potable and complying with ASTM C94/C94M.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.

2.6 RELATED MATERIALS

A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber in preformed strips.

B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy-Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Pozzolan: 25 percent.
2. Slag Cement: 50 percent.
3. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content, 1-1/2-inch Nominal Maximum Aggregate Size: 5-1/2 percent plus or minus 1-1/2 percent.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete as required for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum W/C Ratio at Point of Placement: 0.50.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 INSTALLATION OF STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 30 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating dowels joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.
b. Continuous water-fog spray.

c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inchlap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C231/C231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days, three specimens at 28 days, and one cylinder at 56 days (if needed).

    a. A compressive-strength test shall be the average compressive strength from three specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Designer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Designer but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Designer.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.11 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Designer.

B. Drill test cores, where directed by Designer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

3.12 CONCRETE CURB RAMP

A. Tactile warning surfaces included in concrete curb ramps shall conform to the specifications of Town of Huntersville Standard Drawing 132.1.

3.13 CONCRETE CAP

A. Concrete cap shall be installed per detail 02 sheet 2B-1. See NCDOT Std Drawing 300.01 for pipe bedding detail beneath proposed storm pipe.

3.14 CONCRETE APRON – MOUNTAIN BIKE TRAIL

A. Concrete Apron – Mountain Bike Trail shall be installed per detail 01 sheet 2B-2.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Joint-sealant backer materials.
3. Primers.

B. Related Requirements:

1. Section 321313 "Concrete Paving" for constructing joints in concrete pavement.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site as part of the overall project pre-construction meeting.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Concrete pavement joint sealants.
2. Joint-sealant backer materials.

B. Samples for Initial Selection: Manufacturer's standard color samples, showing full range of available colors for each type of joint sealant.

C. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing: Performed by a qualified testing agency.

1.7 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backer materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.3 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D5893/D5893M, Type SL.

2.4 JOINT-SEALANT BACKER MATERIALS

A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.

C. Install joint-sealant backers to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backer materials.
2. Do not stretch, twist, puncture, or tear joint-sealant backer materials.
3. Remove absorbent joint-sealant backer materials that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants immediately following backer material installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

A. Joints within concrete paving:

1. Joint Location:

a. Expansion and isolation joints in concrete paving.
b. Contraction joints in concrete paving.
c. Other joints as indicated.

B. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D5893/D5893M, Type SL.

1. Joint-Sealant Color: Selected from manufacturer's full range.

END OF SECTION 321373

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete pavers.
2. Curb edge restraints.

B. Related Requirements:

1. Section 012950 "Measurement and Payment."
2. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete header serving as edge restraint for unit pavers.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site as part of the overall project pre-construction meeting.

1.4 ACTION SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.

C. Samples for Initial Selection: For each type of unit paver indicated and the following:

1. Joint materials involving color selection.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified unit paving installer. Installer's field supervisor must have Concrete Paver Installer Certification from the Interlocking Concrete Pavement Institute (ICPI) with the Commercial Paver Technician Designation.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.8 FIELD CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 CONCRETE PAVERS

A. Concrete Pavers, Solid Paving Units, Normal-Weight Concrete: Solid paving units made from normal-weight concrete with a compressive strength not less than 8000 psi, water absorption not more than 5 percent according to ASTM C140, and no breakage and not more than 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C67.

1. Thickness: 2-3/8 inches (60mm).
2. Face Size and Shape: 3-by-9-inch rectangle.
3. Color: As indicated by manufacturer's designations – see construction drawings.

2.3 CURBS AND EDGE RESTRAINTS

A. Job-Built Concrete Edge Restraints: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of 3500 psi.

2.4 AGGREGATE SETTING-BED MATERIALS

A. Graded Aggregate for Subbase: Sound, crushed stone or gravel complying with ASTM D448 for Size No. 57.

A. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C33/C33M for fine aggregate.

B. Polymeric Sand for Joints: Provide sand of color needed to produce required joint color.

C. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2, AASHTO M 288.
2. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
3. Permittivity: 0.02 per second, minimum; ASTM D 4491.
4. UV Stability: 50 percent after 500 hours' exposure, ASTM D 4355.

D. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase course for unit pavers.

3.3 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

1. For concrete pavers, a block splitter may be used.

D. Joint Pattern: Herringbone.

E. Tolerances: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.

F. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

1. Install job-built concrete edge restraints to comply with requirements in Section 033000 "Cast-in-Place Concrete."

3.4 AGGREGATE SETTING-BED APPLICATIONS

A. Compact soil subgrade uniformly to at least 95 percent of laboratory density.

B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Designer, and replace with compacted backfill or fill as directed.

C. Place aggregate base, compact by tamping with plate vibrator, and screed to depth indicated.

D. Place geotextile over compacted base course, overlapping ends and edges at least 12 inches.

E. Place leveling course and screed to a thickness of 1 inch, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.

F. Treat leveling course with herbicide to inhibit growth of grass and weeds.

G. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base.

H. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.

I. Spread dry polymeric joint sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add jointing sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

J. Do not allow traffic on installed pavers until sand has been vibrated into joints.

K. Repeat joint-filling process 30 days later.

3.5 REPAIRING, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION 321400

SECTION 321723– PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2018 Standard specifications are included by reference.

1.2 SUMMARY

A. Section Includes:
   1. Pavement Markings

PART 2 – MATERIALS

A. THE FOLLOWING ITEMS SHALL CONFORM TO THE SPECIFICATIONS OF NCDOT STANDARD SPECIFICATIONS SECTION 1205:
   1. THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)
   2. THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)

PART 3 – EXECUTION

A. PLACEMENT
   1. Pavement markings shall be placed as indicated on plan sheet PM-1.

END OF SECTION 321723

SECTION 321811 – CRUSHED STONE SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes decomposed granite fines surfacing and stone curb edge restraint.

B. Related Sections:

1. Section 012950 "Measurement and Payment."
2. Section 312000 “Earth Moving.”

1.3 DEFINITIONS

Subgrade: The soil surface on which aggregate base is placed.

1.4 ACTION SUBMITTALS

A. Products; Sample of decomposed granite and stone strips (or approved equals) and sieve analysis for grading of decomposed granite.

B. Contractor shall submit certification from the supplier certifying the decomposed granite and stone strips (or approved equals) meet the requirements of this specification.

C. Contractor shall submit the manufacturer, Material Safety Data Sheet (MSDS), Name, Trade Name, trademark, and conformance to state law of all herbicides or other chemicals.

1.5 TESTS

A. Perform gradation of decomposed granite material in accordance with ASTM C 136 – Method for Sieve Analysis for Fine and Course Aggregates.

1.6 DELIVERY, STORAGE, AND HANDLING

A. On Site Storage: Store material on-site covered or in a location where material will not be contaminated.

1.7 WARRANTY

A. In addition to manufacturer's warranties, Contractor shall provide warranty for the performance of the product. Contractor shall warranty installation of product for the time of one year from completion and acceptance of the work by the Owner or Owner's Representative.

PART 2 - PRODUCTS

2.1 DECOMPOSED GRANITE

A. Aggregates: Granite fines shall consist of inert materials that are hard, durable, with stone free from surface coatings and deleterious materials.

B. Sieve Analysis: Crushed stone sieve analysis percentage of weight passing a square mesh sieve based upon AASHTO T11-82 and T27-82.

Aggregate Gradation	
Sieve Size	% Passing
3/8 inch	100
No. 4	95 - 100
No. 8	75 - 80
No. 16	55 - 65
No. 30	40 - 50
No. 50	25- 35
No. 100	20 - 25
No. 200	5 - 15

2.2 STONE CURB

A. Tennessee Strip Rubble Curbs: Tennessee strip stone curbing, with face battered 1 inch per foot (1:12), produced in random lengths not less than 12 inches from Tennessee stone complying with ASTM C615/C615M.

1. Tennessee Color and Grain: Tans, Pink and Brown with full color range of yellow, white, buff, and rose tones.
2. Top Width: 4 inches
3. Total Height: 8 inches
4. Top Finish: Sawed
5. Face Finish: Split

2.3 HERBICIDE

A. Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.1 GENERAL

A. Equipment:

1. Equipment shall be capable of performing the work as described in this specification. Equipment that is inadequate to obtain the results specified shall be replaced or supplemented as required to meet the requirements of this specification. Any equipment that is used in an improper manner may be cause for rejection of the work if in the opinion of Designer, the work fails to meet the requirements of this specification.
2. Equipment used for compaction shall be the rolling type, vibratory type, or combination of both types, and shall be of sufficient capacity to meet the compaction requirements herein.

B. Layout of Work

1. Contractor shall stake or otherwise delineate the proposed alignment of the space according to the drawings. Obtain approval of the Designer prior to proceeding with excavation and subgrade preparation.
2. Cut/fill bench for the granite fines as shown on the drawings.

C. Weed Control

1. Apply herbicide in inhibit growth of grass and weeds to prepared subgrade per manufacturer's recommendations.
2. Herbicides or other chemicals shall be applied using well-maintained equipment by individuals working for contractor who are properly licensed by any State and/or Federal Agency having jurisdiction over such applications. It shall be the responsibility of the Contractor to be knowledgeable of current laws and regulations pertaining to herbicide and other chemical applications, and to notify Owner or Owner's Representative immediately if any request for herbicide or chemical applications by Owner or Owner's Representative is inappropriate as they pertain to these laws and regulations.
3. Herbicides or other chemicals shall not be applied during periods when wind or other physical conditions cause the herbicides or chemicals to be transported a distance of more than five (5) feet from the immediate area where they are being placed. It shall be the responsibility of the Contractor to stop work immediately and notify the Owner or Owner's Representative if any weather or other physical condition exists, which would make the application of herbicides or other chemicals inappropriate.
4. All herbicides or other chemicals used shall be applied at a rate and strength, and by the method recommended by the manufacturer of the product being used.

3.2 PREPARATION

A. Protection of Existing Conditions:

1. Use every possible precaution to prevent damage to existing conditions to remain such as structures, utilities, plant materials and walks on or adjacent to the site of the Work.

2. Provide barricades, fences or other barriers to protect existing conditions to remain from damage during construction.

B. Subgrade Preparation:

1. Compact soil subgrade uniformly to at least 95 percent of laboratory density.

2. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Designer, and replace with compacted backfill or fill as directed.

3.3 EDGE RESTRAINT INSTALLATION

A. Provide edge restraints as indicated. Install edge restraints before placing granite fines surfacing.

1. Install edge restraints to comply with manufacturer's written instructions.

3.4 PLACEMENT AND COMPACTION

A. The Contractor is responsible for controlling placement of the material; no additional compensation will be made for material placement in excess of the specified thickness or width.

B. Do not install granite fines material during rain or snow. Do not install granite fines on sub-grade that has standing water.

C. Add water to ±2% wet of optimum moisture content. Use roller or mechanical hand tamper for compaction. Compact to 95% Standard Proctor Density (ASTM D698-70) to a uniform thickness.

1. Use plate compactor on edges and hard to get areas.
2. Loose material shall not be present on final surface.

D. Top of surface shall be flush with adjacent grade. Remove any excess gravel on edges. Ensure there are no low spots, high spots, or standing water on or adjacent to crushed gravel surface.

3.5 SURFACE FINISHING

A. Use a smooth steel wheel roller for the final rolling of top surface of granite fines. Water surface and evenly spread loose stones before final rolling. Make minimum of two complete passes over area to embed stones. Correct soft spots developed during rolling.

B. Compacted surface shall be smooth and free from waves and other irregularities. Unsatisfactory portions of base course shall be torn up, reworked, re-laid, and rerolled at no additional expense to the Owner.

3.6 INSPECTION

A. Finished surface shall be uniform and solid, with no evidence of chipping or cracking.

B. Compacted paving material shall be firm to the full depth of pavement with no soft areas.

C. Loose material shall not be present on the surface

D. No ruts shall be visible on the surface of the pavement.

E. Pavement sections that do not meet this specification, shall be repaired or replaced at the Contractor's expense.

3.7 REPAIRS

A. Excavate damaged area to depth of decomposed granite fines material and square off sidewalls.

B. If area is dry, moisten damaged portion lightly and scarify.

C. Apply granite fines to excavated area to finished grade.

D. Compact with an 8" to 10" hand tamp or 1000 lb. roller.

E. Repaired surface shall be smooth and free from waves and other irregularities. Unsatisfactory portions of base course shall be torn up, reworked, re-laid, and rerolled at no additional expense to the Owner.

END OF SECTION 321811

323224 - PRECAST GRAVITY RETAINING WALL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2024 Standard Specifications are incorporated by reference.

1.2 SUMMARY

A. Section Includes:
   1. Precast Gravity Retaining Wall

1.3 ACTION SUBMITTALS

1. Provide delegated design signed and sealed wall drawings and product specifications.
2. Samples for Initial Selection: Manufacturer’s standard color samples.

PART 2 - MATERIALS

A. Precast Gravity Retaining Walls shall conform to the specifications of NCDOT 2024 Standard Specification section 455.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 323224

SECTION 329113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Provide or create soil mixes for planting that meets or exceeds the standards contained herein.

B. Related Sections:

1. Section 012950 "Measurement and Payment."
2. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
3. Section 329119 “Landscape Grading”
4. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
5. Section 329300 "Plants" for placing planting soil for plantings.

1.3 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.

C. CEC: Cation exchange capacity.

D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

E. Imported Soil: Soil that is transported to Project site for use.

F. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

G. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

H. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

I. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.

J. SSSA: Soil Science Society of America.

K. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

L. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

M. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

N. USCC: U.S. Composting Council.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site as part of the overall project pre-construction meeting.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for application and use.
2. Include test data substantiating that products comply with requirements.
3. Include sieve analyses for aggregate materials.
4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:

    a. Manufacturer's qualified testing agency's certified analysis of standard products.
    b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
    c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, 1-gal. volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For each testing agency.

B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1. Laboratories: Subject to compliance with requirements.
2. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on imported soil.

1. Notify Designer seven days in advance of the dates and times when laboratory samples will be taken.

B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

B. Sample Collection and Labeling: Have samples taken and labeled by Contractor under the direction of the testing agency.

1. Number and Location of Samples: Minimum of five representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.10 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

B. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":

   a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
   b. Hydrometer Method: Report percentages of sand, silt, and clay.

2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D698 (Standard Proctor).

C. Chemical Testing:

1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."
3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.

D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol including the following:

1. Percentage of organic matter.
2. CEC, calcium percent of CEC, and magnesium percent of CEC.
3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Zinc ppm.
11. Zinc availability ppm.
12. Copper ppm.

13. Sodium ppm and sodium absorption ratio.
14. Soluble-salts ppm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil.
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable. In lieu of containers, fertilizer and soil amendments may be furnished in bulk, with a certificate indicating the above information accompanying each delivery.

B. Before and after delivery, fertilizer and soil amendments shall be kept in a dry storage area away from contaminants. Precautions shall be taken prior to use to prevent rupture of packaging and to prevent wetting, contamination, or deterioration.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 SOIL TYPES

A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.

B. Topsoil: Native soil on site or natural soil harvested from another site that naturally has the texture and composition to meet the specification described below, and is free of noxious weed see, shall constitute an Acceptable Planting Media (APM).

C. Planting mix for Lawn, Turf or Seeding Areas: A planting mix may be developed that will be an Acceptable Planting Media by amending the existing soil or by removing the existing soil and replacing it with new planting mix. The planting mix shall have uniform composition throughout, with a mixture of subsoil. It shall be free of stones, lumps, live plants and their roots, sticks, and other extraneous matter. It shall contain no man-made materials unless otherwise specified. Planting mix shall not be used while in a frozen or muddy condition.

1. Unless there are unusual circumstances with project and unless otherwise specified in the contract documents and approved by the Grounds Superintendent and/or designee, the Acceptable Planting Media shall contain the following specified percentages of constituents:

    a. CLAY Minimum 10%/Maximum 40%
    b. SAND Minimum 20%/Maximum 50%
    c. SILT Minimum 20%/Maximum 50%
    d. ORGANIC MATTER Minimum 5%/Maximum 10%

2. Organic Matter is defined as compost/humus such as sawdust or leaf mold that has completed the decomposition process. Compost shall be well-composted, stable, and weed-free material bearing USCC's "Seal of Testing Assurance". Wood derivatives shall be shredded and composted, nitrogen-treated, of uniform texture and free of chips, stones, sticks, soil, or toxic materials. Percentage of organic matter shall be determined by loss on ignition of moisture free samples dried at 65 degrees.
3. APM shall have an acidity range of pH 6.5 to 7.0.

D. Planting mix for Tree and/or Bed/Shrub Planting Areas: A planting mix may be developed that will be an Acceptable Planting Media by amending the existing soil or by removing the existing soil and replacing it with new planting mix. The planting mix shall have uniform composition throughout, with a mixture of subsoil. It shall be free of stones, lumps, live plants and their roots, sticks, and other extraneous matter. It shall contain no man-made materials unless otherwise specified. Planting mix shall not be used while in a frozen or muddy condition.

1. Unless there are unusual circumstances with project and unless otherwise specified in the contract documents and approved by the Grounds Superintendent and/or designee, the Acceptable Planting Media shall contain the following specified percentages of constituents:

a. CLAY Minimum 10%/Maximum 40%
b. SAND Minimum 20%/Maximum 50%
c. SILT Minimum 20%/Maximum 50%
d. ORGANIC MATTER Minimum 15%/Maximum 20%

2. Organic Matter is defined as compost/humus such as sawdust or leaf mold that has completed the decomposition process. Compost shall be well-composted, stable, and weed-free material bearing USCC's "Seal of Testing Assurance". Wood derivatives shall be shredded and composted, nitrogen-treated, of uniform texture and free of chips, stones, sticks, soil, or toxic materials. Percentage of organic matter shall be determined by loss on ignition of moisture free samples dried at 65 degrees.
3. APM shall have an acidity range of pH 6.5 to 7.0.

E. Soils can be placed on a pre-approved list by the Grounds Superintendent and/or designee, after a vendor has proved that they have the ability to provide the soils as described and be consistent with the mixtures. The Grounds Department retest soils and recompiles this list annually. Other soils can be tested throughout the year and placed on the list, if approved, at the contractor's or vendor's request. Thirty calendar days for approval is required. Grounds Management will collect the samples and submit the first soil samples for laboratory testing. Any sample that requires resubmittal for approval will be the contractor's or vendor's responsibility and must be tested by a reputable soil testing lab.

2.2 SOIL CONDITIONER

A. Work covered in this special provision includes supplying and applying composted soil conditioner. Soil conditioner is an organic soil additive that is mixed with the soil in order to improve its internal drainage, structure, nutrient holding capacity, nutrient holding capacity or to improve organic matter composition. Composted soil conditioner must be thoroughly mixed and tilled into the top 8" and 10" of the existing soil in all areas to be planted.

B. Soil conditioner shall be composted and aged pine bark, screened to be 9/16" size or smaller. It shall be black in color, not be fresh, have no pine bark smell and have an acidity of pH 5.8 to 6.0. A sample of the composted soil conditioner must be submitted to the Owner's Representative for approval prior to installation.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. Reaction: pH of 5.5 to 8.
2. Soluble-Salt Concentration: Less than 4 dS/m.
3. Moisture Content: 35 to 55 percent by weight.
4. Organic-Matter Content: 30 to 40 percent of dry weight.
5. Particle Size: Minimum of 98 percent passing through a 1/2-inch sieve.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 6 to 7.5, a soluble-salt content measured by electrical conductivity of maximum 5 dS/m, having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.

D. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. Partially Decomposed Wood Derivatives: In lieu of shredded and composted wood derivatives, mix shredded and partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

2.4 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

C. Proceed with placement only after unsatisfactory conditions have been corrected.

D. Product supplied must meet the specification above as determined by soil testing at an approved lab or be supplied from a vendor on the Grounds Department’s pre-approved list. Soil shall not be handled or spread when moisture content is excessively high.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a maximum of 5 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: Pass unamended soil through a 2-inch sieve to remove large materials.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 18 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off the project site.

1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Mixing: Spread unamended soil to total depth of 6 inches but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.

    a. Mix lime and potassium with dry soil before mixing fertilizer.
    b. Mix fertilizer with planting soil no more than seven days before planting.

2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 12 inches in loose depth for material compacted by compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each blended lift of planting soil to 75 percent of maximum Standard Proctor density according to ASTM D698 and tested in-place.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 18 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply approximately half the thickness of planting soil over prepared, loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Application: Spread planting soil to total depth of 6 inches but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Lifts: Apply planting soil in lifts not exceeding 12 inches in loose depth for material compacted by compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each lift of planting soil to 75 percent of maximum Standard Proctor density according to ASTM D698.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of 18 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.

1. Mix lime and potassium with dry soil before mixing fertilizer.
2. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 75 percent of maximum Standard Proctor density according to ASTM D698.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests:

1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D698. Space tests at no less than one for each 1000 sq. ft. of in-place soil or part thereof.

C. Soil will be considered defective if it does not pass tests.

D. Prepare test reports.

E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.7 PROTECTION

A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Designer and replace contaminated planting soil with new planting soil.

3.8 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 329113

SECTION 329119 - LANDSCAPE GRADING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Stripping, stockpiling, and redistribution of topsoil, rough grading, rock removal, and excavation of the site.
2. Final grade topsoil for finish landscaping shown on grading plans.

B. Related Sections:

1. Section 012950 "Measurement and Payment."
2. Section 312000 “Earth Moving”
3. Section 329113 “Soil Preparation”
4. Section 329200 “Turf and Grasses”
5. Section 329300 “Plants”

C. Existing Conditions:

1. Contractor shall accept actual conditions at the project site and do work specified without additional compensation for possible variation from grades and conditions shown, whether surface or subsurface. All grading work shall be unclassified except for rock removal as described herein.

D. Protection:

1. Benchmarks and Monuments: Maintain carefully all benchmarks, monuments and other reference points. If disturbed or destroyed, replace as directed. If found at variance with the drawings, notify the Project Coordinator before proceeding to lay out work.
2. Protection of Existing Work Remaining: All existing curbs, sidewalks, driveways and paving damaged in performance of this work shall be restored without additional cost to the Owner in the manner prescribed by authorities having jurisdiction.
3. Tree Preservation and Protection: During all phases of earthwork and site grading, the Contractor shall comply with Section 015639 “Temporary Tree and Plant Protection”.

PART 2 - PRODUCT

2.1 MATERIALS:

A. Topsoil and Planting Mix: See Section 329113 “Soil Preparation”.

B. Non-woven Filter Fabric: Fabric for wrapping perforated pipe and washed stone shall be the non-woven filter type, Mirafi 140NL, Webtec NO-4, Linq 130 EX, or an approved equal.

C. Surplus Material: Contractor shall remove unsuitable materials and surplus excavated materials from the site and legally dispose of it.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Verify trench backfilling has been inspected.

B. Verify subsoil base has been contoured and compacted.

C. Examine the areas and UPM under which earthwork and site grading is to be performed and notify the Designer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

D. Testing:

1. Laboratory: The Contractor shall employ services of a testing laboratory to perform tests required under this section.
2. Quality Control Testing During Construction: It is the responsibility of the Contractor to notify the Designer at appropriate times when Testing is required. Field density tests shall be performed in accordance with ASTM D-698.
3. Density tests will be provided to Designer for areas compacted during construction before proceeding with soil work.

3.2 SUBSOIL PREPARATION:

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, and stones in excess of 1/2 inch (13 mm) in size. Remove subsoil contaminated with petroleum products.

C. Scarify subgrade to depth of 3 inches (75 mm), where topsoil is to be placed. Scarify areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 SOIL PREPARATION:

A. Soils for all landscaped areas will conform to Section 329113 “Soil Preparation” for all soil types, either topsoil or planting mix.

B. Soil Test: A sample of the proposed topsoil or planting mix shall be submitted to the Designer 30 calendar days prior to installation and be approved prior to delivery to the site. Organic matter will be defined as organic/humus such as sawdust or leaf-mold that has completed the decomposition process.

C. Soil preparations for planting areas are divided into categories depending on the situation. Only Type 2 and Type 3 are applicable.

1. Type 2

a. The “Type 2” planting bed preparation is intended for areas in which the existing soil is to be removed to a depth of 18” and replaced with soil meeting the plant mix specification. This preparation also includes the tilling, loosening, sub-soiling of the material from18” to 36” deep in order to provide aeration and lessen the compaction. Backfill materials/soils fit into this category and must be removed/replaced.
b. Existing soil shall be removed and disposed of in accordance with the contract provisions. The existing layer of soil between 18” and 36” deep shall be tilled in place and inspected by Designer prior to plant mix/soil being added to reach final grade.
c. The contractor shall install a sufficient quantity of approved plant mix to achieve the desired/specified grade. Soil shall be added in an amount sufficient to account for natural consolidation. Unless otherwise specified, the plant bed shall be graded as follows:

i. Plant beds in turf areas or around buildings – 6” above surrounding grade at center of bed, 2” above grade at edge of bed.

d. All planting beds and areas to be mulched shall have a 4” V-cut trench installed at the perimeter of the planting bed and adjacent to concrete walks, curbing, and grassed areas. The V-cut trench shall form the bed line edge. Trench depth and width shall be consistent and uniform throughout the installation.
e. All work shall be achieved from the sides of the planting bed areas. The contractor shall not allow equipment to operate on the loosened soil or plant mix.

2. Type 3

a. The “Type 3” planting is intended for individual tree and individual/group Shrub planting where no soil replacement is required unless specified by the Designer. Type 3 planting is applicable to landscape to be installed at building edges. The tree and shrub planting procedures, including preparation of backfill and planting hole are found under Section 329300 “Plants”.

3.4 PLACING TOPSOIL:

A. Place topsoil in areas to be seeded or sodded and planted, to thickness as scheduled (Paragraph 3.8).

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough and low areas. Maintain levels, profiles, and contours of subgrade.

D. Remove roots, weeds, and foreign material while spreading.

E. Manually spread topsoil close to building to prevent damage.

F. Lightly compact placed topsoil.

G. Leave site clean and raked, ready to receive seeding or sodding and landscape planting.

3.5 TOLERANCES:

A. Top of Topsoil: Plus or minus 1/2 inch (6 mm).

3.6 DRAINAGE:

A. Subsurface drainage shall be installed as indicated in the plans and be tied into the existing storm drain system. A 4” perforated drain pipe shall be installed in the bottom of the planting area. Drain pipe shall be laid in the specified non-woven geotextile fabric, then covered with a minimum 6” of #57 washed stone, then wrapped with the specified non-woven geotextile fabric. Special care shall be exercised when filling planting area with soil so as not to crush or damage the drainage system.

3.7 PROTECTION:

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, walls, sidewalks, and paving.

3.8 SCHEDULE OF TOPSOIL DEPTHS:

A. The following paragraphs identify compacted topsoil thickness for various locations.

1. Perennial Planting Beds: Minimum 12 inches
2. Native Plants and Grass Areas: Minimum 12 inches.
3. Shrub Beds: Minimum 18 inches.
4. Turf seeded and sodded Areas: Minimum 6 inches
5. Ground Cover: Minimum 6 inches.

END OF SECTION 329119

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sodding.
2. Erosion-control materials.

B. Related Sections:

1. Section 012950 "Measurement and Payment."
2. Section 329113 “Soil Preparation”
3. Section 329119 “Landscape Grading”
4. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 “Soil Preparation” and drawing designations for planting soils.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site as part of the overall project pre-construction meeting.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Sod: Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

E. Soil Analysis: Submit complete results of analysis, identifying required soil amendments, and amendment rates and procedures.

F. Planting Schedule: Submit proposed planting schedule, indicating dates for installation and completion of lawn work. Once accepted, revise schedule only as approved in writing by the Owner’s Representative, after documentation of reasons for delays.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Instructions: Prior to expiration of Contractor’s Maintenance Period, submit instructions recommending procedures to be followed by OWNER for maintenance of lawns for one full year following expiration of Contractor’s Maintenance Period. Meet with the OWNER and/or their representatives, to review instructions and to assure adequate understanding for OWNER to carry out instructions.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or AmericanHort.
2. Experience: Five years' experience in turf installation in addition to requirements in Section 014000 “Quality Requirements”.
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the National Association of Landscape Professionals:

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Lawn Care Manager.
    c. Landscape Industry Certified Lawn Care Technician.

5. Pesticide Applicator: State licensed, commercial.

B. 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 in this section.

C. Comply with all regulations applicable to landscape materials.

D. Soil Analysis: Provide and pay for the services of an approved, independent testing agency to perform an analysis of soil to be used. Analysis shall include a comprehensive description of soil, and a listing of types and quantities of soil amendments required for the establishment, growth and health of lawns. The number of samples required shall be a minimum of two samples per acre of lawn area, unless additional samples are recommended by testing agency.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: April 15th – May 30th.
2. Fall Planting: September 23rd – December 30th.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

C. Utilities: Locate and avoid damage to all underground utilities; perform work in a manner which will avoid damage. Utilities not necessarily shown on Drawings.

D. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

E. When conditions detrimental to lawn establishment, growth and maintenance are encountered, such as rubble, adverse drainage conditions, or obstructions, notify Owner's Representative for directions before planting.

F. Sodding shall only be permitted after irrigation system is installed and operating properly.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Sod shall be delivered machine cut to a uniform thickness of ¾" to 1½", excluding top growth and thatch. Length and width shall be the supplier's standard, with a maximum allowable deviation of 5%. Torn, uneven, or desiccated pads or edges shall not be acceptable.

C. Standard size sections of sod shall be capable of supporting their own weight and shape when suspended vertically.

D. Turfgrass Species, Warm-Season Grass: Bermudagrass (Cynodon dactylon).

E. Provide sod composed of species specified, free of weeds and other extraneous grass types.

2.2 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition:

a. 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.4 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Fiber Mesh / Coir Fiber Mat: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd. with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

C. Erosion-Control Mats: Cellular, nonbiodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Designer and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation.”

B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Designer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SODDING

A. Sodding shall not be done when the ground is frozen, snow covered, saturated, excessively dry, or in any other condition which would make establishment and survival of sod reasonably unlikely.

B. Prior to sod bed preparation, soil shall be in a loose, smooth, friable condition, free from stones over 1-½” in any dimension, sticks, roots, construction debris, and other extraneous matter. If soil has become crusty, hardened or eroded since being spread, it shall be a part of this work to restore the soil to the loose, smooth condition described above.

C. Prior to preparation of previously undistributed areas, completely remove existing vegetation and debris, and dispose of such material off-site; do not turn under vegetation into soil being prepared for sod bed. Loosen existing grade to a depth of 4"; remove all debris which surfaces.

D. Spread fertilizer at the rate of 16 lbs per 1000 sq. ft. or as otherwise recommended by the soil test report for the specified turf species. Add pH balancing agents at rate recommended by soil test report to achieve a pH of 5.5 to 6.5 for Centipede grass, 6.5 to 7.0 for Bermuda grass, 6.5 to 7.5 for St. Augustine grass and 6.0 to 7.0 for Zoysia grass. Add peat and other additives as recommended by the soil test report. Blend additives thoroughly into upper 4" of soil. Remove any rock or other debris which may surface. Till areas until soil is loose and friable and all soil amendments are uniformly distributed.

E. Work areas to a smooth even surface free from surface irregularities, ridges or depressions. Prepared areas shall meet required finish grade elevations allowing for sod thickness, and shall have positive drainage.

F. Moisten prepared areas if soil is dry. Water thoroughly, and then allow surface moisture to evaporate. Do not create muddy soil conditions; do not saturate soil.

G. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

H. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to and butting tightly against each other. Stagger strips to offset joints in adjacent courses. Care shall be taken to ensure that sod is not stretched or overlapped and that all joints are butted tight. On slopes, sod shall be laid parallel to the contour.

I. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.

J. Immediately after laying and firming the sod, irrigate to a depth of 4 inches below the underside of the strips.

K. During the first seven days after installation, maintain a continuous moist soil depth of at least 4 inches. After that period, water as necessary to maintain moist root zone.

3.6 TURF RENOVATION

A. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

C. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

D. Mow, dethatch, core aerate, and rake existing turf.

E. Remove weeds before sodding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

H. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

1. Soil Amendment(s): according to requirements of the soils preparation and required soils testing.
2. Initial Fertilizer: Slow-release fertilizer applied according to manufacturer's recommendations.

I. Apply sod as required for new turf.

J. Water newly planted areas and keep moist until new turf is established.

3.7 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. For sod, the first mowing shall not be attempted until the sod is firmly rooted. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow bermudagrass to a height of 1/2 to 1 inch.
2. Prior to cutting secured areas, drive peds flush with grade.

D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Designer:

1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.11 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Sodded Turf: 30 days from date of Substantial Completion.

END OF SECTION 329200

SECTION 329201 – BUFFER MITIGATION PLANTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Buffer Mitigation Planting

PART 2 - PRODUCTS

2.01 See sheet L1-1 for details and specifications for plantings. Follow planting schedule for number and species.

PART 3 - EXECUTION

3.01 PREPARATION

1. Prior to construction, verify grades for the areas to receive improvements are accurate to the plans and details.

2. Ensure property lines, setbacks and legal boundaries of work are clearly established.

3.02 PREINSTALLATION MEETINGS

1. Preinstallation Conference: Conduct conference at Project site prior to installation of new plantings.

3.03 INSTALLATION

1. Follow the landscape plans, details and specifications for ground preparation, handling of saplings, planting and stabilization of new trees and maintenance of area.

2. Clean up debris and unused material and remove from Project site.

END OF SECTION 329201

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Plants.
2. Tree stabilization.

B. Related Sections:

1. Section 012950 "Measurement and Payment."
2. Section 015639 “Temporary Tree and Plant Protection” for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
3. Section 311000 “Site Clearing” for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
4. Section 329200 "Turf and Grasses" for turf (lawn) planting and erosion-control materials.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.

D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

E. Finish Grade: Elevation of finished surface of planting soil.

F. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

G. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

H. Planting Area: Areas to be planted.

I. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" for drawing designations for planting soils.

J. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

K. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

L. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

M. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site as part of the overall project pre-construction meeting.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

D. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing with the National Association of Landscape Professionals or AmericanHort.
2. Experience: Five years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

4. Personnel Certifications: Installer's field supervisor, personnel assigned to the Work shall have certification in one of the following categories from the National Association of Landscape Professionals:

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Horticultural Technician.

5. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Designer may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Designer may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Designer of sources of planting materials seven days in advance of delivery to site.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

G. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.11 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: April 15th – May 30th.
2. Fall Planting: September 23rd – December 30th.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.12 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of tree stabilization.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods: From date of Substantial Completion.

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
c. Annuals: Three months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.

2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Designer, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 5-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood, Ground or shredded bark, Wood and bark chips, Pine straw, Pine needles, Peanut, pecan, and cocoa-bean shells.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural. NO DYED MULCH PRODUCTS.

2.4 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.
3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
4. Guys and Tie Wires: Are NOT permitted.
5. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
6. Guy Cables: Are NOT permitted.
7. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
8. Proprietary Staking-and-Guying Devices: Proprietary stake or anchor and adjustable tie systems to secure each new planting by plant stem; sized as indicated and according to manufacturer's written recommendations.

2.6 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA U1, Use Category UC4a; acceptable to authorities having jurisdiction, and containing no arsenic or chromium.

B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

C. Burlap: Non-synthetic, biodegradable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.

3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Designer and replace with new planting soil.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Designer's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Designer. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation.”

B. Placing Planting Soil: Blend planting soil in place.

C. Before planting, obtain Designer’s acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: At time directed by Designer, broadcast dry product uniformly over prepared soil at application rate according to manufacturer's written recommendations.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter for all plant stock.

3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
7. Maintain supervision of excavations during working hours.
8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

C. Obstructions: Notify Designer if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Drainage: Notify Designer if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Backfill: use planting soil for backfill. For trees, use excavated soil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

    a. Quantity: Two per plant or three for each caliper inch of tree.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Balled and Potted and Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Backfill: use planting soil for backfill. For trees, use excavated soil for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

    a. Quantity: Two per plant or three for each caliper inch of tree.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Designer.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Designer, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

A. Trunk Stabilization by Upright Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated. NO WIRES TO STABILIZE TREES, USE FIBROUS OR WEBB GUYING MATERIAL.

1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.

    a. Securely attach guys to stakes 30 inches long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses.
    b. For trees more than 6 inches, anchor guys to wood deadmen buried at least 36 inches below grade.

c. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
d. Support trees with fabric or webbing, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
e. Attach flags to each guy wire, 30 inches above finish grade.
f. Paint turnbuckles with luminescent white paint.

2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.8 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Treelike Shrubs in Turf Areas: Apply mulch ring of 3-inch average thickness, to cover the planting pit or trench. Do not place mulch within of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.10 INSTALLATION OF EDGING

A. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch deep, shovel-cut edge as indicated on Drawings.

3.11 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible, to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.12 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Designer.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Designer.

B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Designer determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size as those being replaced for each tree of 6 inches or smaller in caliper size.
2. Provide one new tree of 6-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.
3. Species of Replacement Trees: Same species being replaced.

3.14 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

D. After installation and before Substantial Completion remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.15 MAINTENANCE SERVICE

A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: 12 months from date of Substantial Completion.

B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: Six months from date of Substantial Completion.

END OF SECTION 329300

SECTION 329700 – SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2018 Standard specifications are included by reference.

1.2 SUMMARY

A. Section Includes:
   1. Signage

PART 2 – MATERIALS

A. THE FOLLOWING ITEMS SHALL CONFORM TO THE SPECIFICATIONS OF NCDOT 2018 STANDARD SPECIFICATIONS SECTION 901:
   1. CONTRACTOR FURNISHED, TYPE E SIGN

B. THE FOLLOWING ITEMS SHALL CONFORM TO THE SPECIFICATIONS OF NCDOT 2018 STANDARD SPECIFICATIONS SECTION 903:
   1. SUPPORTS, 3-LB STEEL U-CHANNEL

C. THE FOLLOWING ITEMS SHALL CONFORM TO THE SPECIFICATIONS OF NCDOT 2018 STANDARD SPECIFICATIONS SECTION 904:
   1. SIGN ERECTION, TYPE E

PART 3 – EXECUTION

A. PLACEMENT

All signs shall be placed as indicated in the plans.

END OF SECTION 329700

SECTION 329800 – TRAIL ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Town of Huntersville Standard specifications are included by reference.

1.2 SUMMARY

A. Section Includes:
   1. Bollards
   2. Tree Pits
   3. Farm Fence
   4. Handrail
   5. Concrete Wheel Stop

PART 2 – MATERIALS

A. Bollards
   1. Permanent bollards shall match the specifications of Detail 03 on sheet 2B-1.
   2. Collapsible bollards shall match the specifications of Detail 04 on sheet 2B-1.
   3. Bollard placement shall match the layout of Detail 05 on sheet 2B-1.

B. Tree Pits
   1. Tree pits shall match the specifications of Town of Huntersville Std Drawings 602.1, 603.1, 604.1, and 605.1 as indicated in the plans.

C. Farm Fence
   1. Farm Fence shall match the specifications of Detail 01 on sheet 2B-1.

D. Handrail
   1. Handrail specifications shall match that of Town of Huntersville Std Drawing 700.1.
   2. Handrail location shall match that of Town of Huntersville Handrail Warrants (Std Drawing 701.1) or as otherwise directed by the Engineer.

E. Concrete Wheel Stop
   1. Concrete Wheel Stop specifications shall match that of Town of Huntersville Standard Drawings.

PART 3 – EXECUTION

A. PLACEMENT
All bollards, tree pits, farm fence, handrail, and wheel stops shall be located as identified in the plans or as otherwise directed by the Engineer.

END OF SECTION 329800

SECTION 329900 – STRUCTURES

1. TIMBER BOARDWALK

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. All materials, construction, and fabrication shall meet the requirements of the *2024 NCDOT Standard Specifications for Roads and Structures.*

B. Falsework and Formwork Special Provision

C. Crane Safety Special Provision (if applicable)

1.2. SUMMARY

A. The work under this Section consists of fabrication and installation of timber boardwalk. The Contractor shall construct these structures along the horizontal and vertical alignments shown in the drawings or as directed by the Engineer. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary to complete the work as indicated on the project drawings and specified herein.

B. Timber boardwalks shall be constructed in accordance with *2024 NCDOT Standard Specifications for Roads and Structures*, Section 1082 unless noted otherwise in these specifications.

C. The concrete deck of the timber boardwalk shall be constructed in accordance with *2024 NCDOT Standard Specifications for Roads and Bridges*, Section 420 unless noted otherwise in these specifications.

1.3. REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

1. American Wood Protection Association (AWPA)

AWPA C2	Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
AWPA M4	Standard for the Care of Preservative-Treated Wood Products
AWPA M6	Brands Used on Forest Products
AWPA P5	Standard for Waterborne Preservatives

2. American National Standards Institute (ANSI)

ANSI B18.2.1	Square and Hex Bolts and Screws (Inch Series)
ANSI B18.2.2	Square and Hex Nuts (Inch Series)
ANSI B18.6.2	Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws
ANSI B18.6.3	Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)
ANSI B18.21.1	Lock Washers (Inch Series)
ANSI B18.22.1	Plain Washers

3. ASTM International (ASTM)

ASTM A 36	Carbon Structural Steel
ASTM A 123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

4. U.S. Department of Defense (DOD)

MIL-P-21035	Paint, High Zinc Dust Content, Galvanizing Repair (Metric)

1.4. CONSTRUCTION REQUIREMENTS

A. Geometry and Component Requirements:

1. Span:
   a. 10’ Spans: Spans may be constructed with variable lengths up to a maximum of 10’, measured from center of timber pile to center of timber pile.
   b. 20’ Spans: Spans may be constructed of variable lengths between 10’ and 20’, measured from center of timber pile to center of timber pile.
   c. Construction of consecutive 20’ spans is prohibited. A 20’ boardwalk span must be adjacent to 10’ boardwalk spans.

2. Width: The boardwalk clear width shall be as indicated in the drawings and shall be measured between the inside faces of timber rail elements.

3. Elevations and Vertical Alignment: The timber boardwalks will be constructed so that the top of concrete deck elevations align with the grade elevations shown on the plans.

4. Concrete Deck: Adhere to the concrete deck depths shown on the plans. Do not construct any portion of the deck with concrete depths above or below what is listed on the plans. The cross slope of the deck is achieved by varying the top surface of the concrete with an additional 2” on one side. Refer to the greenway plans for the direction of the cross slope for each boardwalk.

5. Expansion Joints: See Concrete Approach Special Provision and plans for details.

6. Railings: The top of the timber rail system shall not be less than 48 inches above the deck (measured from the high point of the walking/riding surface). Horizontal handrails are only needed for boardwalks with a grade greater than 3%.

7. Approach Rails shall be constructed at the specified boardwalk quadrants shown in the plans. See Boardwalk Approach Rail Special Provision and plans for details.

1.5. SUBMITTALS

A. The Contractor shall submit the following to the Engineer. Note that approval of the submittals by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

1. SD-06 Test Reports
   a. Timber Preservative Inspection
   b. Delivery Inspection List

2. SD-07 Certificates
   a. MSDS and CIS

3. Product Data: For each type of product used. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

4. Concrete Mix Design: Submit details of concrete mix design(s) to Engineer for review and approval prior to placement. Submittal shall include sufficient information to verify the proposed mix is in conformance with the 2024 Standard Specifications.

5. Product Test Reports: For the following:
   a. Bolts, nuts and washers including mechanical properties and chemical analysis.

1.6. QUALITY CONTROL

A. Quality Control shall be provided in accordance with ANSI/AITC A190.1-latest edition, the American Institute for Timber Construction “Standard for Heavy Timber Construction” AITC 108, American Wood-Preservers’ Association Standards, and the American Institute of Timber Construction Inspection Manual AITC-200, as applicable.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel and timber members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.

2. Clean and relubricate bolts and nuts that become dry and rusty before use.

PART 2 – PRODUCTS

2.1. MATERIALS

A. Materials shall be in accordance with the relevant paragraphs of the *2024 NCDOT Standard Specifications for Roads and Bridges*, Section 1082.

B. Lumber 2"-6" thick shall be pressure treated southern pine grade 1 or better and shall conform to AASHTO Standard M 168 of Wood Products. All lumber shall be dressed cut S4S (surfaced four sides). Preservatives and Pressure Treatment Process shall be in accordance with AASHTO Standard M 133 and American Wood-Preservers' Association (AWPA) standards. Pressure treated timber components shall be free of arsenic and shall be Alkaline Copper Quaternary Type D. Components in direct contact with the soil shall be use condition UCB-4B, with minimum retentions of 0.6 lbs/cf. Other framing and handrail components not in direct contact with the soil shall be use condition UCB-3B, with minimum retentions of 0.15 lbs/cf.

C. Timber piles shall be southern pine and conform to ASTM D25. They shall possess a minimum tip diameter of 10". Piles shall conform to AASHTO Standard M 168 of Wood Products. Preservatives and Pressure Treatment Process shall be in accordance with AASHTO Standard M 133 and American Wood Preservers' Association (AWPA) standards. All pressure treated timber piles shall be Chromated Copper Arsenate (CCA) with minimum retentions of 0.8 lbs/cf.

D. Hardware: Bolts with necessary nuts and washers, timber connectors, nails, screws, spikes, and other fastenings. Bolts and nuts shall conform to ASTM A 307. Provide cast-iron ogee, malleable iron washers, or plate or cut washers where indicated. Provide bolts with washers under nut and head. Provide timber connectors and other metal fastenings of type and size shown. Hot-dip galvanize all hardware and straps, unless otherwise noted, as required in *2024 NCDOT Standard Specifications for Roads and Structures*, Section 1076.

1. Lag Screws: ANSI B18.2.1, type and grade best suited for the purpose
2. Bolts, Nuts, and Studs: AASHTO M253
3. Screws: ANSI B18.6.3

E. Concrete: Class AA concrete shall be used for all concrete deck called out in the plans. All hardware required for the concrete deck, including the metal deck pan, angles, and all fasteners required for construction shall adhere to the hardware requirement in this Special Provision and be hot dip galvanized in accordance with 2024 NCDOT Standard Specifications section 1076.

F. Galvanized Steel Deck Pan: Concrete Deck shall be installed on a metal deck form with a galvanized finish. The deck must meet the following criteria:

1. Minimum Section Modulus of 0.071 in^3/ft
2. Minimum yield strength of 60 ksi.
3. Maximum rib height of 5/8”.

G. Concrete Deck: Class AA concrete, per NCDOT Standard Specifications

H. Welded Wire Mesh: Welded wire mesh used in the concrete deck shall be in accordance with *2024 NCDOT Standard Specifications for Roads and Structures*, Section 1070. All welded wire mesh shall be epoxy coated.

I. Boardwalk Backwall: Class A concrete, per *2024 NCDOT Standard Specifications for Bridge and Structures.*

J. Reinforcing Steel: ASTM A 615 (AASHTO M 31), Grade 60 and *2024 NCDOT Standard Specifications for Bridge and Structures.*

2.2. EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

2.3. INSTALLATION

A. Delivery is made to a location nearest the site which is easily accessible to normal over-the-road tractor/trailer equipment. The contractor is to schedule a pre-installation meeting to discuss the method of erecting the boardwalk, as well as to verify the location(s) of the crane(s) required for erection. All equipment locations and staging shall occur within the right-of-way and easements established in the greenway plans. Contractor to verify prior to commencing boardwalk erection.

B. The Fabricator will provide detailed, written instruction in the proper lifting procedures and splicing procedures (if required). The method and sequence of erection shall be the responsibility of the Contractor.

C. No debris will be allowed to collect in the channel of the waterway. Contractor to provide measures to ensure debris is collected from the channel of the waterway as soon as is practical during construction.

PART 3 – CONSTRUCTION REQUIREMENTS

3.1 CONSTRUCTION REQUIREMENTS

A. Construction of Boardwalk shall be in accordance with the *NCDOT 2024 Standard Specifications for Roads and Structure*s and shall conform to plans and special provisions. Any variations from these documents shall be approved by the Engineer and Owner.

B. Cut, bevel, and face timbers prior to plant preservative treatment. Provide protective equipment for personnel fabricating, field treating, or handling materials treated with creosote or water-borne salts. Refer to paragraph entitled "MSDS and CIS."

C. Framing: Cut and frame lumber and timber so that joints will fit over contact surface. Secure timbers and piles in alignment. Open joints are unacceptable. Shimming is not allowed. Bore holes for bolts with a bit 1/16 inch larger in diameter than bolt. Bore holes for lag screws in two parts. Make lead hole for shank the same diameter as shank. Make lead hole for the threaded portion approximately two-thirds of the shank diameter. Counter bore for countersinking wherever smooth faces are indicated or specified.

D. Bracing: Align bents before bracing is placed. Provide bracing of sufficient length to provide a minimum distance of 5.25 inches between outside bolt and end of brace. Bracing and girts shall bear firmly against piles or timber to which secured. Place fillers to avoid bending the bracing more than 1 inch out of line when bracing bolts or other fastenings are drawn up tight. Built-up fillers will not be permitted. Make filler a single piece of pile cut-off. Bolt ends of bracing through pile, post, or cap with a bolt of at least the indicated diameter. Bolt intersections as indicated.

E. Caps: Prior to placing caps, prepare tops of piles according to Section entitled, "Field Treatment." Place timber caps to secure bearing over tops of supporting piles and to secure even alignment of their ends.

F. Stringers: Place crown up and, if possible, the better edge of deck stringers down. Tops of stringers shall not vary from a plane more than will permit bearing of the floor on stringers. Lap stringers to take bearing over full width of cap or floor beam at each end. Fasten stringers as indicated. Stringers may be of sufficient length to cover two spans, except on horizontal curves. Between stringers, frame and nail solid-bridging at as indicated in the drawings. Make size and spacing of bridging as indicated.

G. Do not groove the boardwalk decks. Do not introduce any loading during the pouring, curing, or finishing of the concrete deck that will cause deformation to the metal deck form or welded wire mesh. Immediately after finishing of concrete, slightly roughen entire surface by lightly brooming with fiber-bristle broom perpendicular to traffic. Coordinate final finish with Engineer before application.

H. Fastening: Vertical bolts shall have nuts on the lower end. Bolt members together when they are installed and retighten immediately prior to final acceptance of contract. Provide bolts having sufficient additional threading to provide at least 3/8 inch per foot thickness of timber for future retightening. Provide timber connectors of types indicated.

I. Expansion Joints: ½" open joints shall be placed at bent locations at spacings not exceeding 50'.

J. The substructure of the timber boardwalks are designed for minimum pile depth elevations. Refer to the Geotechnical report for the minimum bottom of pile elevation for each boardwalk. If the minimum bottom of pile elevation is not satisfied during construction, contact the Engineer immediately.

K. Driven timber piles shall conform to Section 450 of the *2024 NCDOT Standard Specifications for Roads and Structures*. For dynamic pile testing, refer to Section 450 and the Geotechnical Report.

L. No debris will be allowed to collect in the channel of the waterway.

3.2 FIELD TREATMENT

A. Timberwork: Field treat cuts, bevels, notches, refacing and abrasions made in the field in treated piles or timbers in accordance with AWPA M4, MSDS and CIS. Wood preservatives are restricted use pesticides and shall be applied according to applicable standards. Trim cuts and abrasions before field treatment.

B. Piling and Post Protection: In accordance with AWPA M4, immediately after pile or post tops are cut off and prior to placement of pile cap, protect pile or post top with several heavy applications of the same preservative used to treat the pile or post, or else copper naphthenate solutions containing a minimum of 2 percent copper metal may be used with treated products.

C. Galvanized Surfaces: Repair and recoat zinc coating which has been field or shop cut, burned by welding, abraded, or otherwise damaged to such an extent as to expose the base metal. Thoroughly clean the damaged areas by wire brushing and remove traces of welding flux and loose or cracked zinc coating prior to painting. Paint cleaned area with two coats of zinc oxide-zinc dust paint conforming to MIL-P-21035. Compound paint with a suitable vehicle in a ratio of one part zinc oxide to four parts zinc dust by weight.

2. FALSEWORK AND FORMWORK

PART 1 – GENERAL

1.1. DESCRIPTION

A. Use this Special Provision as a guide to develop temporary works submittals required by the Standard Specifications or other provisions; no additional submittals are required herein. Such temporary works include, but are not limited to, falsework and formwork.

B. Falsework is any temporary construction used to support the permanent structure until it becomes self-supporting. Formwork is the temporary structure or mold used to retain plastic or fluid concrete in its designated shape until it hardens. Access scaffolding is a temporary structure that functions as a work platform that supports construction personnel, materials, and tools, but is not intended to support the structure. Scaffolding systems that are used to temporarily support permanent structures (as opposed to functioning as work platforms) are considered to be falsework under the definitions given. Shoring is

a component of falsework such as horizontal, vertical, or inclined support members. Where the term "temporary works" is used, it includes all of the temporary facilities used in bridge construction that do not become part of the permanent structure.

C. Design and construct safe and adequate temporary works that will support all loads imposed and provide the necessary rigidity to achieve the lines and grades shown on the plans in the final structure.

PART 2 – PRODUCTS

2.1. MATERIALS

A. Select materials suitable for temporary works; however, select materials that also ensure the safety and quality required by the design assumptions. The Engineer has authority to reject material on the basis of its condition, inappropriate use, safety, or nonconformance with the plans. Clearly identify allowable loads or stresses for all materials or manufactured devices on the plans. Revise the plan and notify the Engineer if any change to materials or material strengths is required.

PART 3 – DESIGN AND CONSTRUCTION REQUIREMENTS

3.1 WORKING DRAWINGS

A. Provide working drawings for items as specified in the contract, or as required by the Engineer, with design calculations and supporting data in sufficient detail to permit a structural and safety review of the proposed design of the temporary work.

B. On the drawings, show all information necessary to allow the design of any component to be checked independently as determined by the Engineer.

C. When concrete placement is involved, include data such as the drawings of proposed sequence, rate of placement, direction of placement, and location of all construction joints.

D. When required, have the drawings and calculations prepared under the guidance of, and sealed by, a North Carolina Registered Professional Engineer who is knowledgeable in temporary works design.

E. If requested by the Engineer, submit with the working drawings manufacturer's catalog data listing the weight of all construction equipment that will be supported on the temporary work. Show anticipated total settlements and/or deflections of falsework and forms on the working drawings. Include falsework footing settlements, joint take-up, and deflection of beams or girders.

F. As an option for the Contractor, overhang falsework hangers may be uniformly spaced, at a maximum of 36 inches, provided the following conditions are met:

Member Type (PCG)	Member Depth, (inches)	Max. Overhang Width, (inches)	Max. Slab Edge Thickness, (inches)	Max. Screed Wheel Weight, (lbs.)	Bracket Min. Vertical Leg Extension, (inches)
II	36	39	14	2000	26

III	45	42	14	2000	35
IV	54	45	14	2000	44
MBT	63	51	12	2000	50
MBT	72	55	12	1700	48

G. Overhang width is measured from the centerline of the girder to the edge of the deck slab. For Type II, III & IV prestressed concrete girders (PCG), 45-degree cast-in-place half hangers and rods must have a minimum safe working load of 6,000 lbs.

H. For MBT prestressed concrete girders, 45-degree angle holes for falsework hanger rods shall be cast through the girder top flange and located, measuring along the top of the member, 1'-2 ½" from the edge of the top flange. Hanger hardware and rods must have a minimum safe working load of 6,000 lbs.

I. For links slabs, the tops of girders directly beneath the link slab shall be free of overhang falsework attachments or other hardware. Submit calculations and working drawings for overhang falsework in the link slab region.

J. The overhang bracket provided for the diagonal leg shall have a minimum safe working load of 3,750 lbs. The vertical leg of the bracket shall extend to the point that the heel bears on the girder bottom flange, no closer than 4 inches from the bottom of the member. However, for 72-inch members, the heel of the bracket shall bear on the web, near the bottom flange transition.

K. Provide adequate overhang falsework and determine the appropriate adjustments for deck geometry, equipment, casting procedures and casting conditions.

L. If the optional overhang falsework spacing is used, indicate this on the falsework submittal and advise the girder producer of the proposed details. Failure to notify the Engineer of hanger type and hanger spacing on prestressed concrete girder casting drawings may delay the approval of those drawings.

M. Falsework hangers that support concentrated loads and are installed at the edge of thin top flange concrete girders (such as bulb tee girders) shall be spaced so as not to exceed 75% of the manufacturer's stated safe working load. Use of dual leg hangers (such as Meadow Burke HF-42 and HF-43) are not allowed on concrete girders with thin top flanges. Design the falsework and forms supporting deck slabs and overhangs on girder bridges so that there will be no differential settlement between the girders and the deck forms during placement of deck concrete.

N. When staged construction of the bridge deck is required, detail falsework and forms for screed and fluid concrete loads to be independent of any previous deck pour components when the mid-span girder deflection due to deck weight is greater than ¾".

O. Note on the working drawings any anchorages, connectors, inserts, steel sleeves or other such devices used as part of the falsework or formwork that remains in the permanent structure. If the plan notes indicate that the structure contains the necessary corrosion protection required for a Corrosive Site, epoxy coat, galvanize or metalize these devices. Electroplating will not be allowed. Any coating required by the Engineer will be considered incidental to the various pay items requiring temporary works.

P. Design falsework and formwork requiring submittals in accordance with the 1995 AASHTO *Guide Design* Specifications *for Bridge Temporary Works* except as noted herein.

1. Wind Loads: Table 2.2 of Article 2.2.5.1 is modified to include wind velocities up to 110 mph. In addition, Table 2.2A is included to provide the maximum wind speeds by county in North Carolina.

Table 2.2 - Wind Pressure Values

Height Zone feet above ground	Pressure, lb/ft^2 for Indicated Wind Velocity, mph				
	70	80	90	100	110
0 to 30	15	20	25	30	35
30 to 50	20	25	30	35	40
50 to 100	25	30	35	40	45
over 100	30	35	40	45	50

1. Time of Removal

The following requirements replace those of Article 3.4.8.2.

Do not remove forms until the concrete has attained strengths required in Article 420-16 of the Standard Specifications and these Special Provisions.

Do not remove forms until the concrete has sufficient strength to prevent damage to the surface.

Table 2.2A - Steady State Maximum Wind Speeds by Counties in North Carolina

COUNTY	25 YR (mph)	COUNTY	25 YR (mph)	COUNTY	25 YR (mph)
Alamance	70	Franklin	70	Pamlico	100
Alexander	70	Gaston	70	Pasquotank	100
Alleghany	70	Gates	90	Pender	100
Anson	70	Graham	80	Perquimans	100
Ashe	70	Granville	70	Person	70
Avery	70	Greene	80	Pitt	90
Beaufort	100	Guilford	70	Polk	80
Bertie	90	Halifax	80	Randolph	70
Bladen	90	Harnett	70	Richmond	70
Brunswick	100	Haywood	80	Robeson	80
Buncombe	80	Henderson	80	Rockingham	70
Burke	70	Hertford	90	Rowan	70
Cabarrus	70	Hoke	70	Rutherford	70
Caldwell	70	Hyde	110	Sampson	90
Camden	100	Iredell	70	Scotland	70
Carteret	110	Jackson	80	Stanley	70
Caswell	70	Johnston	80	Stokes	70
Catawba	70	Jones	100	Surry	70
Cherokee	80	Lee	70	Swain	80
Chatham	70	Lenoir	90	Transylvania	80
Chowan	90	Lincoln	70	Tyrell	100
Clay	80	Macon	80	Union	70
Cleveland	70	Madison	80	Vance	70
Columbus	90	Martin	90	Wake	70
Craven	100	McDowell	70	Warren	70
Cumberland	80	Mecklenburg	70	Washington	100
Currituck	100	Mitchell	70	Watauga	70
Dare	110	Montgomery	70	Wayne	80
Davidson	70	Moore	70	Wilkes	70
Davie	70	Nash	80	Wilson	80
Duplin	90	New Hanover	100	Yadkin	70
Durham	70	Northampton	80	Yancey	70
Edgecombe	80	Onslow	100		
Forsyth	70	Orange	70		

3.2. REVIEW AND APPROVAL

A. The Engineer is responsible for the review and approval of temporary works' drawings.

B. Submit the working drawings sufficiently in advance of proposed use to allow for their review, revision (if needed), and approval without delay to the work.

C. The time period for review of the working drawings does not begin until complete drawings and design calculations, when required, are received by the Engineer.

D. Do not start construction of any temporary work for which working drawings are required until the drawings have been approved. Such approval does not relieve the Contractor of the responsibility for the accuracy and adequacy of the working drawings.

3.3 CONSTRUCTION REQUIREMENTS

A. All requirements of Section 420 of the Standard Specifications apply.

B. Construct temporary works in conformance with the approved working drawings. Ensure that the quality of materials and workmanship employed is consistent with that assumed in the design of the temporary works. Do not weld falsework members to any portion of the permanent structure unless approved. Show any welding to the permanent structure on the approved construction drawings.

C. Provide tell-tales attached to the forms and extending to the ground, or other means, for accurate measurement of falsework settlement. Make sure that the anticipated compressive settlement and/or deflection of falsework does not exceed 1 inch. For cast-in-place concrete structures, make sure that the calculated deflection of falsework flexural members does not exceed 1/240 of their span regardless of whether or not the deflection is compensated by camber strips.

3.4 MAINTENANCE AND INSPECTIONS

A. Inspect and maintain the temporary work in an acceptable condition throughout the period of its use. Certify that the manufactured devices have been maintained in a condition to allow them to safely carry their rated loads. Clearly mark each piece so that its capacity can be readily determined at the job site.

B. Perform an in-depth inspection of an applicable portion(s) of the temporary works, in the presence of the Engineer, not more than 24 hours prior to the beginning of each concrete placement. Inspect other temporary works at least once a month to ensure that they are functioning properly. Have a North Carolina Registered Professional Engineer inspect the cofferdams, shoring, sheathing, support of excavation structures, and support systems for load tests prior to loading.

3.5 FOUNDATIONS

A. Determine the safe bearing capacity of the foundation material on which the supports for temporary works rest. If required by the Engineer, conduct load tests to verify proposed bearing capacity values that are marginal or in other high-risk situations.

B. The use of the foundation support values shown on the contract plans of the permanent structure is permitted if the foundations are on the same level and on the same soil as those of the permanent structure.

C. Allow for adequate site drainage or soil protection to prevent soil saturation and washout of the soil supporting the temporary works supports.

D. If piles are used, the estimation of capacities and later confirmation during construction using standard procedures based on the driving characteristics of the pile is permitted. If preferred, use load tests to confirm the estimated capacities; or, if required by the Engineer conduct load tests to verify bearing capacity values that are marginal or in other high risk situations.

E. The Engineer reviews and approves the proposed pile and soil bearing capacities.

3.6 REMOVAL

A. Unless otherwise permitted, remove and keep all temporary works upon completion of the work. Do not disturb or otherwise damage the finished work.

B. Remove temporary works in conformance with the contract documents. Remove them in such a manner as to permit the structure to uniformly and gradually take the stresses due to its own weight.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. Unless otherwise specified, temporary works will not be directly measured.

B. Payment at the contract unit prices for the various pay items requiring temporary works will be full compensation for the above falsework and formwork.

3. <u>CRANE SAFETY</u>

Comply with the manufacturer specifications and limitations applicable to the operation of any and all cranes and derricks. Prime contractors, sub-contractors, and fully operated rental companies shall comply with the current Occupational Safety and Health Administration (OSHA) regulations.

Submit all items listed below to the Engineer prior to beginning crane operations. Changes in personnel or equipment must be reported to the Engineer and all applicable items listed below must be updated and submitted prior to continuing with crane operations.

CRANE SAFETY SUBMITTAL LIST

A. **Competent Person:** Provide the name and qualifications of the "Competent Person" responsible for crane safety and lifting operations. The named competent person will have the responsibility and authority to stop any work activity due to safety concerns.

B. **Riggers:** Provide the qualifications and experience of the persons responsible for rigging operations. Qualifications and experience should include, but not be limited to, weight calculations, center of gravity determinations, selection and inspection of sling and rigging equipment, and safe rigging practices.

C. **Crane Inspections:** Inspection records for all cranes shall be current and readily accessible for review upon request.

D. **Certifications:** Crane operators shall be certified by the National Commission for the Certification of Crane Operators (NCCCO) or the National Center for Construction Education and Research (NCCER). Other approved nationally accredited programs will be considered upon request. In addition, crane operators shall have a current CDL medical card. Submit a list of crane operator(s) and include current certification for each type of crane operated (small hydraulic, large hydraulic, small lattice, large lattice) and medical evaluations for each operator.

4. BOARDWALK APPROACH RAIL

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

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

B. All materials, construction, and fabrication shall meet the requirements of the *2024 NCDOT Standard Specifications for Roads and Structures*.

1.2. SUMMARY

A. Approach Rails are used at the beginning and end of each Boardwalk, and details are shown in the plans. Refer to plans for specific locations.

PART 2 – PRODUCTS

2.1. MATERIALS

A. Materials shall be in accordance with the relevant paragraphs of the *2024 NCDOT Standard Specifications for Roads and Bridges*.

B. Concrete Post Supports: Class B concrete, per *2024 NCDOT Standard Specifications for Bridge and Structures.*

PART 3 – CONSTRUCTION REQUIREMENTS

3.1. CONSTRUCTION METHODS

A. Approach Rail shall be constructed in accordance with and follow the same guidelines as the Timber Boardwalk Special Provision for this project and the 2024 NCDOT Standard Specifications, unless otherwise noted in these specifications.

5. CONCRETE APPROACH SLAB

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. All materials, construction, and fabrication shall meet the requirements of the *2024 NCDOT Standard Specifications for Roads and Structures*.

1.2. SUMMARY

A. Construct reinforced concrete approach slabs at the specified boardwalk approaches shown on the plans. Include subgrade and base course; furnish and place temporary slope drainage systems and subsurface drainage systems; remove any existing pavement or materials; furnish and place concrete, reinforcing steel, and other materials; finish and cure concrete.

B. Locate and construct all expansion joints as shown in the plans. Immediately after removing the forms, inspect the expansion joint void carefully. Neatly remove any concrete or mortar in the joint.

C. Construct the approach slabs after the adjacent boardwalk is constructed.

PART 2 – PRODUCTS

2.1. MATERIALS

A. Refer to Division 10 of the *2024 NCDOT Standard Specifications for Roads and Structures*.

Item	**Section**
Curing Agents	1026
Portland Cement Concrete, Class AA	1000
Reinforcing Steel	1070
Stone, No. 78M	1005
Subdrain Fine Aggregate	1044-1

PART 3 – CONSTRUCTION REQUIREMENTS

3.1. CONSTRUCTION METHODS

A. Concrete Slabs

1. Construct the subgrade in accordance with Section 500. Construct the aggregate concrete base course in accordance with Section 520. Apply Section 420 to all concrete except as otherwise provided herein. Finish the reinforced concrete approach slabs in accordance with Article 420-14.

2. Apply a light broomed texture to the approach slabs before the concrete becomes non-plastic. Cure approach slabs in the same manner as specified for bridge decks in Subarticle 420-15(B).

3. Temporarily cover or fill the opening in the joint at the boardwalk installation of the joint seal. Make sure that the covering or filler provides for drainage off the boardwalk deck and keeps debris out of the joint and off the boardwalk cap.

4. Include any necessary temporary slope drainage systems to protect both the concrete approach slab and the adjoining structure. Use either corrugated polyethylene, corrugated steel or corrugated aluminum alloy for the temporary drainage pipe. Do not use perforated pipe. Provide temporary pipe of sufficient length for complete drainage away from the greenway embankment.

5. Backfill the approach slabs as soon as practical to prevent erosion adjacent to the slab

B. Expansion Joints

1. Filled Joints

a. Provide a nonbituminous type joint filler that meets AASHTO M 153 for Types I, II or III, or a bituminous type that meets AASHTO M 213. Furnish a Type 3 material certification with each lot of the joint material supplied to each project.

b. Use cork, bituminous fiber, neoprene or rubber in all expansion joint material. Use an optional second layer to obtain the required thickness, when a thickness of more than 1 inch is required.

c. Cut the joint filler to the same shape and size as the area to be covered except cut it 1/2 inch below any surface that is exposed to view in the finished work. As an option, cut the joint filler the same size and shape as that of the adjoining surfaces and neatly cut back the material 1/2 inch on the surfaces that are exposed to view after the concrete hardens. Cut the joint filler out of as few pieces as practical and, except as noted above, completely fill the space provided. Fasten the pieces in any one joint together in an approved manner. Do not use loose fitting or open joints between sections of filler or between filler and forms. Do not use joints made up with small strips. Place 2-ply roofing felt over all joints in the filler material in vertical expansion joints below top of curbs. Place the felt on the side of the joint adjacent to the new pour.

d. Seal all expansion joints with a low modulus silicone sealant.

2. Low Modulus Silicone Sealant

a. Provide a cold applied, single component, chemically curing low modulus silicone sealant evaluated by NTPEP. Acid cure sealants are not acceptable for use on Portland cement concrete. Bond breakers shall meet requirements listed below.

b. Type SL Silicone Sealant: A self-leveling silicone used to seal horizontal joints in Portland cement concrete pavements and bridges. Tooling is not normally required.
   1) Requirements:
   2) Silicone sealant shall meet the Requirement Table, ASTM D5893 and shall have been evaluated by NTPEP.

3) Deliver each lot of sealant in containers plainly marked with the manufacturer's name or trademark, lot number and date of manufacture

Requirements

REQUIREMENT TABLE PHYSICAL PROPERTIES OF SEALANT		
Property	Requirement	Test Method
Peel	Minimum of 20 lb/in of width with at least 75% cohesive failure	ASTM D903 bonded on concrete block
Movement Capability and Adhesion	No adhesive or cohesive failure after 10 cycles of test movements of +100% (extension) and –50% (compression)	ASTM C719

3. Bond Breaker: Install silicone sealant over a bond breaker to prevent the sealant from bonding to the bottom of the joint. Use bond breakers that do not stain or adhere to the sealant and are chemically inert and resistant to oils. Furnish a Type 3 material certification for each lot of bond breaker material supplied to each project.

a. Type M: Type M backer rod is a closed-cell polyolefin foam backer rod which has a closed-cell skin over an open cell core. Use this backer rod in roadway and bridge joints with both silicone sealant types. Use Type M backer rod that complies with the table below.

REQUIREMENT TABLE PHYSICAL PROPERTIES OF TYPE M BACKER ROD		
Property	Requirement	Test Method
Min. Density	2.0 lb/cf	ASTM D 1622
Min. Tensile Strength	25 psi	ASTM D 1623
Max. Water Absorption	0.5% by volume	ASTM C 509

b. Type N: Provide bond breaking tape made from extruded polyethylene that has a pressure sensitive adhesive on one side. Bond breaking tape may be used with both types of silicone but is suitable for bridge joints only. Bond breaking tapes shall be at least 0.005 inch in thickness.

END OF SECTION 329900

SECTION 334200 - STORMWATER CONVEYANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2018 Standard Specifications apply where referenced.

1.2 SUMMARY

A. Section Includes:

1. NCDOT Standard Items:
    a. RC Pipe Culverts, Class III.
    b. RC Pipe Culverts, Class IV.
    c. Reinforced Endwalls.
    d. Masonry Drainage Structures.
    e. Frame with Grate & Hood.
    f. Rip Rap.

2. Other Items Not Covered by NCDOT Standards:
    a. PVC pipe and fittings.
    b. Concrete pipe and fittings.
    c. Cleanouts.
    d. Drains.
    e. Manholes.
    f. Stormwater inlets.
    g. Pipe outlets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Stormwater inlets: Include plans, elevations, sections, details, frames, covers, and grates.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

B. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1-inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.

C. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes in accordance with manufacturer's written rigging instructions.

D. Handle stormwater inlets in accordance with manufacturer's written rigging instructions.

1.7 FIELD CONDITIONS

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

1. Notify Architect no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Architect's written permission.

PART 2 - PRODUCTS

2.1 NCDOT STANDARD ITEMS

A. The following items shall conform to the specifications set forth in the NCDOT 2018 Standard Specifications Section 310:
1. 48” RC Pipe Culverts, Class III.

2. 15” RC Pipe Culverts, Class IV.
3. 18” RC Pipe Culverts, Class IV.
4. 36” RC Pipe Culverts, Class IV.

B. The following items shall conform to the specifications set forth in the NCDOT 2018 Standard Specifications Section 838:
1. Reinforced Endwalls.

C. The following items shall conform to the specifications set forth in the NCDOT 2018 Standard Specifications Section 840:
1. Masonry Drainage Structures
2. Frame with Grate & Hood, STD 840.03, Type E.
3. Frame with Grate & Hood, STD 840.03, Type F.
4. Frame with Grate & Hood, STD 840.03, Type G.

D. The following items shall conform to the specifications set forth in the NCDOT 2018 Standard Specifications Section 876:
1. Rip Rap, Class I.
2. Rip Rap, Class B.

2.2 OTHER ITEMS (NON-NCDOT STANDARDS)

A. CONCRETE PIPE AND FITTINGS
1. Source Limitations: Obtain concrete pipe and fittings from single manufacturer.
2. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C76 .
3. Bell-and-spigot ends and gasketed joints with ASTM C443 , rubber gaskets sealant joints with ASTM C990 , bitumen or butyl-rubber sealant.
4. Class III, Wall A B C.
5. Class IV, Wall A B C.

B. NONPRESSURE TRANSITION COUPLINGS
1. Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
2. Sleeve Materials:
   a. For Concrete Pipes: ASTM C443 , rubber.
3. Ring-Type, Flexible Couplings:
   a. Source Limitations: Obtain ring-type, flexible couplings from single manufacturer.
   b. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

C. DRAINS
1. Cast-Iron Area Drains:
   a. Source Limitations: Obtain cast-iron area drains from single manufacturer.

b. Description: ASME A112.6.3 gray-iron round body with anchor flange and round[secured] grate. Include bottom outlet with inside caulk or spigot connection, of sizes indicated.
c. Top-Loading Classification(s): Medium Duty and Heavy Duty.

D. STORMWATER INLETS
1. Combination Inlets: Made with vertical curb and horizontal gutter openings[, of materials and dimensions in accordance with utility standards]. Include heavy-duty frames and grates.
2. Frames and Grates: Heavy duty [, in accordance with utility standards].

E. PIPE OUTLETS
1. Riprap Basins: Broken, irregularly sized and shaped, graded stone in accordance with NSSGA's "Quarried Stone for Erosion and Sediment Control."
a. Average Size: NSSGA No. R-3, screen opening 2 inches.
b. Average Size: NSSGA No. R-4, screen opening 3 inches.
c. Average Size: NSSGA No. R-5, screen opening 5 inches.
2. Filter Stone: In accordance with NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.
3. Energy Dissipaters: In accordance with NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

F. STORMWATER CONTROL MEASURES
1. In accordance with the notes and details on plan sheets SCM-1 and SCM-2.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure drainage piping in accordance with the following:

1. Install piping pitched down in direction of flow.
2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
3. Install piping with 36 inch- minimum cover.
4. Install PVC cellular-core piping in accordance with ASTM D2321 and ASTM F1668.
5. Install reinforced-concrete sewer piping in accordance with ASTM C1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping in accordance with the following:
1. Join PVC cellular-core piping in accordance with ASTM D2321 and ASTM F891 for solvent-cemented joints.
2. Join reinforced-concrete sewer piping in accordance with ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
3. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 BACKWATER VALVE INSTALLATION

A. Install horizontal-type backwater valves in piping where indicated.

3.5 DRAIN INSTALLATION

A. Install type of drains in locations indicated.

1. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification drains in vehicle-traffic service areas.
4. Use Extra-Heavy-Duty, top-loading classification drains in roads.

B. Embed drains in 4-inch- minimum concrete around bottom and sides.

C. Fasten grates to drains if indicated.

D. Set drain frames and covers with tops flush with pavement surface.

3.6 STORMWATER OUTLET INSTALLATION

A. Construct riprap of broken stone, as indicated.

B. Install outlets that spill onto grade, anchored with concrete, where indicated.

C. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

D. Construct energy dissipaters at outlets, as indicated.

3.7 15” FLARED END SECTION

A. Shall meet the specifications of Town of Huntersville Standard Drawing No. 307.1.

3.8 18” FLARED END SECTION

A. Shall meet the specifications of Town of Huntersville Standard Drawing No. 307.1.

3.9 STORMWATER CONTROL MEASURE

A. Install in accordance with the notes and details on plan sheets SCM-1 and SCM-2.

3.10 IDENTIFICATION

A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use [warning tape or] detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.11 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Damage: Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems in accordance with requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test in accordance with requirements of authorities having jurisdiction, UNI-B-6, and the following:

a. Exception: Piping with soil tight joints unless required by authorities having jurisdiction.
b. Option: Test plastic piping in accordance with ASTM F1417.

6. Force-Main Storm Drainage Piping: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than [150] <Insert number> psig (kPa).

a. Ductile-Iron Piping: Test in accordance with AWWA C600, "Hydraulic Testing" Section.
b. PVC Piping: Test in accordance with AWWA M23, "Testing and Maintenance" Chapter.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

3.12 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water. Flush with water.

END OF SECTION 334200

SECTION 335100 – ADJUSTMENT OF MANHOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. NCDOT 2018 Standard Specifications apply where referenced.

1.2 SUMMARY

A. Section Includes:
   1. Adjustment of Manholes.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 WORK

A. Adjustment of Manholes shall conform to the NCDOT 2018 Standard Specifications section 858.

END OF SECTION 335100

APPENDIX A – GEOTECHNICAL REPORT

FROEHLING & ROBERTSON, INC.

Report of Subsurface Exploration and Geotechnical Engineering Services

North Mecklenburg Park Greenway
Huntersville, Mecklenburg County, North Carolina

Prepared for:

McAdams

3430 Toringdon Way, Suite 110

Charlotte, North Carolina 28277

Prepared by:

Froehling & Robertson, Inc.

3300 International Airport Drive, Suite 600

Charlotte, North Carolina 28208

27 July 2022

F&R Project No. 63A-0059

F&R Project No.: 63A-0059 27 July 2022

McAdams
3430 Toringdon Way
Suite 110
Charlotte, NC 28277

Attn: Mr. Andrew Hickling

Re: **Report of Subsurface Exploration and Geotechnical Engineering Services**
North Mecklenburg Park Trail
Huntersville, Mecklenburg County, North Carolina

Dear Mr. Hickling:

The enclosed report presents the results of the subsurface exploration program and geotechnical engineering evaluation undertaken by Froehling & Robertson, Inc. (F&R), in connection with the above referenced project in Huntersville, North Carolina. Our services were performed in general accordance with F&R Proposal No. 2163-00164, dated 16 September 2021. This report presents our understanding of the project, reviews our subsurface exploration and laboratory testing procedures, describes the general subsurface conditions at the boring locations, and presents our evaluations, and recommendations.

We have enjoyed working with you on this project, and we are prepared to assist you with further geotechnical services as plans are further developed. If requested, we can also perform the recommended quality assurance monitoring and testing services during construction. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,

FROEHLING & ROBERTSON, INC.

NORTH CAROLINA PROFESSIONAL SEAL 048021 ENGINEER ALEXANDER T. KUCZERO

2022-07-27 19:06-04:00

07/27/2022

Alexander T. Kuczero, P.E.
Geotechnical Engineer

Andrew R. Frank, P.E.
Regional Senior Geotechnical Engineer

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EXECUTIVE SUMMARY

This Executive Summary is provided as a brief overview of our geotechnical engineering evaluation for the project and is not intended to replace more detailed information contained elsewhere in this report. As an overview, this summary inherently omits details that could be very important to the proper application of the provided geotechnical design recommendations. This report should be read in its entirety prior to implementation into design and construction. The Project Information section of this report should be particularly reviewed by project designers to confirm that the geotechnical engineer's understanding of the project concurs with the current project parameters at the time of project design.

- The site was explored by six (6) Standard Penetration Test (SPT) borings (B-1 through B-6) and (1) offset boring (designated as B-3A) performed on 27 June 2022. Site subsurface conditions generally consisted of surficial soils, fill material, residual soils, partially weathered rock (PWR) and auger refusal materials.
- F&R recommends utilizing driven timber piles, with a minimum tip diameter of 10 inches, to support the pier locations for the proposed elevated timber boardwalks based on the provided maximum top of pile reactions of up to 28 kips and 2.1 kips for axial compression and transverse loads, respectively.
    - The timber pile locations at Boardwalk #1 should be pre-drilled to facilitate pile installation to a minimum embedment of 1-foot into PWR. The predrilled hole should be large enough to facilitate driving to the specified embed, but not larger than the required minimum tip diameter of 10 inches.
    - We do not anticipate pre-drilling will be required for the installation of timber piles for Boardwalk #2. For the required allowable axial pile load of up to 28 kips, the timber piles will need to be driven a minimum of 3 feet into dense residual soil (N-value >30 bpf) with a minimum total embedment of at 20 feet.
- Based on the assumed loading conditions and recommended subgrade preparation, we recommend a light-duty flexible pavement section for the proposed greenway paths consisting of 2 inches S9.5B Asphalt Pavement Surface Mix underlain by 6 inches Aggregate Base Course (ABC) Stone.
- Groundwater level readings were taken in each boring during drilling and immediately upon completion of the soil drilling process. Groundwater was encountered upon the completion of drilling in borings B-5 and B-6 at approximate depths of 10 and 11.7 feet below the existing ground surface, respectively. We do not anticipate that groundwater will be encountered during grading operations given our previously stated understanding of the proposed grading. However, we anticipate groundwater will likely be encountered during installation of deep foundations for the boardwalks.

1.0 INTRODUCTION

1.1 Site Description and Project Information

Project information was provided to F&R by McAdams via email correspondences. F&R has been with the following information:

- Preliminary Greenway Plans (*North Meck Park Greenway Plans.pdf and HUN21002x.dwg*) prepared by McAdams and dated 05/23/2022; conveyed to F&R via email dated 5/24/2022.
- Preliminary Boardwalk Plans (Huntersville Prelim Boardwalk 6-20-2022.pdf), Sheets S-1, S-2, S-3, prepared by McAdams and dated 06/2022; conveyed to F&R via email dated 7/15/2022.
- Concrete Deck Boardwalk Design – Pile Reactions (*North Mecklenburg Park Greenway - Boardwalk - Geotech Loads.pdf*) prepared by Moffatt& Nichol and dated 07/2022; conveyed to F&R via email dated 7/19/2022.

F&R understands the project will consist of a new multi-use greenway path in Huntersville, Mecklenburg County, North Carolina. While the alignment has not been finalized, we understand that the new greenway trail will generally start near 16322 Amber Field Drive and will extend northward along a power line easement until the greenway termination about 300 feet west of the CVS parking lot at 16715 Old Statesville Road.

Based on the provided information, we understand that the total proposed length of the new paved trail is approximately 0.7 miles and will include two boardwalk crossings, each 50 feet in length. The locations of the proposed boardwalks are summarized in the following table.

Boardwalk	Alignment	Begin Station	End Station
#1	L1	12+93	22+43
#2	Y3	0+58	1+08

The provided drawings indicate that the boardwalks will be 12 feet wide and timber-framed with concrete decking. The currently planned boardwalks will consist of three 10-foot spans and a 20-foot span, each supported by a pair of timber piles set about 8 feet apart. We were provided with the following pile loads for the boardwalks on 19 July 2022:

Boardwalk Span	Factored Reactions (Top of Pile, except Moment*)		
	Axial (Compression)	Transverse	Moment*
10’ Span + 10’ Span	23.9 kip	1.5 kip	18.1 kip-ft
10’ Span + 20’ Span	28.0 kip	2.1 kip	23.6 kip-ft

*Moment provided is at pile fixity depth of 11 feet assumed by others

Based on our experience with other recent greenway projects, pathway traffic loads will consist of pedestrians, cyclists, and occasional maintenance vehicles. The majority of the project is located adjacent to an existing stream, which traverses various drainage features and existing utility right-of-ways. The site is predominately low-lying land and is currently under construction for a stream restoration. Based on the provided elevation profiles, the proposed alignment elevations are relatively close to existing grades, with proposed cuts and fills generally less than about 2 feet and 6 feet, respectively. We anticipate that boardwalk deck heights will range from 0 to about 5.5 feet above existing site grades with above-grade pile lengths of about 0 to about 4 feet.

1.2 Scope of Services

The purposes of our involvement on this project were to 1) conduct a subsurface exploration program consisting of up to six (6) soil test borings, 2) provide general descriptions of the subsurface soil conditions at the locations explored, 3) provide pavement design recommendations for at-grade portions of the trail, 4) provide foundation recommendations for the boardwalk sections, and 5) comment on geotechnical aspects of the proposed development. To accomplish the above-outlined objectives, we undertook the following scope of services:

1) Visited the site to observe existing surface conditions and features and mark boring locations.
2) Coordinated utility clearance with NC-811 Utility services.
3) Reviewed readily available geologic information relative to the project site.
4) Executed a subsurface exploration consisting of six (6) standard penetration test (SPT) borings and one (1) offset boring. Maximum drill depths ranged from 8 to 40 feet for the borings along the trail and presumed boardwalk locations, respectively. The borings were drilled to their pre-planned depths, successive increments into partially weathered rock, or auger refusal, whichever was encountered first. In general, the borings were advanced using hollow stem auger drilling procedures with split-spoon sampling in general accordance with ASTM D1586. Up to five Standard Penetration Tests (SPTs) were performed from the ground surface to the depth of 10 feet and at 5-foot intervals thereafter to the boring termination depth. No rock coring or exploration of any refusal material was planned or included for this project.
5) Performed a laboratory-testing program on selected split-spoon samples consisting of up to two (2) classification tests (Atterberg limits, wash #200, and natural moisture).
6) Evaluated the findings of the test borings and laboratory data relative to the development of design pavement sections.

7) Developed geotechnical engineering recommendations for the design of deep foundations to support the boardwalk abutments, including recommended pile types and axial and lateral capacities.

8) Prepared this written report summarizing our work on the project, providing descriptions of the subsurface conditions encountered, providing recommendations for foundation and pathway pavement design, and discussing geotechnical related aspects of the proposed construction. Copies of the test boring logs and laboratory test results are included.

Our scope of services did not include rock coring, survey services, quantity estimates, preparation of plans or specifications, slope stability analyses, civil, stormwater, or environmental engineering services, evaluations of earthquake motions, or the identification and evaluation of wetland or other environmental aspects of the project site.

By the nature of the work performed, our field exploration activities resulted in disturbances to the site. Reasonable efforts were made to lessen potential impacts of the field exploration. Borings were backfilled with auger cuttings. As stated in our proposal, F&R assumes no responsibility for borehole subsidence after demobilizing from the site and recommends that others occasionally observe the boring locations and provide any additional infill that may be needed.

2.0 EXPLORATION PROCEDURES

2.1 Subsurface Exploration Methods

The subsurface exploration program consisted of six (6) Standard Penetration Test (SPT) borings (B-1 through B-6) and (1) offset boring (designated as B-3A). Boring B-3 was performed as auger only until reaching a depth that exceeded boring B-3. No samples were retrieved from boring B-3A due to encountering shallow refusal. The borings were performed on 27 June 2022 at the approximate locations shown on the attached Boring Location Plan (Drawing No. 2, Appendix II).

F&R personnel marked boring locations in the field using a handheld GPS. Boring elevations were interpolated to the nearest foot from the Mecklenburg County GIS. In consideration of the methods used in their determination, the boring locations shown on the attached Boring Location Plan and elevations shown on the attached Boring Logs should be considered approximate.

The SPT borings were performed in accordance with generally accepted practice using a CME-550X rubber-tired (ATV)-mounted drill rig equipped with an automatic hammer. Hollow-stem augers were advanced to pre-selected depths and representative soil samples were recovered with a standard split-spoon sampler (1 3/8 in. ID, 2 in. OD) in general accordance with ASTM D 1586, the Standard Penetration Test. In this test, a weight of 140 pounds is freely dropped from a height of 30 inches to drive the split-spoon sampler into the soil. The number of blows required to drive the split-spoon sampler three consecutive 6-inch increments is recorded, and the blows of the last two increments are summed to obtain the Standard Penetration Resistance (N-value). The N-value provides a general indication of in-situ soil conditions and has been correlated with certain engineering properties of soils.

In some soils, it is not always practical to drive a split-spoon sampler the full three consecutive 6-inch increments. Whenever more than 50 blows are required to drive the sampler over a 6-inch increment, or the sampler is observed not to penetrate after 50 blows, the condition is called split-spoon refusal. Split-spoon refusal conditions may occur because of obstructions or because the earth materials being tested are very dense or very hard. When split-spoon refusal occurs, often little or no sample is recovered. The SPT N-value for split-spoon refusal conditions is typically estimated as greater than 100 blows per foot (bpf). Where the sampler is observed not to penetrate after 50 blows, the N-value is reported as 50/0. Otherwise, the depth of penetration after 50 blows is reported in inches, i.e. 50/5, etc.

Subsurface water level readings were taken in each of the borings immediately upon completion of the soil drilling process. Following groundwater readings, all boreholes were backfilled with auger cuttings (soil). Periodic observation and maintenance of the boreholes should be performed due to potential subsidence at the ground surface, as the borehole backfill could settle over time.

Representative portions of the split-spoon soil samples obtained throughout the exploration program were sealed in airtight containers and transported to our laboratory. The collected samples were classified by a member of our professional staff in general accordance with techniques outlined in the visual-manual identification procedure (ASTM D 2488) and the Unified Soil Classification System. The soil descriptions and classifications discussed in this report and shown on the attached Boring Logs are generally based on visual observation and should be considered approximate. Copies of the boring logs are provided and classification procedures are further explained in the attached Appendix II.

Split-spoon soil samples recovered on this project will be stored at F&R's office for a period of sixty days. After sixty days, the samples will be discarded unless prior notification is provided to us in writing.

2.2 Soil Laboratory Testing

Laboratory classification testing was performed on two (2) split-spoon samples. This testing included water content determination (ASTM D2216), Atterberg limits tests (ASTM D4318), and Wash No. 200 sieve analysis (ASTM D6913 without hydrometer). Based on the testing results, the soils from these selected samples were then classified in general accordance with Unified Soil Classification System (ASTM D2487).

The results of the laboratory testing program are summarized in a table in Section 3.4, *Laboratory Test* Results of this report and presented in the Material Test Report in Appendix III.

3.0 SUBSURFACE CONDITIONS

3.1 Regional Geology

The project site is located in the Charlotte Belt of the Piedmont Physiographic Province. According to the Generalized Geologic Map of North Carolina (1985), the site is primarily underlain by metamorphosed quartz diorite rock that is massive to foliated. The topography of the Piedmont Plateau consists of well-rounded hills and long-rolling ridges with a northeast-southwest trend.

The soils resulting from in-situ weathering of the parent rock, without significant transportation, are called residual soils and may retain some of the structure of the rock from which they weathered. The residual soil profile generally grades downward gradually from fine-grained plastic soils near the ground surface to coarser-grained soils at greater depth. A transitional zone of "partially weathered rock" of varying thickness can occur between the coarser-grained residual soils and the underlying bedrock. Partially weathered rock (PWR) is defined, for engineering purposes, as residual material with standard penetration resistances in excess of 100 blows per foot. Weathering of the parent bedrock is generally more rapid near fracture zones and therefore, the bedrock surface may be irregular. Irregular patterns of differential weathering may also result in zones of rock and partially weathered rock embedded within the more completely weathered coarse-grained soils.

3.2 Subsurface Conditions

The subsurface conditions discussed in the following paragraphs, and shown on the Boring Logs in Appendix II, represent an estimate of the subsurface conditions based on interpretation of the field and laboratory data using normally accepted geotechnical engineering judgments.

The strata breaks designated on the Boring Logs represent approximate boundaries between soil types. Actual transitions between soil strata are generally less distinct than the immediate transitions depicted on the Boring Logs. Although individual soil test borings are representative of the subsurface conditions encountered at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Given the spacing between boring locations, it should be anticipated that subsurface conditions could vary between the borings.

Below the existing ground surface, the borings generally encountered surficial soils, residual soils, partially weathered rock (PWR) and auger refusal materials. These various materials are discussed further below:

3.2.1 Surficial Materials

A surficial layer of soil material was encountered in each of the borings with a thicknesses ranging from about 1 to 4 inches. Surficial soil is typically a 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 soil materials. Therefore, the term Surficial Soil is not intended to indicate suitability for landscaping and or other purposes. The surficial soil depths provided in this report are based observations made at the time of drilling and should be considered approximate. We note that the transition from surficial soil to underlying materials may be gradual, and therefore the observation and measurement of surficial soil depths is subjective. Actual surficial soil depths should be expected to vary.

3.2.2 Residual Soils

Residual soils, formed by the in-place weathering of the parent rock, were encountered beneath the surficial soils in each of the borings. Sampled residual soils were described as sandy silt (ML), silty sand (SM), and clayey sand (SC). Standard penetration resistances within the sampled residuum ranged from 2 to 74 bpf.

3.2.3 Partially Weathered Rock

Partially weathered rock (PWR) is a transitional material between soil and rock, which retains the parent structure of the rock and has hard or very dense consistencies. PWR was encountered in borings B-3 and B-4 at a depth of 8 feet below the ground surface. Sampled PWR was described as clayey and silty sand (SC & SM) and exhibited penetration resistances ranging from 50 blows per 6 inches of split-spoon penetration to 50 blows per 3 inches of penetration (50/6 to 50/3).

3.2.4 Auger Refusal

Auger refusal occurs when materials are encountered that cannot be penetrated by the soil auger and is normally indicative of a hard or very dense material, such as debris within fill, boulders, rock lenses, pinnacles, or the upper surface of bedrock. Auger refusal was encountered in borings B-3, B-3A and B-4 at approximate depths ranging from 7 to 10 feet below the existing ground surface.

Auger refusal discussed herein is based on conditions impenetrable to the drilling equipment utilized (CME-550X drill rig). Auger refusal conditions with a CME-550X do not necessarily indicate conditions impenetrable to other equipment. Auger refusal conditions may exist intermediate of the boring locations or in unexplored areas of the site.

3.3 Groundwater Data

Groundwater level readings were taken in each boring during drilling and immediately upon completion of the soil drilling process. Groundwater was encountered upon the completion of drilling in borings B-5 and B-6 at approximate depths of 10 feet and 11.7 feet below the existing ground surface, respectively.

It should be noted that groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. Additionally, groundwater measurements made in predominantly cohesive and fine-grained soils are not necessarily indicative of the actual static groundwater level due to the low permeability of such soils. As such, soil moisture and groundwater conditions at other times may vary or be different from those described in this report.

3.4 Laboratory Test Results

As outlined in *Section 2.2, Soil Laboratory Testing*, selected split-spoon and bulk samples obtained during the field exploration were tested in general accordance with applicable ASTM International (ASTM) standards. The results of the soil laboratory testing program are summarized in the following table:

Soil Classification Test Summary

Boring No.	Sample Depth (ft)	Water Content (%)	% Finer than No. 200 Sieve	Atterberg Limits			USCS Classification
				LL	PL	PI	
B-6	6.5-8	19.4	21	Non-Plastic			SM
B-5	3.5-5	8.9	25	32	24	8	SM

Notes: LL – Liquid Limit, PL – Plastic Limit, PI – Plastic Index,

4.0 DESIGN RECOMMENDATIONS

4.1 General

The following evaluations and recommendations are based on interpretation of the field and laboratory data obtained during this exploration and our experience with similar subsurface conditions and projects. Soil penetration data has been used to consider allowable bearing pressures and estimate associated settlements using established correlations. Subsurface conditions in unexplored locations may vary from those encountered. If structure locations, loadings, or elevations are changed, we should be notified and requested to confirm and, if necessary, re-evaluate our recommendations.

Determination of an appropriate foundation system for a given structure is dependent on the proposed structural loads, soil and/or rock conditions, and construction constraints such as proximity to other structures, etc. The subsurface exploration aids the geotechnical engineer in determining the soil/rock stratum appropriate for structural support. This determination includes considerations with regard to both allowable bearing/frictional capacities and compressibility of the soil/rock strata. In addition, since the method of construction greatly affects the soil intended for structural support, consideration must be given to the implementation of suitable methods of site preparation, fill compaction, and other aspects of construction.

The location of the boardwalks and associated borings designations that were requested for this study are summarized in the following table:

Proposed Boardwalk Summary Table

Boardwalk	Alignment	Begin Station	End Station	Borings Drilled
#1	L1	12+93	22+43	B-3, B-3A, B-4
#2	Y3	0+58	1+08	B-5, B-6

Our analysis indicates that conventional shallow foundation support of the timber boardwalks on the encountered subsurface soils in the areas of the proposed structures would result in settlements that we anticipate would exceed tolerable limits (i.e. greater than 1 inch). Therefore, we recommend these structures be supported on a system of deep foundations.

We have assumed the locations of the boardwalk piers are based on hydraulic studies and have been placed to provide adequate scour protection for the foundations of each structure. Our scope of services did not include any scour analysis.

4.2 Timber Pile Foundations

F&R recommends utilizing driven timber piles, with a minimum tip diameter of 10 inches, to support the pier locations for the proposed elevated timber boardwalks based on the provided top of pile reactions of up to 28 kips and 2.1 kips for axial compression and transverse loads, respectively. Pile analysis and embedment criteria for piles at each of the boardwalk structures is presented below.

Boardwalk #1

PWR was encountered in borings B-3 and B-4, in the area of Boardwalk #1, at a depth of 8 feet below the ground surface. Auger refusal was encountered in borings B-3, B-3A and B-4 at depths approximate depths ranging from 7 to 10 feet below the existing ground surface. Based on the subsurface conditions encountered at Boardwalk #1 in borings B-3 and B-4, we anticipate a driven timber pile would likely refuse upon encountering PWR. While the pile tip bearing on PWR would develop the required maximum axial capacity of 28 kips, pile fixity would not be achieved. Therefore, embedment into PWR will be required.

The timber pile locations at Boardwalk #1 should be pre-drilled to facilitate pile installation to a minimum embedment of 1-foot into PWR. The predrilled hole should be large enough to facilitate driving to the specified embedment, but not larger than the required minimum tip diameter of 10 inches.

Analysis of lateral pile deflection under pinned-head conditions was performed for a vertical timber pile with a minimum tip diameter of 10 inches using LPile software. The subsurface profile utilized in the deflection analysis was modeled after subsurface conditions encountered in boring B-3. A maximum lateral deflection of about ⅔-inch (at the pile head) was calculated for a timber pile 13.5 feet in length (including 4.5 feet above the ground surface and the 1-foot required embedment into PWR) subjected to a 2.1-kip lateral load at the pile head. Under these parameters, pile fixity is achieved at a depth of about 8 feet below the ground surface.

Boardwalk #2

We do not anticipate pre-drilling will be required for the installation of timber piles for Boardwalk #2. For the required allowable axial pile load of 28 kips, the timber piles will need to be driven a minimum of 3 feet into dense residual soil (N-value >30 bpf) with a minimum total embedment of 20 feet. Final pile tip elevations should be based on a driving refusal criteria developed from a WEAP analyses as further described in the *General Timber Pile Recommendations* section on the following page.

Analysis of lateral pile deflection under pinned-head conditions was performed for a single vertical timber pile with a minimum tip diameter of 10 inches using LPile software. The subsurface profile utilized in the deflection analysis was modeled after subsurface conditions encountered in boring B-6. A maximum lateral deflection of about ½ -inch (at the pile head) was calculated for a timber pile 24 feet in length (including 4 feet above the ground surface) subjected to a 2.1-kip lateral load at the pile head. Under these parameters, pile fixity is achieved at a depth of about 10 feet below the ground surface.

General Timber Pile Recommendations

We note that variations in pile lengths should be anticipated; piles may be shorter or possibly longer than suggested by the test boring data.

For timber piles, an impact pile driving hammer should have a maximum rated energy of 10,000 to 15,000 foot pounds, unless a wave equation analysis (WEAP) indicates a larger hammer will not damage the pile. A vibratory-type pile hammer is not recommended. We will be happy to assist the contractor to perform a WEAP analysis and develop the driving criteria once the pile hammer has been selected. When the piles have reached the design capacity based on the driving criteria at the anticipated depths (based on either the pile driving formulas or PDA analyses), driving operations should be stopped to prevent damaging the pile. It is noted that the capacity of the pile is developed by both skin friction and end bearing. However, if the piles have not reached design capacity based on the driving criteria, restriking/redriving of the piles is typically performed a day or more later in order to allow the pile to develop additional resistance as the pore water pressures dissipate. Care should be taken during handling and driving operations to prevent damage to the pile.

Timber piles should meet the ASTM D-25 standard specifications for round timber piles and should be pressure treated in accordance with AWPA Standard C1 and C3, preservative treatment specifications.

We recommend that appropriate personnel (with an understanding of the site soil conditions and required pile embedment depths) be present during installation to observe and document the following:

- Document pile installation equipment and energy imparted by hammer during driving.
- Record the dimensions of each pile, the final location, and report any obvious defects.
- Count and record the blows per foot during driving.
- Confirm that adequate driving resistance or the minimum depth has been achieved.

4.3 Pavement Recommendations

The following pavement design recommendations were developed based on the following assumptions:

- a 20-year design life;
- a design CBR of 4 (Our design CBR value was developed based on our experience with soils similar to those encountered at the project site and the presumptive preliminary NCDOT Piedmont Province CBR value of 6);
- assumed traffic loads consisting of up to 20 trips per week by maintenance or police vehicles (automobiles, SUV's or pickup trucks) in addition to typical use by pedestrians and cyclists;
- pavement subgrade will be prepared in accordance with the recommendations indicated here and the construction recommendations presented in Section 5.

Based on the above assumptions, we recommend using the following minimum pavement section:

2 inches	S9.5B -Asphalt Pavement Surface Mix
6 inches	Aggregate Base Course (ABC) Stone (95% ASTM D698)

Our pavement recommendations are based on pavements being supported on soils with similar CBR characteristics to those used in design or better. Soft and/or wet near-surface soils were encountered in portions of the project site. Some moisture conditioning and compactive efforts may be required to achieve the support characteristics used in this design.

Where off-site borrow materials are required to develop pavement support areas, the proposed borrow should be tested to confirm that its CBR value is sufficient. Fill materials underlying pavements should be placed in accordance with the controlled fill and pavement subgrade recommendations contained in this report. In addition, all pavement subgrades should be evaluated by a geotechnical engineer prior to base stone placement. If excessive subgrade movement is observed, appropriate improvements such as undercutting and/or in-place stabilization will be required at that time.

Pavement lifetime is dependent upon site development, traffic type/volume, adherence to site-specific development guidelines and an effective pavement maintenance program. Pavement materials and construction methods should be in accordance with the guidelines provided in the latest edition of the NCDOT Standard Specifications for Roads and Structures.

4.4 General Slope Stability

Our exploration did not include a detailed analysis of slope stability for any temporary or permanent conditions. For ease of maintenance (mowing, etc.), we suggest a maximum permanent slope configuration of 3 horizontal to 1 vertical (3H:1V). However, if steeper configurations are needed, we generally recommend permanent slopes no steeper than 2.5H:1V

In structural and pavement areas, minimum top of slope setbacks of 10 feet and 5 feet are recommended, respectively. However, in general we do not recommend the placement of detention or retention pond structures at the top of slopes.

As applicable during construction and as part of the final design, we recommend that drainage and/or run off from nearby landscape, pavement and structures be directed away from the crest and toe of planned cut and fill slopes. Soil slopes should be covered for protection from rain, and surface runoff should be diverted away from the slopes. In addition, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible for erosion protection. These general slope recommendations are appropriate for slopes underlain by competent materials. However, the provided recommendations should not be used to deviate from OSHA regulations. Construction should be performed in accordance with applicable OSHA regulations.

5.0 CONSTRUCTION RECOMMENDATIONS

5.1 General

The principal purpose of this section is to comment in general on the items related to earthwork and associated geotechnical engineering aspects of construction that should be expected for this project. It is recommended that F&R's geotechnical engineer be retained to provide soil engineering services during the construction phases of the project and perform appropriate evaluations to help confirm that conditions encountered during construction are similar to conditions observed in the borings. The geotechnical engineer can also assist in interpretation of differing subsurface conditions that may be encountered and recommend remedial work, if needed.

5.2 Site Preparation

Before proceeding with construction, any surficial soils, roots, and any other deleterious non-soil materials should be stripped or removed from the proposed construction area. During the clearing and stripping operations, positive surface drainage should be maintained to prevent the accumulation of water.

After stripping, areas intended to support new fill, pavements, and foundations should be carefully evaluated by a representative of the geotechnical engineer. At that time, the engineer may require proofrolling of the subgrade with a 20- to 30-ton loaded truck or other pneumatic-tired vehicle of similar size and weight. Proofrolling should be performed during a time of good weather and not while the site is wet, frozen, or severely desiccated. The purpose of the proofrolling is to locate soft, weak, or excessively wet soils present at the time of construction and provides an opportunity for the geotechnical engineer to locate inconsistencies intermediate of the boring locations.

Any unsuitable materials observed during the evaluation and proofrolling operations should be undercut and replaced with compacted fill or stabilized in-place. The actual extent of undercutting and/or in-place stabilization required can best be determined by a representative of the geotechnical engineer at the time of construction. Therefore, we suggest that contingency funds be allotted within the project budget for over-excavating and replacing weak, deleterious soils within the proposed pavement areas.

Undercutting or additional in-place compaction may be necessary if the exposed subgrade soils become unstable during construction. Any fill materials, aggregate, and or pavement should be placed as soon as possible over the approved subgrade in order to reduce exposure of the subgrade to weather and construction activity.

It is important to stress that if site preparation or construction are performed during the winter months, additional undercutting of the subgrade soils may be required if the subgrade is not properly prepared or protected.

5.3 Controlled Structural Fill

Based on the boring data, controlled structural fill may be constructed using the non-organic on-site soils. If an off-site borrow source is required to balance the site, the imported materials should have a classification of CL, ML, SC, or SM as defined by the Unified Soil Classification System. Other materials may be suitable for use as controlled structural fill material and should be individually evaluated by the geotechnical engineer. If encountered, CH and MH soils should not be used for backfill within 2 feet of subgrade elevations in structural or paved areas. Controlled structural fill should be free of boulders, organic matter, debris, or other deleterious materials and should have a maximum particle size no greater than 3 inches. In addition, we recommend a minimum standard Proctor (ASTM D 698) maximum dry density of approximately 90 pounds per cubic feet for fill materials.

Fill materials should be placed in horizontal lifts with maximum height of 8 inches loose measure. New fill should be adequately keyed into stripped and scarified subgrade soils and should, where applicable, be benched into the existing slopes. During fill operations, positive surface drainage should be maintained to prevent the accumulation of water. We recommend that structural fill be compacted to at least 95 percent of the standard Proctor maximum dry density. In confined areas such as utility trenches, portable compaction equipment and thin lifts of 3 to 4 inches may be required to achieve specified degrees of compaction. Each lift of fill should be tested in order to confirm that the recommended degree of compaction is attained.

In general, we recommend that the moisture content of fill materials be maintained within three percentage points of the optimum moisture content as determined from the standard Proctor density test. Based on laboratory testing and manual classification techniques, some of the near surface soils encountered during this study were wet of optimum moisture content. Wet soils will likely require significant drying efforts prior to placement and compaction. We recommend that the contractor have equipment on site during earthwork for both drying and wetting of fill soils.

Moisture control may be especially difficult during winter months or extended periods of rain. Attempts to work the soils when wet can be expected to result in deterioration of otherwise suitable soil conditions or of previously placed and properly compacted fill. Where construction traffic or weather has disturbed the subgrade, the upper 8 inches of soils (or more if warranted) intended for structural support should be scarified and re-compacted. Each lift of fill should be tested in order to confirm that the recommended degree of compaction is attained.

5.4 Excavation Characteristics

PWR was encountered in borings B-3 and B-4 at a depth of 8 feet below the ground surface. Auger refusal was encountered in borings B-3, B-3A and B-4 at depths ranging from of 7 to 10 feet below the existing ground surface. While these difficult excavation materials are present at the site, we do not generally anticipate that they will be encountered during grading operations given our previously stated understanding of the proposed grading.

5.5 Surface Water Control

If free water is allowed to stand on stable subgrade soils, the in-situ silty and clayey soils can absorb water, swell, and experience a reduction in their support capability. As a result, we recommend that the subgrade surface be graded to provide positive drainage away from the construction areas and towards suitable drainage handling areas, such as a perimeter ditch, French drain, culvert, or retention pond. Where pockets of silty and clayey soils exist, trapped or perched water conditions could develop during periods of inclement weather and during seasonally wet periods. Such conditions could cause seepage into excavations and deeper cuts. In addition, if site grading is performed during the seasonally wet months or after extended periods of inclement weather, wet and water softened near-surface soil conditions should be expected across the site.

5.6 Groundwater Conditions

Groundwater was encountered upon the completion of drilling in borings B-5 and B-6 at approximate depths of 10 and 11.7 feet below the existing ground surface, respectively. We do not anticipate that groundwater will be encountered during grading operations given our previously stated understanding of the proposed grading. However, we anticipate groundwater will likely be encountered during installation of deep foundations for the boardwalks.

Due to the presence of silty soils, which generally have very low hydraulic conductivity, trapped or perched water conditions may be encountered at some point during project development, especially during periods of inclement weather and seasonally wet periods. Further, shallow perched groundwater may cause difficulty establishing a stable subgrade for fill placement or pavement section construction, as applicable. If unstable subgrade conditions are encountered at the time of construction, remedial recommendations should be provided by the geotechnical engineer. Examples of potential remedial recommendations may include drying of the subgrade and re-compaction, reinforcement with geotextile, and/or a system of French drains.

Groundwater levels tend to fluctuate with seasonal and climatic variations as well as with some types of construction operations. Generally, the highest subsurface water levels occur in late winter and early spring and the lowest levels occur in late summer and early fall. If encountered during construction, engineering personnel from our office should be notified immediately.

6.0 CONTINUATION OF SERVICES

F&R recommends that we be retained for professional and construction materials testing services during construction of the project. Our continued involvement on the project helps provide continuity for proper implementation of the recommendations discussed herein.

Additionally, we request the opportunity to review the foundation plans and project specifications when these construction documents approach completion. This review evaluates whether the recommendations and comments provided herein have been understood and properly implemented. The above listed services are not part of the currently authorized scope of services.

7.0 LIMITATIONS

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 Appendix IV. We recommend that you review the GBA information.

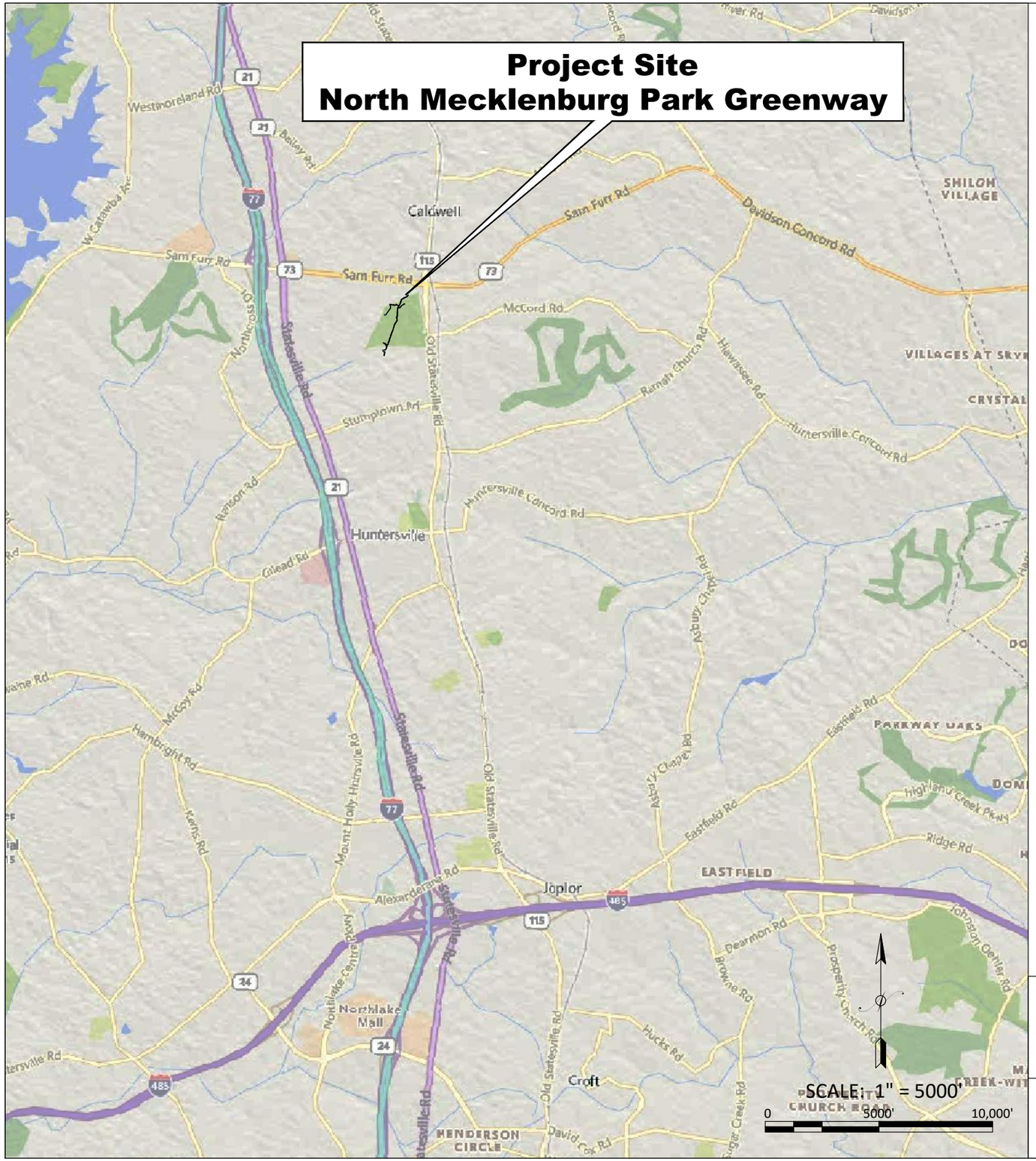
This report has been prepared for the exclusive use of McAdams for the specific application to the proposed North Mecklenburg Park Trail in Huntersville, Mecklenburg County, North Carolina, in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our recommendations are based on design information furnished to us at the time the work was performed; the data obtained from the previously described subsurface exploration program, and generally accepted geotechnical engineering practice. The findings and recommendations do not reflect variations in subsurface conditions, which could exist in unexplored areas of the site. In areas where variations from the available subsurface data become apparent during construction, it will be necessary to re-evaluate our recommendations based upon on-site observations of the conditions.

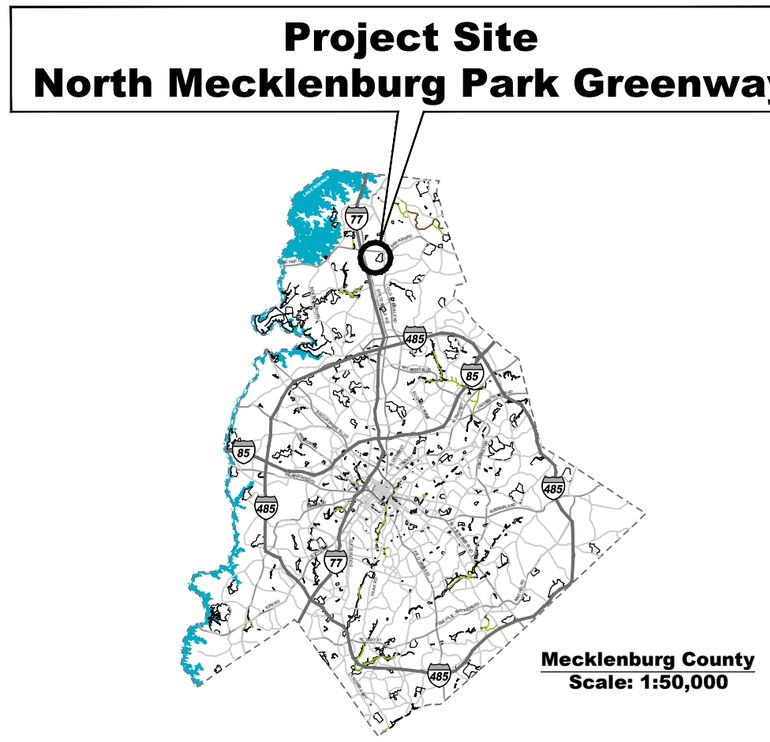
Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions in other areas will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, our experienced geotechnical engineers should evaluate foundation construction to verify 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 design or location of the proposed structures, the recommendations presented in this report shall not be considered valid unless the changes are reviewed by our firm and recommendations of this report modified 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

Site Vicinity Map (Drawing No. 1)

Boring Location Plan (Drawing No. 2)





FROEHLING & ROBERTSON *Engineering Stability Since 1881*	Date: July, 2022	
	Scale: As Shown	
	Drawn: KHH	63A-0059
North Mecklenburg Greenway Huntersville, North Carolina The John R. McAdams Company	Site Vicinity Map	Drawing No. 1

N. OLD STATESVILLE RD

SAM FURR RD

HARVEST POINT DR

AMBER FIELD DR

NORTH MECKLENBURG PARK

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 36+94

B–1 B–2 B–3 B–4 B–5 B–6

WOODEN BRIDGE

WOODEN BRIDGE

RIG PARKING SPOT

SCALE: 1" = 250'

0 250' 500'

FROEHLING & ROBERTSON

Engineering Stability Since 1881

Date: July, 2022

Scale: As Shown

Drawn: KHH | 63A-0059

North Mecklenburg Greenway
Huntersville, North Carolina
The John R. McAdams Company

Boring Location Plan

Drawing No. 2

APPENDIX II

Key to Soil Classification

Soil Classification Chart

Boring Logs (B-1 through B-6)

KEY TO BORING LOG SOIL CLASSIFICATION

Particle Size and Proportion

Visual descriptions are assigned to each soil sample or stratum based on estimates of the particle size of each component of the soil and the percentage of each component of the soil.

Particle Size Descriptive Terms		Proportion Descriptive Terms		
Soil Component	Particle Size	Component	Term	Percentage
Boulder	> 12 inch	Major	Uppercase Letters (e.g., SAND, CLAY)	> 50%
Cobble	3 - 12 inch			
Gravel-Coarse	3/4 - 3 inch			
-Fine	#4 - 3/4 inch	Secondary	Adjective (e.g., sandy, clayey)	20% - 50%
Sand-Coarse	#10 - #4			
-Medium	#40 - #10			
-Fine	#200 - #40	Minor	Some	15% - 25%
Silt (non-cohesive)	< #200		Little	5% - 15%
Clay (cohesive)	< #200		Trace	0% - 5%

Notes:
1. Particle size is designated by U.S. Standard Sieve Sizes
2. Because of the small size of the split-spoon sampler relative to the size of gravel, the true percentage of gravel may not be accurately estimated.

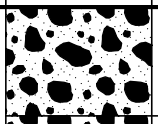
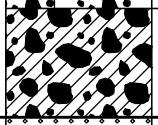
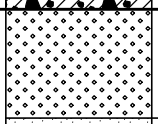
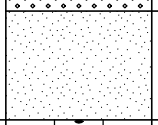
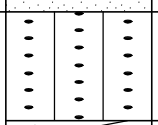
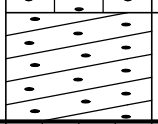
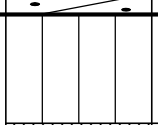
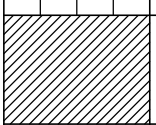
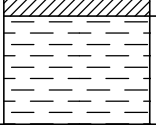
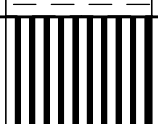
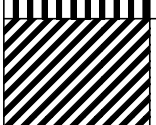
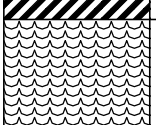
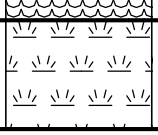
Density or Consistency

The standard penetration resistance values (N-values) are used to describe the density of coarse-grained soils (GRAVEL, SAND) or the consistency of fine-grained soils (SILT, CLAY). Sandy silts of very low plasticity may be assigned a density instead of a consistency.

DENSITY		CONSISTENCY	
Term	N-Value	Term	N-Value
Very Loose	0 - 4	Very Soft	0 - 1
Loose	5 - 10	Soft	2 - 4
Medium Dense	11 - 30	Firm	5 - 8
Dense	31 - 50	Stiff	9 - 15
Very Dense	> 50	Very Stiff	16 - 30
		Hard	> 30

Notes:
1. The N-value is the number of blows of a 140 lb. Hammer freely falling 30 inches required to drive a standard split-spoon sampler (2.0 in. O.D., 1-3/8 in. I.D.) 12 inches into the soil after properly seating the sampler 6 inches.
2. When encountered, gravel may increase the N-value of the standard penetration test and may not accurately represent the in-situ density or consistency of the soil sampled.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

FROEHLING & ROBERTSON

BORING LOG

Boring: B-1 (1 of 1)

Project No: 63A-0059
Client: McAdams
Project: North Meck Greenway
City/State: Huntersville, NC

Elevation: 743 ±
Total Depth: 8.0'
Boring Location: See boring location plan

Drilling Method: HSA
Hammer Type: Automatic
Date Drilled: 6/27/22
Driller: HPC / Z.K.

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
742.9	0.1	**SURFICIAL SOILS:** 1 inch	4-5-4	0.0	9	Groundwater was not encountered immediately upon completion of drilling.
		RESIDUUM: Loose, brown, fine to medium sandy SILT (ML) with rock fragments, moist		1.5		
741.0	2.0	Loose, mottled gray with orange and brown, clayey fine to medium SAND (SC) with trace organics, moist	3-3-4	2.0	7	
			4-4-3	3.5		
				5.0	7	
737.0	6.0	Loose, white, black, and gold, silty fine to coarse SAND (SM) with little mica, moist	2-3-5	6.5		
735.0	8.0	**Boring terminated at 8 feet.**		8.0	8	

*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.

FROEHLING & ROBERTSON

BORING LOG

Boring: B-2 (1 of 1)

Project No: 63A-0059
Client: McAdams
Project: North Meck Greenway
City/State: Huntersville, NC

Elevation: 750 ±
Total Depth: 8.0'
Boring Location: See boring location plan

Drilling Method: HSA
Hammer Type: Automatic
Date Drilled: 6/27/22
Driller: HPC / Z.K.

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
749.8	0.2	**SURFICIAL SOILS:** 2 inches	3-9-6	0.0	15	Groundwater was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, brown and gray, fine to medium sandy SILT (ML) with trace organics, moist		1.5		
748.0	2.0		2-4-4	2.0	8	
		Loose, mottled gray with orange and brown, clayey fine to coarse SAND (SC), moist	5-8-8	3.5		
				5.0	16	
744.0	6.0	Loose, white, brown, and black, silty fine to coarse SAND (SM), moist	3-4-5	6.5		
742.0	8.0	**Boring terminated at 8 feet.**		8.0	9	

*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.

FROEHLING & ROBERTSON

BORING LOG

Boring: B-3 (1 of 1)

Project No: 63A-0059
Client: McAdams
Project: North Meck Greenway
City/State: Huntersville, NC

Elevation: 753 ±
Total Depth: 9.2'
Boring Location: See boring location plan

Drilling Method: HSA
Hammer Type: Automatic
Date Drilled: 6/27/22
Driller: HPC / Z.K.

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
752.8	0.3	**SURFICIAL SOILS:** 3-inches	4-11-7	0.0	18	Groundwater was not encountered immediately upon completion of drilling.
		RESIDUUM: Medium dense, brown, silty fine to medium SAND (SM), moist		1.5		
			3-3-3	2.0		
749.5	3.5	Loose to very loose, mottled gray brown, clayey fine to coarse SAND (SC), moist	2-1-1	3.5	6	
				5.0	2	
747.0	6.0	Medium dense, mottled gray and green, clayey fine to coarse SAND (SC) with trace mica, moist	8-10-7	6.5		
745.0	8.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense brown and tan, silty fine to coarse SAND (SM) with trace mica and rock fragments, moist	50/3	8.0	17	
743.8	9.2	**Auger refusal at 9.2 feet.**			100+	

*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.

FROEHLING & ROBERTSON

BORING LOG

Boring: B-3A (1 of 1)

Project No: 63A-0059
Client: McAdams
Project: North Meck Greenway
City/State: Huntersville, NC

Elevation: 753 ±
Total Depth: 7.0'
Boring Location: Offset 10' SW of B-3

Drilling Method: HSA
Hammer Type: Automatic
Date Drilled: 6/27/22
Driller: HPC / Z.K.

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		Auger only to 7 feet.				Groundwater was not encountered immediately upon completion of drilling.
746.0	7.0	**Auger refusal at 7 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.

FROEHLING & ROBERTSON

BORING LOG

Boring: B-4 (1 of 1)

Project No: 63A-0059
Client: McAdams
Project: North Meck Greenway
City/State: Huntersville, NC

Elevation: 747 ±
Total Depth: 10.0'
Boring Location: See boring location plan

Drilling Method: HSA
Hammer Type: Automatic
Date Drilled: 6/27/22
Driller: HPC / Z.K.

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
746.8	0.3	**SURFICIAL SOILS:** 3-inches	12-14-9	0.0	23	Groundwater was not encountered immediately upon completion of drilling.
		RESIDUUM: Medium dense, brown, silty fine to medium SAND (SM) with rock fragments, moist		1.5		
745.0	2.0		7-4-9	2.0		
		Medium dense, mottled gray, brown, and orange, clayey fine to medium SAND (SC) with trace organics, moist		3.5	13	
743.5	3.5		9-17-39			
		Very dense to dense, white, gray, and brown, silty fine to coarse SAND (SM) with rock fragments, moist		5.0	56	
			29-29-15	6.5		
739.0	8.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, white, brown, and black, silty SAND (SM) with rock fragments, moist		8.0	44	
			25-50/6	8.5		
737.0	10.0			9.5	100+	
		Auger refusal at 10 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.

FROEHLING & ROBERTSON

BORING LOG

Boring: B-5 (1 of 1)

Project No: 63A-0059
Client: McAdams
Project: North Meck Greenway
City/State: Huntersville, NC

Elevation: 764 ±
Total Depth: 40.0'
Boring Location: See boring location plan

Drilling Method: HSA
Hammer Type: Automatic
Date Drilled: 6/27/22
Driller: HPC / Z.K.

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
763.8	0.2	**SURFICIAL SOILS:** 2-inches	3-5-5	0.0		Groundwater encountered at approximately 11.7 feet immediately upon completion of drilling.
		RESIDUUM: Sampled as loose to medium dense, brown and tan, silty fine to medium SAND (SM) with trace organics, moist		1.5	10	
			8-9-10	2.0		
760.5	3.5	Medium dense, mottled gray, brown, and orange, silty fine to coarse SAND (SM) with little mica, wet		3.5	19	
			11-13-16	5.0	29	
				6.5		
			9-14-16	8.0	30	
				8.5		
			8-8-11	10.0	19	
752.0	12.0	Dense, brown and white, silty fine to coarse SAND (SM) with little mica, wet		13.5		
			11-14-18	15.0	32	
				18.5		
			12-15-19	20.0	34	
742.0	22.0	Very dense, brown and white, silty fine to coarse SAND (SM) with trace mica, wet		23.5		
			21-32-42	25.0	74	
737.0	27.0	Dense, brown, black, and white, silty fine to coarse SAND (SM) with rock fragments and trace mica, wet		28.5		
			14-20-26	30.0	46	
732.0	32.0	Very dense, brown, white, and black, clayey fine to medium SAND (SC) with trace mica, wet		33.5		
			20-28-44	35.0	72	
			22-29-40	38.5		
724.0	40.0	**Boring terminated at 40 feet.**		40.0	69	

*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.

FROEHLING & ROBERTSON

BORING LOG

Boring: B-6 (1 of 1)

Project No: 63A-0059
Client: McAdams
Project: North Meck Greenway
City/State: Huntersville, NC

Elevation: 758 ±
Total Depth: 40.0'
Boring Location: See boring location plan

Drilling Method: HSA
Hammer Type: Automatic
Date Drilled: 6/27/22
Driller: HPC / Z.K.

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
757.7	0.3	**SURFICIAL SOILS:** 4-inches	3-4-6	0.0		Groundwater encountered at approximately 10 feet immediately upon completion of drilling.
		RESIDUUM: Stiff, brown and tan, sandy fine to medium SILT (ML) with trace organics, moist		1.5	10	
756.0	2.0	Medium dense, brown and gray, silty fine to medium SAND (SM) with trace organics, moist	4-7-10	2.0		
				3.5	17	
			10-9-8	5.0	17	
752.0	6.0	Medium dense, mottled gray and white, silty fine to medium SAND (SM) with trace mica, wet	2-4-6	6.5		
				8.0	10	
			5-7-8	8.5		
	▽			10.0	15	
746.0	12.0	Medium dense, gray, clayey fine to medium SAND (SC) with trace mica, wet	11-10-10	13.5		
				15.0	20	
741.0	17.0	Dense to medium dense, brown, tan, and white, silty fine to medium SAND (SM) with trace mica, wet	11-16-17	18.5		
				20.0	33	
			7-11-13	23.5		
				25.0	24	
731.0	27.0	Medium dense to very dense, brown and white, silty fine to coarse SAND (SM) with little mica, wet	9-12-18	28.5		
				30.0	30	
			17-23-33	33.5		
				35.0	56	
721.0	37.0	Dense, brown and tan, silty fine to coarse SAND (SM) with little mica, wet	14-18-31	38.5		
718.0	40.0	Boring terminated at 40 feet.		40.0	49	

*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

Material Test Report

Froehling & Robertson, Inc.
Charlotte Office
3300 International Airport Drive, Suite 600
Charlotte, NC 28208
Phone: 704.596.2889 www.FandR.com

Material Test Report

Client: The John R. McAdams Company
3430 Toringdon Way
Charlotte, NC 28277

CC:

Project: 63A0059
North Meck Greenway
16131 Old Statesville Rd
Huntersville, NC 28078

Report No: ASM:6322-02259
Issue No: 1

Reviewed By: Warren Carver J
Review Date: 7/12/2022

Material Details

Source Onsite Excavated **Sampled From** on-site excavation

Sample Details

Sample ID	6322-02259-S01	6322-02259-S02
Field Sample ID		
Date Sampled	7/11/2022	7/11/2022
Boring No	B-5	B-6
Depth	3.5-5'	6.5-8'

Other Test Results

Description	Method	Results		Limits
Passing No. 200 (75 µm) (%)	ASTM D1140	25	21	
Procedure		A	A	
Soaking Period (min)		120	120	
Initial Dry Mass (g)		197.9	199.6	
Water Content Determined		No	No	
Tested By		Usery David B	Usery David B	
Water Content (%)	ASTM D2216	8.9	19.4	
Date Tested		7/11/2022	7/11/2022	
Tested By		Usery David B	Usery David B	
Group Code	ASTM D2487	SM	SM	
Group Name		Silty sand	Silty sand	
Liquid Limit			0	
Plasticity Index			0	
Sand (%)		75	79	
Fines (%)		25	21	
Tested By	ASTM D2487	Usery David B	Usery David B	
Liquid Limit	ASTM D4318	32		
Plastic Limit		24	NP (Non-Plastic)	
Plasticity Index		8		
Tested By		Usery David B	Usery David B	
Date Tested		7/11/2022	7/11/2022	

Comments

Legend

The results provided herein relate only to the items inspected and/or tested. This report shall not be reproduced, except in full, without the prior written approval of F&R.

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APPENDIX IV

GBA Publication “Important Information about This Geotechnical Engineering Report”

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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APPENDIX B – PERMITTING INFORMATION

Authorization Certificate Application for a Water Quality Buffer Disturbance

FOR OFFICE USE ONLY: Application Received Date: 9-6-24 Complete Submittal ☑ Yes ☐ No	FOR OFFICE USE ONLY: Authorization Certificate Number: 25-05

Instructions for the proper completion of this form are available on the following website: http://stormwater.charmeck.org (Select "Regulations", select "Buffers & BMPs", select "Water Quality Buffer Implementation Guidelines" see Section 5).

SECTION 1: GENERAL INFORMATION
Applicant's Name: TRACY HOUK, TOWN OF HUNTERSVILLE
Applicant's Mailing Address: PO BOX 2879 HUNTERSVILLE, NC 28070
Applicant's Phone Numbers: Office 704-766-2227 Cell
Applicant's Email: THOUK@HUNTERSVILLE.ORG
Owner's Name (if different from above applicant):
Owner's Address:
Owner's Phone: Office Cell
Owner's Email:
If applicant is different from owner, describe affiliation and attach to this application written authorization for the buffer disturbance signed by the property owner:
Contractor's Name (or name of other parties involved in buffer disturbance and/or mitigation if applicable): TBD FOLLOWING BID
Contractor's Mailing Address:
Contractor's Phone Numbers: Office Cell
Contractor's Email:
Jurisdiction/Town where Proposed Buffer Disturbance is Located: HUNTERSVILLE, NC
Address and/or Parent # of Proposed Buffer Disturbance: 911119 (SEE TABLE ON BUA EXHIBIT FOR COMPLETE LIST) (16131 Old Statesville Rd. Huntersville)
Name of Development where Proposed Buffer Disturbance is Located (if applicable): NORTH MECKLENBURG PARK
Type of Buffer (select only one): Water Supply ☐; S.W.IM. ☐; Post-Construction ☑; Goose Creek ☐; or Six Mile Creek ☐
Type of Buffer Disturbance (select all that apply): Removal of Vegetation ☑; Installation of Structure ☑; Addition of Fill ☑; Grading/Land Disturbance ☑; and/or Other Specify:
Specify the Nature of the Activity that will Disturb the Buffer: minimal clearing, grading, greenway construction
Specify the Reason for the Buffer Disturbance: greenway construction
Square Footage of Parcel: 4,228,629 SF Square Footage of Disturbed Area: 217,748 SF
Square Footage of Buffer on the Parcel: Stream Side Zone 140,880, Managed Use Zone 31,200, Upland Zone 360,960, Total 533,040
Square Footage of Buffer to be Disturbed: Stream Side Zone 9,317 ; Managed Use Zone ; Upland Zone 39,242 ; Total 48,559
Date When Buffer Impact will Occur/When Unauthorized Disturbances Occurred: BEGINNING WINTER 2025
Date When Mitigation will be Completed: LATE-2025
Map: ***Attach to this application a scaled map (copy of survey is acceptable) containing the following information:***
1. Lengths of all boundary/property lines for the parcel and parcel address where the buffer disturbance is to occur.
2. Location(s) of all water course(s) on the property, including all perennial and intermittent streams, lakes, ponds, and wetlands.
3. Location(s) of buildings, parking areas, and other impervious surfaces.
4. Location(s) of the buffer area on the parcel, including lengths of all boundary lines and total square footage of the entire buffer (including all buffer zones if applicable).
5. The scale of the map, which must not be smaller than 100 feet to the inch.
6. Date of map.
7. A small scale vicinity map and north arrow.
8. Location of buffer disturbance (boundary lines and total square footage for each zone), including the area of the footprint of the use, the area of the boundary of any clearing and grading activities, and the area of any ongoing maintenance corridors. The boundaries of temporary equipment access areas must be shown on the map but are not included in the total disturbed area calculation provided tree removal and grading do not occur in the area and it is properly stabilized.
9. Location, number, size, and species of trees greater than two (2) inches in diameter that will be or have been removed from the buffer.
SECTION 2: REQUEST FOR A NO PRACTICAL ALTERNATIVES DETERMINATION (Not Applicable for Unauthorized Impacts)
Explain why the basic project purpose cannot be practically accomplished in a manner that would better minimize the disturbance, preserve aquatic life and habitat, and protect water quality.
Explain why the use cannot practically be reduced in size or density, reconfigured or redesigned to better minimize the disturbance, preserve aquatic life and habitat, and protect water quality.
Describe the plans for practices that have been incorporated into the project to minimize the buffer disturbance.
General Comments: SEE ATTACHED NARRATIVE FOR ABOVE ITEMS

SECTION 3: MITIGATION PLAN

Instructions: ***Select either Part A: Authorized Buffer Disturbances or Part B: Unauthorized Buffer Disturbances, select the type of buffer disturbed or proposed for disturbance, identify the mitigation option being proposed and provide the information requested below that option (only one buffer type can be selected). Also, submit with this application the additional information specified in Section 5.4 of the "Water Quality Buffer Implementation Guidelines" available at the website described at the top of page 1 of this application.*** ***Important Note:*** ***If the mitigation techniques described below are required for compliance with another ordinance, the technique cannot be used as mitigation for water quality buffer impacts.***

Part A: Authorized Buffer Disturbances ***(For Unauthorized Buffer Disturbances see Part B of this Section)***

☐ **Water Supply Watershed Buffer Disturbance:**

☐ Buffer Restoration on Same Parcel (this is the only mitigation option available for this type of buffer disturbance)

- Is a Level 2 revegetation plan being proposed? Yes ☐ No ☐ If "No", explain why:
- Square Footage of Buffer to be Revegetated:

☐ **S.W.I.M., Post-Construction, Six Mile Creek or Lower Lake Wylie Buffer Disturbance:**

☐ Installation of Structural BMP

- Type of BMP or Infiltration Method:
- Size of Drainage Area to be Treated (acres):
- Percentage of Impervious Cover in this Drainage Area:

☑ Buffer Restoration (Refer to attached Revegetation Plan)

- Revegetation Type: Level 1 ☑ Level 2 ☐
- Square Footage of Buffer to be Revegetated (if buffer does not have zones, indicate under "Total"): Stream Side Zone 9,317 ; Managed Use Zone ; and/or Upland Zone 39,242 Total 48,559

☐ Buffer Preservation

- Square Footage of Buffer to be Preserved (if buffer does not have zones, indicate under "Total"): Stream Side Zone ; Managed Use Zone ; and/or Upland Zone Total

☐ Wetland Preservation

- Square Footage of Wetland to be Preserved:

☐ Bottom Land Hardwood Preservation **(Mecklenburg County and Towns only)**

- Square Footage of Bottom Land Hardwood Area to be Preserved:

☐ Controlled Impervious Cover **(Mecklenburg County and Towns only)**

- Amount of Impervious Cover on Parcel square feet ÷ Size of Parcel square feet = x 100 = %

☐ Open Space Development **(Mecklenburg County and Towns only)**

- Amount of Preserved Open Space on Parcel square feet ÷ Size of Parcel square feet = x 100 = %

☐ Mitigation Payment/Credit

- Area of Buffer Disturbance square feet x $10 = $

☐ Alternative Mitigation Techniques (not pre-approved) Specify:

☐ **Goose Creek Buffer Disturbance:**

- Buffer Disturbance Area: Footprint of Use in Buffer square feet + Clearing Limits Outside the Footprint square feet + Maintenance Corridor Outside the Footprint and Clearing Limits square feet = square feet
- Mitigation Area: Buffer Disturbance Area square feet x 3 = square feet

☐ Mitigation Payment: The current rates are on the NCDEQ-Division of Mitigation Services website: https://www.deq.nc.gov/about/divisions/mitigation-services/customers/current-rate-schedules

- Mitigation Area square feet x $_____ = $

☐ Donation of Property

- Appraised Value of Donated Property Interest $ ÷ Calculated Mitigation Payment $ = x 100 = %

☐ Stream Buffer Restoration or Enhancement

- Buffer Restoration Area square feet ÷ Calculated Mitigation Area square feet = x 100 = %
- Buffer Enhancement Area square feet ÷ Calculated Mitigation Area square feet = x 100 = %

Part B: Unauthorized (Illegal) Buffer Disturbance:

- Buffer Restoration (Level 2 revegetation plan is the only mitigation option available for this type of buffer disturbance)

Type of Buffer (select only one): Water Supply ☐; S.W.IM. ☐; Post-Construction ☐; Goose Creek ☐; or Six Mile Creek ☐

- Square Feet of Buffer to be Revegetated (if buffer does not have zones, indicate under "Total"): Stream Side Zone ; Managed Use Zone ; and/or Upland Zone Total

Issuance of the Authorization Certificate: ***Upon the approval and subsequent signing of this Application, the Authorization Certificate for approval of the buffer disturbance is granted and remains valid for a period of 12 months following the approval date indicated below. All buffer disturbances and mitigation must be performed in strict accordance with the information contained herein and attached to this Application. Failure to do so will immediately render this Authorization Certificate null and void and all buffer disturbances will be subject to penalties. Ensure that proper erosion control is practiced during all land disturbing activities and that once the buffer disturbance is completed that all disturbed areas are properly stabilized. In addition, diffuse flow through the buffer must be maintained in perpetuity.***

FOR OFFICE USE ONLY: ☐ Disapproved ☑ Approved ☐ Approve with Modifications

Issued By: T. Ronald Eubanks Date: 9-9-2024

MCADAMS

SECTION 2: REQUEST FOR NO PRACTICAL ALTERNATIVES DETERMINATION

1. Explain why the basic project purpose cannot be practically accomplished in a manner that would better minimize the disturbance, preserve aquatic life and habitat, and protect water quality.

   Response:
   The linear nature of greenways paired with a desire to interact with the natural environment often increases the likelihood of overlap between trails and environmentally sensitive areas along streams. Careful consideration of the stream buffers on this site was taken into account in the alignment development phase; however, the desire to avoid impacts to adjacent private properties, maintain existing park amenity spaces and tree canopy, avoid grading into challenging topography, and predominately follow existing cleared utility easement corridors meant occupying existing buffer space for the greenway. The majority of buffer disturbances do occur within areas that have already been cleared by past construction and on-going utility maintenance, limiting the overall impacts from the proposed greenway construction.

2. Explain why the use cannot practically be reduced in size or density, reconfigured or redesigned to better minimize the disturbance, preserve aquatic life and habitat, and protect water quality.

   Response:
   The footprint of the trail is defined by the desired overall connectivity paired with Town standard widths for both mainline and connector trails, meaning the trail widths and overall alignment of the trail is limited in flexibility while trying to achieve a linear, streamside greenway network. Re-configuration or re-alignment for this greenway was limited by property, topographical, and land-use constraints. There was a desire to limit construction activity in close proximity to existing ball fields, ball courts, and hiking/biking trails in order to maintain the existing character of the park.

3. Describe the plans for practices that have been incorporated into the project to minimize the buffer disturbance.

   Response:
   The greenway mainline and connections have been intentionally designed to follow existing sewer and transmission easements to limit clearing and grading activities as much as practical. In addition, most required stream crossings have been made as close to perpendicular as feasible to reduce the impacts.

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
WILLIAM E. TOBY VINSON, JR
Interim Director

NORTH CAROLINA
Environmental Quality

09-10-2024

LETTER OF APPROVAL

Town of Huntersville
105 Gilead Road
Huntersville, NC 28078

RE: Project Name: North Mecklenburg Park Greenway
Permit Number: MECKL-2025-0141
Acres Approved: 5
County: Mecklenburg
City: Huntersville
Address: 16131 Old Statesville Road
River Basin: Yadkin - Pee Dee
Stream Classification: C: Aquatic Life, Secondary Contact Recreation, Fresh water
Plan Type: Revised Plan

Dear Town of Huntersville,

This office has reviewed the subject erosion and sedimentation control plan. We hereby issue this Letter of Approval. Any modifications required for approval are listed in the body of the email that accompanied this attached letter. The enclosed Certificate of Approval must be posted at the job site. This plan approval 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 not explicitly exempt are required to complete and submit an electronic Notice of Intent (eNOI) form requesting a Certificate of Coverage (COC) under the NCG010000 Construction General Permit. After the form is reviewed and found to be complete, you will receive a link with payment instructions for the annual permit fee. After the fee is processed, you will receive the COC. As the Financially Responsible Party shown on the FRO form submitted for this project, you MUST obtain the COC prior to commencement of any land disturbing activity. The eNOI form may be accessed at deq.nc.gov/NCG01.

Please direct questions about the eNOI form to the Stormwater Program staff in the Raleigh central office. If the owner/operator of this project changes in the future, the new responsible party must obtain a new COC.

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 12 months.

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 and on the plan, which you provided. You are requested to file an amended form if there is any change in the information included on the form.

Your cooperation is appreciated.

Sincerely,

Mike MacIntyre

Land Quality Section

Modifications Required for Approval:

1. Ensure that proposed bypass channels are stabilized as soon as possible after installation.

2. The liner for the emergency spillway for the stormwater control measure is to extend all the way down the embankment, at least to natural ground.

3. Additional measures may be required - The applicant is responsible for the control of sediment on-site. If the approved erosion and sedimentation control measures prove insufficient, the applicant must take those additional steps necessary to stop sediment from leaving this site. [15A NCAC 4B .0115]

WATER CONFLICT MEMO 10/27/22

North Mecklenburg Park Greenway

Tributary to Torrence Creek

Expected Construction: Spring 2023

For tracking and coordination purposes, this memo services as a record of the following conflicts and their resolutions.

#	Item	Drawing/ Sheet	Station	CLTW Asset	Other Asset
1	Conflict 1- Manhole	4/C2-1	Driveway	Manhole	Driveway Shoulder
2	Conflict 2- Culvert	5	-L1- 14+20	8" PVC	36" RCP
3	Conflict 3- Paving	5	-L1- 14+50 TO 18+00	8" PVC	Asphalt Trail
4	Conflict 4- Culvert	5	-L1- 18+70	8" PVC	18" RCP
5	Conflict 5- Paving	5/6	-L1- 18+00 TO 21+60	8" PVC	Asphalt Trail
6	Conflict 6- Future Manhole	5	-L1 17+10	Future Manhole	Asphalt Trail

Conflict 1- Manhole Behind Curb & Gutter along Driveway

I. Conflict Description- There is a current manhole just off to the side of the proposed driveway that will be graded around

   a. Clarifying Q&A
      i. Are there any plans to raise or lower the manhole? No. Slight grading to occur around the manhole.
      ii. Suggested Path to resolution/ alternatives
         1. No design changes are requested.

Note: There is an adjacent line that has been abandoned and daylights. If preferred, permission to cut back existing visible pipe is granted.

Conflict 2- Stormwater Culvert

II. Conflict Description- A large culvert is needed to transmit stormwater across the greenway

   a. Clarifying Q&A
      i. How big and what material is culvert? 36" Class IV RCP is planned.
      ii. How big and what material is sewer line? 8" PVC.
      iii. What is the vertical separation between the sewer and RCP? ~4.5 ft.

iv. Can a smaller pipe be used? Pipe size and material was partially determined by Duke Energy weight needs.
v. Suggested Path to resolution/ alternatives
    1. A concrete cap/ cradle will be installed to further distribute the weight of the RCP line above the sewer line.

Conflict 3- Greenway

III. Conflict Description- for ~350 ft (sta. 14+50 to 18+00), the greenway will be directly overtop of existing sewer

a. Clarifying Q&A
    i. How big and what material is sewer line? 8" PVC.
    ii. Whats the range of depths of the sewer line? 10.5 to 14 ft.
    iii. What is the range of cut/ fill? No cut, 1 ft. max. fill
    iv. Suggested Path to resolution/ alternatives
        1. Limit cut and fill to no more than +/- 1 ft.
        2. No design changes are requested.

Conflict 4- Stormwater Culvert

IV. Conflict Description- A culvert is needed to transmit stormwater across the greenway

a. Clarifying Q&A
    i. How big and what material is culvert? 18" RCP is planned.
    ii. How big and what material is sewer line? 8" PVC.
    iii. What is the vertical separation between the sewer and RCP? 8.5 ft.
    iv. Suggested Path to resolution/ alternatives
        1. No design changes are requested.

Conflict 5- Greenway

V. Conflict Description- for ~310 ft (sta. 18+50 to 21+60), the greenway will be directly overtop of existing sewer

a. Clarifying Q&A
    i. How big and what material is sewer line? 8" PVC.
    ii. Whats the range of depths of the sewer line? 10 to 13 ft.
    iii. What is the range of cut/ fill? No cut, 2 ft. max. fill (to meet prop. Stormwater culvert cover requirements)
    iv. Suggested Path to resolution/ alternatives
        1. Limit cut and fill to no more than +/- 1 ft.
        2. No design changes are requested.

Conflict 6- Future Manhole in greenway trail

I. Conflict Description- Future tie-in of 8" SS line connection from multi-family development will construct a dog house manhole in the center of greenway

a. Clarifying Q&A
   i. How big and what material is sewer line? 8" PVC (exist and prop)
   ii. What's the proposed manhole elevation? The doghouse manhole elevation has been planned to matched the proposed greenway surface elevation at that location.

Note: There is no confirmed project schedule that states which project will occur first. It is currently assumed that the greenway will be under construction and/or complete before the manhole and SS line are constructed.

The above is agreed to by all parties as signed below.

Tracy Houk	Andrew Hickling	Will Rice 11/1/22
Town of Huntersville, Asst. Director Parks & Recreation	McAdams, Project Manager	Charlotte Water

<<ATTACHED PDF OF PLAN AND PROFILE>>

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ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
RICHARD E. ROGERS, JR.
Director

NORTH CAROLINA
Environmental Quality

July 17, 2023

DWR # 20230776
Mecklenburg County

Huntersville Park and Recreation
Attn: Ms. Tracy Houk
PO Box 2879
Huntersville NC 28070

Delivered via email to: thouk@huntersville.org

Subject: Approval of Individual 401 Water Quality Certification
Huntersville Greenway

Dear Ms. Houk:

Attached hereto is a copy of Certification No. WQC006096 issued to Ms. Tracy Houk and Huntersville Park and Recreation, dated July 17, 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.

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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 Mooresville 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 Mooresville 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 Sue Homewood at 336-813-1863 or sue.homewood@deq.nc.gov if you have any questions or concerns.

Sincerely,

DocuSigned by:
Stephanie Goss
980C5097D80E4E9...

Stephanie Goss, Supervisor
401 & Buffer Permitting Branch

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Electronic cc: Aliisa Harjuniemi, Carolina Wetland Services Inc
Doug Perez, USACE Charlotte Regulatory Field Office
Olivia Munzer, NCWRC
Todd Bowers, EPA
DWR 401 & Buffer Permitting Branch Electronic file

Filename: 20230776 Huntersville Greenway - Catawba - NW14 - IC.docx

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NORTH CAROLINA 401 WATER QUALITY CERTIFICATION

CERTIFICATION # WQC006096 ,mkis 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 Ms. Tracy Houk and Huntersville Park and Recreation, who have authorization for the impacts listed below, as described within your application received by the N.C. Division of Water Resources (Division) on May 31, 2023, and by Public Notice issued by the Division on June 7, 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 Permanent	Amount Approved Temporary	Mitigation Amount Required
Perennial Streams			
S1 - Stabilization	20 linear feet	0 linear feet	0 credits
S2 - Stabilization	20 linear feet	0 linear feet	0 credits
Intermittent Streams			
S3 - crossing	40 linear feet – culvert 35 linear feet - riprap	0 linear feet	0 credits
Riparian Wetlands			
W1 - fill	0.01 acres	0 acres	0 credits

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 Mooresville 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)

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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.

   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

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(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,

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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.

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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)

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Materials producing color or odor shall not be present in amounts that may cause adverse impacts on existing wetland uses.

11. 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.

12. 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.

13. 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

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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.

14. Heavy equipment working in wetlands shall be placed on mats or other measures shall be taken to minimize soil disturbance and compaction.

    Citation: 15A NCAC 02H .0506(b); 15A NCAC 02H .0507(c); 15A NCAC 02B .0231

    Justification: Wetland standards require maintenance or enhancement of existing uses of wetlands such that hydrologic conditions necessary to support natural biological and physical characteristics are protected; populations of wetland flora and fauna are maintained to protect biological integrity of the wetland; and materials or substances are not present in amounts that may cause adverse impact on existing wetland uses.

15. 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.

16. 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.

17. 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

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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 17th day of July 2023

DocuSigned by:
Stephanie Goss
980C5097D80E4E9...

Stephanie Goss, Supervisor
401 & Buffer Permitting Branch

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, WILMINGTON DISTRICT
CHARLOTTE REGULATORY OFFICE
8430 UNIVERSITY EXECUTIVE PARK DRIVE, SUITE 615
CHARLOTTE NORTH CAROLINA 28262

July 24, 2023

Regulatory Program/Division

Tracy Houk
Huntersville Park and Recreation
P. O. Box 2879
Huntersville, NC 28070
Via Email: thouk@huntersville.org

Dear Tracy Houk:

This letter is in response to the Pre-Construction Notification (PCN) you submitted to the Wilmington District, Charlotte Regulatory Office on May 31, 2023, for a Department of the Army Nationwide permit (NWP) verification. This project has been assigned the file number SAW-2022-02408 and is known as Huntersville Greenway. This file number should be referenced in all correspondence concerning this project.

A review of the information provided indicates that the proposed work would include the permanent impact of 0.010-acre of wetland for rip rap, the permanent impact of 40 linear feet (0.003-acre) of stream for a culvert, the permanent impact of 40 linear feet (0.004-acre) of stream for bank stabilization, and the permanent impact of 35 linear feet (0.003-acre) for rip rap.. The project area for this determination includes a 13 acre(s) area which is illustrated on the enclosed site plans/maps. The project/review area is located on the SW side of the intersection of Sam Furr Road and Old Statesville Road at Latitude 35.437155 and Longitude -80.848625; in Huntersville, Mecklenburg County, North Carolina.

We have determined that the proposed work is authorized by NWP 14 (Linear Transportation) pursuant to authorities under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403), **and/or** Section 404 of the Clean Water Act (33 U.S.C. § 1344) **and** Section 14 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 408). The proposed work must be accomplished in strict accordance with the general permit conditions, any regional conditions, the special conditions listed in this letter, the application materials, and the enclosed plans “L1 – Plan & Profile” and “Y3 – Plan & Profile”. If the extent of the project area and/or nature of the authorized impacts to waters are modified, a revised PCN must be submitted to this office for written approval before work is initiated. Any violation of permit conditions or deviation from your submitted plans may subject the permittee to enforcement action.

This verification is valid until March 14, 2026, unless prior to this date the subject NWP(s) is suspended, revoked, or is modified such that the activity no longer complies with the terms and conditions of this NWP. If you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP.

Project Specific Special Conditions:

If the Tricolored Bat or other bat species are listed as threatened or endangered prior to tree clearing within the Corps action area, the applicant shall commit to a tree clearing moratorium between April 1 and October 15;
OR
The applicant shall conduct acoustic surveys in accordance with the US Fish and Wildlife Service (USFWS) survey protocols and provide the Corps and USFWS a preliminary statement of the surveys within 24 hours and develop a relocation plan as needed. Impacts to WOTUS at these locations shall not occur until the Corps has coordinated with USFWS and received their concurrence.

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.

This NWP verification does not preclude the necessity to obtain any other Federal, State, or local permits, licenses, and/or certifications, which may be required.

If you have any questions related to this verification or have issues accessing documents referenced in this letter, please contact Doug Perez, Biologist-Regulatory Specialist of the Charlotte Regulatory Office at (704) 510-1439, by mail at the above address, or by email at doug.j.perez@usace.army.mil. Please take a moment to complete our customer satisfaction survey located at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Sincerely,



Doug Perez
Biologist-Regulatory Specialist

Enclosures

Cc (w/enclosures)
Aliisa Harjuniemi, Carolina Wetland Services, Inc. (via aliisa@cws-inc.net)

General Conditions (33 CFR PART 320-330):

1. The time limit for completing the work authorized ends on **03/14/2026.**

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort of if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit you must obtain the signature of the new owner on the transfer form attached to this letter and forward a copy to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit.

6. You must allow a representative from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Commencement Notification Form

Action ID Number: SAW-2022-02408 **County: Mecklenburg**

Permittee: Huntersville Park and Recreation, Tracy Houk

Project Name: Huntersville Greenway

Date Verification Issued: 7/24/2023

Project Manager: Doug Perez

Upon commencement OR Within 10 days of commencing the activity authorized by this permit, sign this certification, and return it to the following address:

US ARMY CORPS OF ENGINEERS
Wilmington District
Attn: Doug Perez
Charlotte Regulatory Office
U.S Army Corps of Engineers
8430 University Executive Park Drive, Suite 615
Charlotte, North Carolina 28262
or
doug.j.perez@usace.army.mil
(704) 510-1439

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers representative. Failure to comply with any terms or conditions of this authorization may result in the Corps suspending, modifying or revoking the authorization and/or issuing a Class I administrative penalty, or initiating other appropriate legal action.

Construction Start Date: _____

_____ _____

Signature of Permittee **Date**

Compliance Certification Form

Action ID Number: SAW-2022-02408 **County: Mecklenburg**

Permittee: Huntersville Park and Recreation, Tracy Houk

Project Name: Huntersville Greenway

Date Verification Issued: 7/24/2023

Project Manager: Doug Perez

Upon completion OR Within 30 days of completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

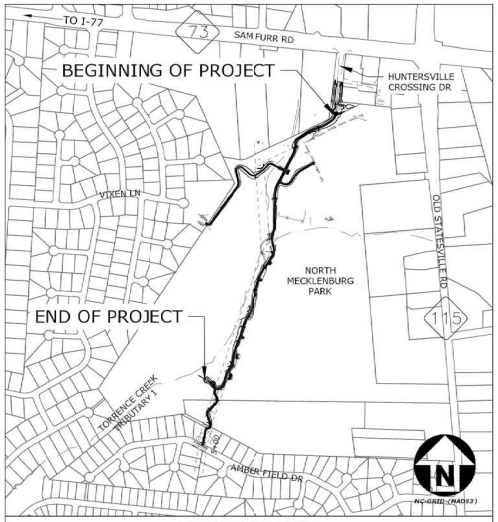
US ARMY CORPS OF ENGINEERS
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Charlotte, North Carolina 28262
or
doug.j.perez@usace.army.mil
(704) 510-1439

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers representative. Failure to comply with any terms or conditions of this authorization may result in the Corps suspending, modifying or revoking the authorization and/or issuing a Class I administrative penalty, or initiating other appropriate legal action.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and condition of the said permit including any general or specific conditions, and the required mitigation was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee **Date**



VICINITY MAP

HUNTERSVILLE, MECKLENBURG COUNTY NORTH CAROLINA

NORTH MECKLENBURG PARK GREENWAY

PROJECT DESCRIPTION:
12' WIDE GREENWAY ALONG TORRENCE CREEK TRIBUTARY WITH 5' TO 8' WIDE GREENWAY CONNECTIONS

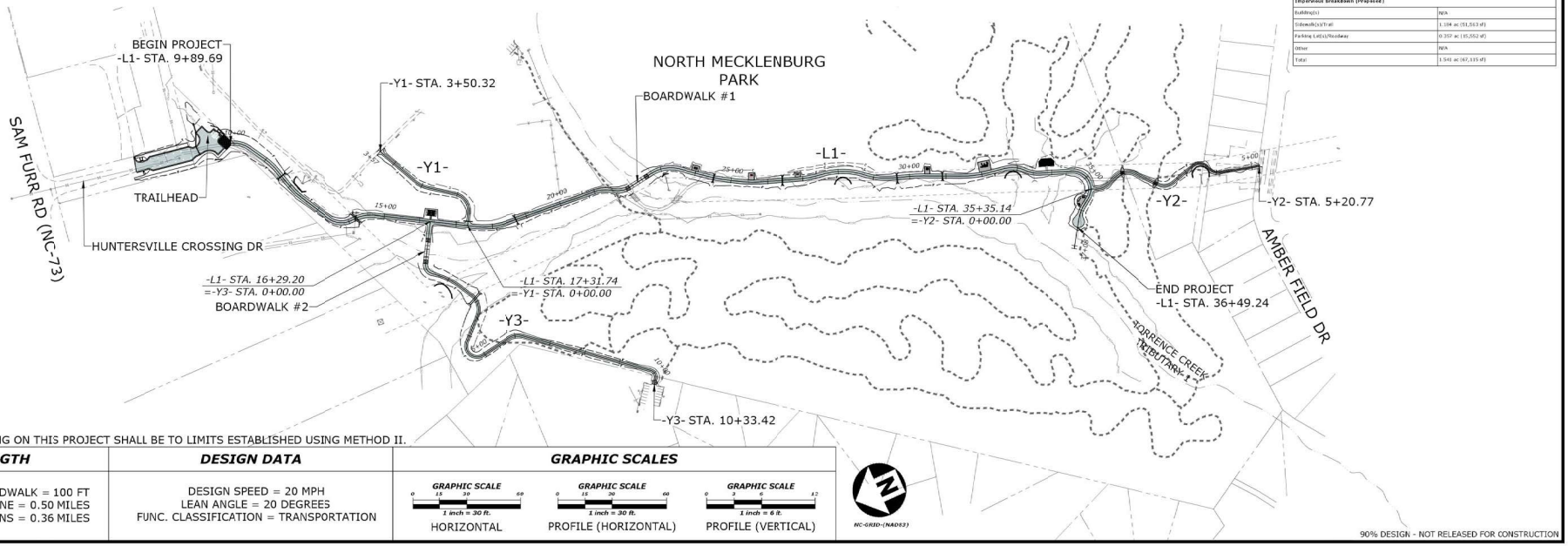
TYPE OF WORK:
GRADING, PAVING, DRAINAGE, STRUCTURES, PAVEMENT MARKING, & EROSION CONTROL

INDEX OF SHEETS

SHEET NO.	SHEET TITLE
1	COVER SHEET
1A	GENERAL NOTES
1B	CONVENTIONAL SYMBOLS
1C	KEY SHEET
2A-1 THRU 2A-2	TYPICAL SECTIONS
2B-1 THRU 2B-8	DETAILS
3B-1	EARTHWORK SUMMARY
3D-1	DRAINAGE SUMMARY
4 THRU 11	PLAN & PROFILE SHEETS
CA-1	CONSTRUCTION ACCESS PLAN
PM-1	PAVEMENT MARKING & SIGNAGE PLAN
C2-1	ROADWAY/TRAILHEAD SITE PLAN
C2-2	ROADWAY/TRAILHEAD PROFILE
C3-1	ROADWAY/TRAILHEAD GRADING & DRAINAGE PLAN
C4-1 THRU C4-2	ROADWAY CROSS SECTIONS
SCM-1 THRU SCM-2	STORMWATER CONTROL MEASURE PLANS
L2-1 THRU L2-6	HARDSCAPE PLANS
L4-1 THRU L4-7	HARDSCAPE/LANDSCAPE DETAILS
L5-1 THRU L5-6	LANDSCAPE PLANS
EC-1 THRU EC-10	EROSION CONTROL PLANS
X-1A	CROSS SECTION INDEX
X-1 THRU X-7	CROSS SECTIONS
S-1 THRU S-7	STRUCTURE PLANS
W-1 THRU W-2	WALL PLANS

SITE DATA TABLE

Total Area (acres, square feet)	97.076 ac (4,228,629 sf)
Approved Disturbed Area (acres, square feet)	5.00 ac (217,748 sf)
River Basin	Catawba
Stream Classification	PS-IV; B; CA
General Zoning Data	
Lot, Building Type (Z.O. Article 3, 4 and 8.10)	N/A
Zoning District (Z.O Article 3)	NR, HC(CD), GR
Overlay District, if applicable (Article 3 Z.O)	N/A
Principle Use(s) (Z.O Article 3)	Parks
Conditions for Use (See Article 9)	Parks (including Greenways)
Permitted Accessory Uses	N/A
Lot Count (if multi-building site)	N/A
Total number of dwellings (detached/ attached)	N/A
Total Number of Mixed Use/Live-Work Units	N/A
Total Area of Non-Residential (acres, square feet)	N/A
Total Area of Residential (acres, square feet)	N/A
Total Area of Principle Use (acres, square feet)	N/A
Total Area of Accessory Use (acres, square feet)	N/A
Project Timetable	
Proposed Start of Grading	October 2023
Proposed Start of Construction	October 2023
Proposed Occupancy	N/A
Other	N/A
Setbacks and Build-to-lines (Z.O Article 3, 4 & 8.)	
Front	N/A
Corner(s)	N/A
Rear	N/A
Left Side Yard	N/A
Right Side Yard	N/A
Watershed Information (Z.O. Article 3 and S.O. Section 7.290)	
Is the property within a regulated watershed district?	No
Watershed District	N/A
Low Density/High Density	N/A
Percentage of Allowable Impervious Area	N/A
Area of Impervious Allowed (acres, square feet)	N/A
Percent of Impervious Shown on Plans	N/A
Area of Impervious Shown (acres, square feet)	N/A
Impervious Breakdown (Proposed)	
Building(s)	N/A
Sidewalk(s)/Trail	1.194 ac (51,563 sf)
Parking Lot(s)/Roadway	0.357 ac (15,552 sf)
Other	N/A
Total	1.541 ac (67,115 sf)



METHOD OF GRADING: CLEARING ON THIS PROJECT SHALL BE TO LIMITS ESTABLISHED USING METHOD II.

PROJECT LENGTH	DESIGN DATA	GRAPHIC SCALES
LENGTH OF BOARDWALK = 100 FT TOTAL LENGTH OF MAINLINE = 0.50 MILES TOTAL LENGTH OF CONNECTIONS = 0.36 MILES	DESIGN SPEED = 20 MPH LEAN ANGLE = 20 DEGREES FUNC. CLASSIFICATION = TRANSPORTATION	GRAPHIC SCALE 0 15 30 60, 1 inch = 30 ft. — HORIZONTAL GRAPHIC SCALE 0 15 30 60, 1 inch = 30 ft. — PROFILE (HORIZONTAL) GRAPHIC SCALE 0 3 6 12, 1 inch = 6 ft. — PROFILE (VERTICAL)

90% DESIGN - NOT RELEASED FOR CONSTRUCTION

McAdams

The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361.2269
license number C-0293

www.mcadamsco.com

CLIENT
Town of Huntersville NORTH CAROLINA

REVISIONS
NO. DATE

GREENWAY ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 042301 ENGINEER ANDREW J. HICKLING

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 035534 ENGINEER RICHARD A. SOMER

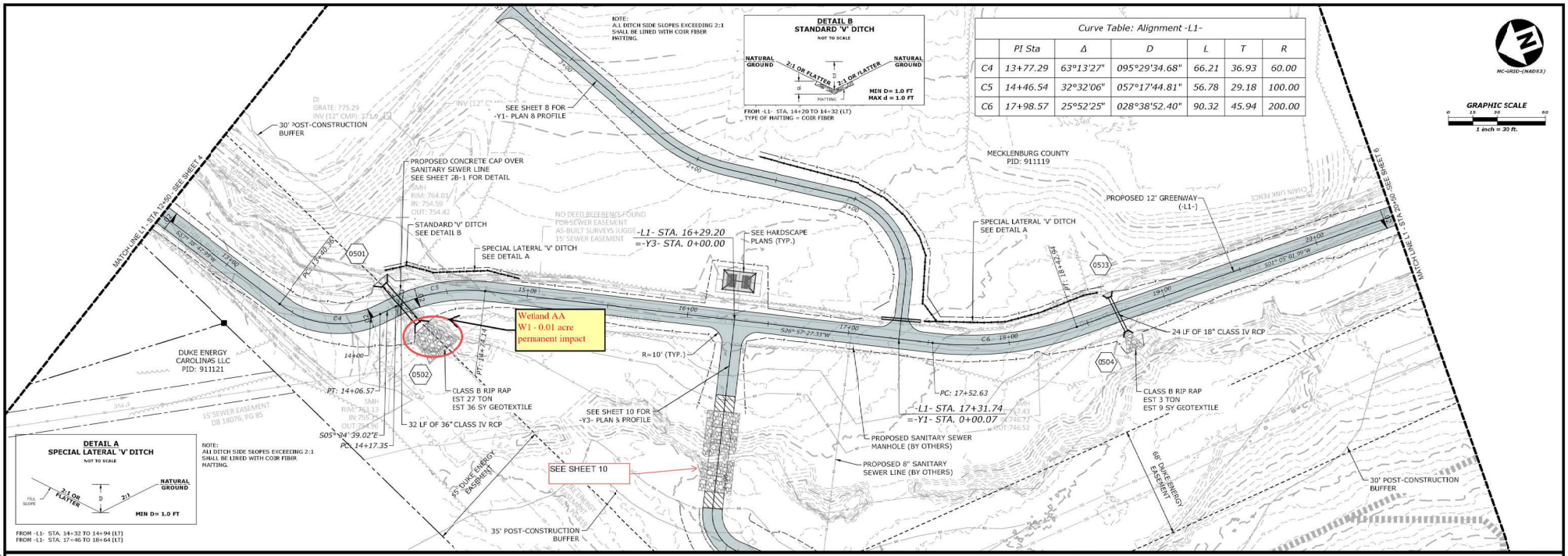
NORTH MECKLENBURG PARK GREENWAY

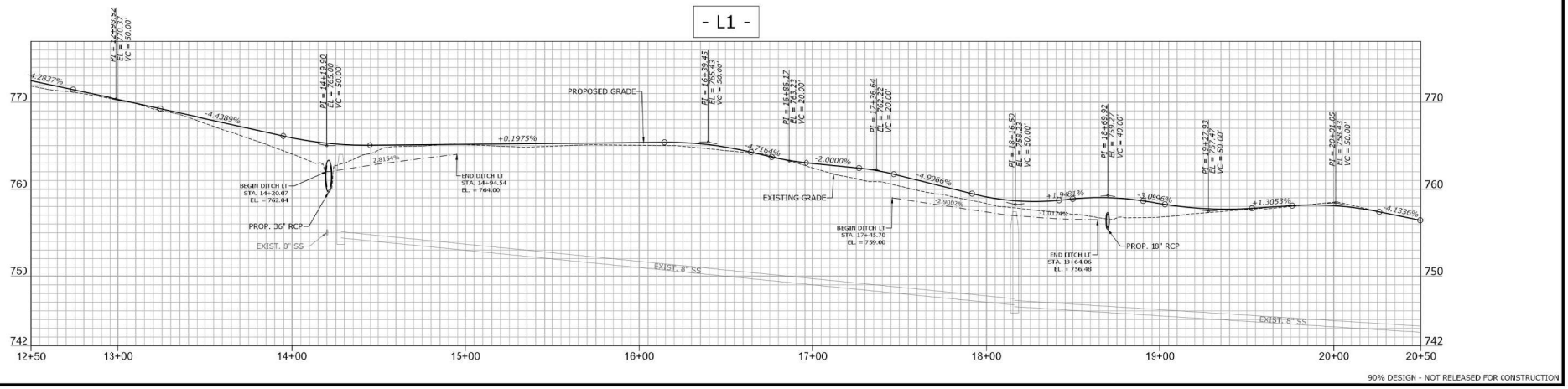
COVER SHEET

PLAN INFORMATION
PROJECT NO. HUN-21002
FILENAME HUN21002-CS.dwg
CHECKED BY AJH
DRAWN BY JAP
SCALE 1" = 150'
DATE 05/01/2023

1

M:\Projects\HUN\HUN21002\04 Production\Engineering\Construction Drawings\Current Drawings\HUN21002-CS.dwg, 5/2/2023 1:03:29 PM, Jimmy Predwood





90% DESIGN - NOT RELEASED FOR CONSTRUCTION

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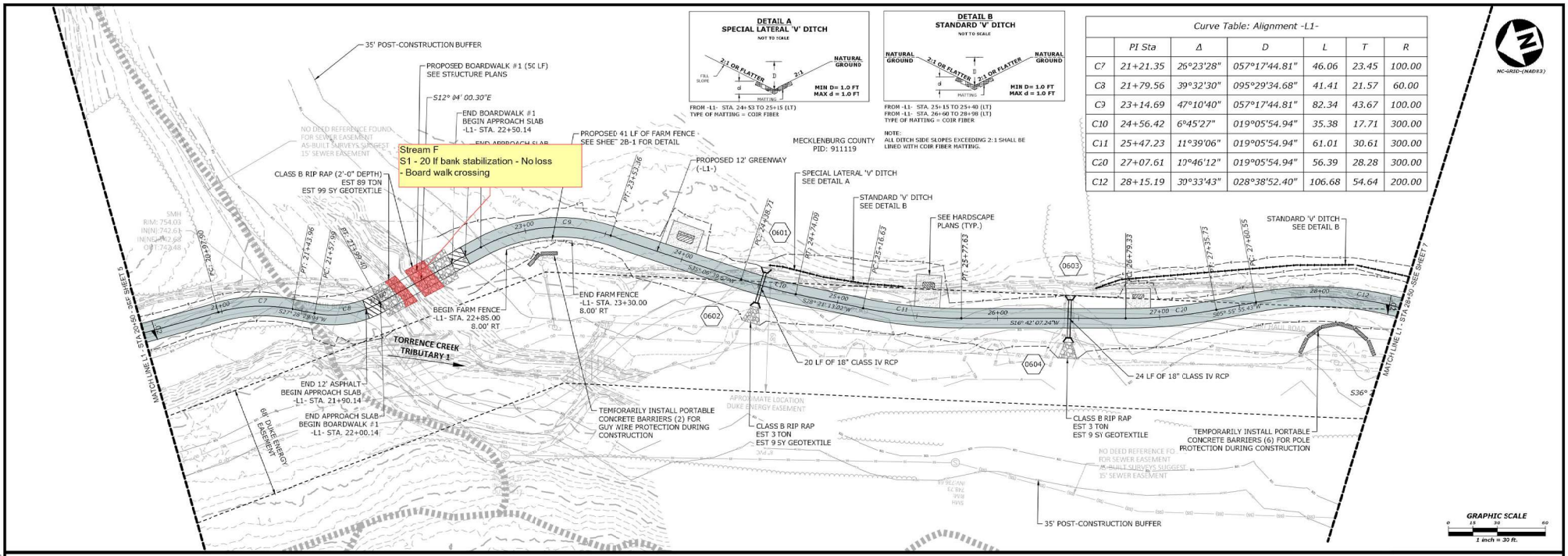
HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL PATRICK A. SOMERVILLE ENGINEER

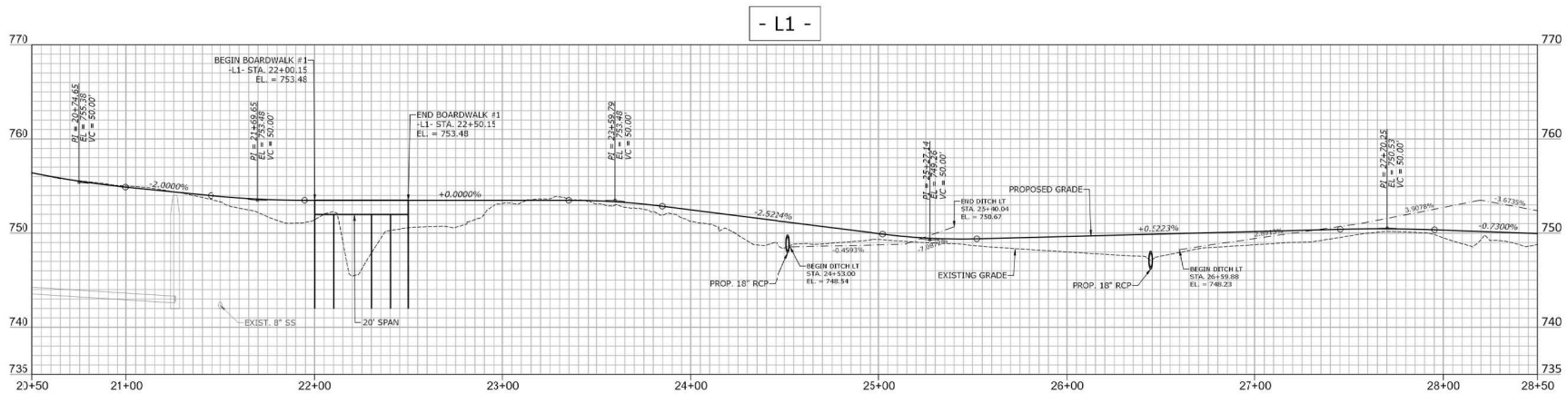
NORTH MECKLENBURG PARK GREENWAY

-L1- PLAN & PROFILE

PLAN INFORMATION
PROJECT NO. HUN-21002
FILENAME HUN21002-P1.dwg
CHECKED BY AJH
DRAWN BY JAP
SCALE 1" = 30' / 1"=6'
DATE 05/01/2023

5





90% DESIGN - NOT RELEASED FOR CONSTRUCTION

M:\Projects\HUN\NC\21002\04 Production\Engineering\Construction Drawings\Current Drawings\HUN21002-P1.dwg, 5/12/2023 7:45:41 AM, Jimmy Predwood

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NORTH CAROLINA

REVISIONS
NO. DATE

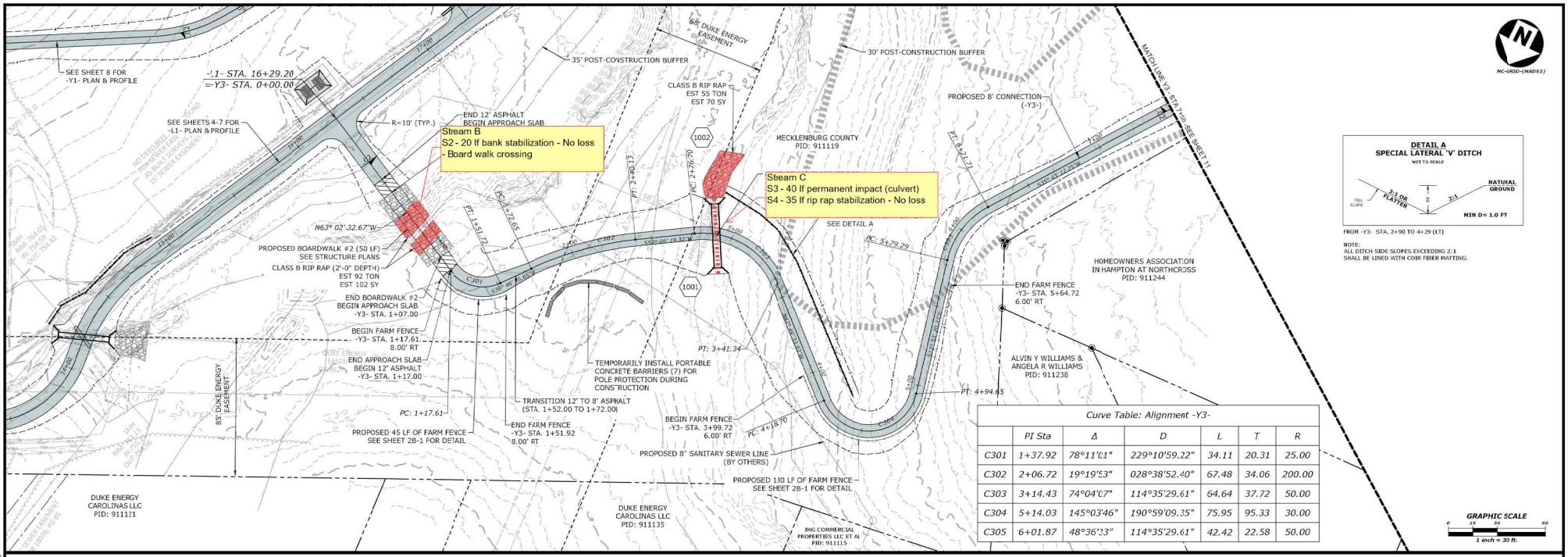
GREENWAY ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 042301 ENGINEER ANDREW J. HICKLING

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 035534 ENGINEER PATRICK A. SOMERVILLE

NORTH MECKLENBURG PARK GREENWAY

-L1- PLAN & PROFILE

PLAN INFORMATION
PROJECT NO. HUN-21002
FILENAME HUN21002-P1.dwg
CHECKED BY AJH
DRAWN BY JAP
SCALE 1" = 30' / 1"=6'
DATE 05/01/2023


-!1- STA. 16+29.20
=-Y3- STA. 0+00.00
SEE SHEET 8 FOR -Y1- PLAN & PROFILE
SEE SHEETS 4-7 FOR -L1- PLAN & PROFILE
Stream B
S2 - 20 lf bank stabilization - No loss
- Board walk crossing
Stream C
S3 - 40 lf permanent impact (culvert)
S4 - 35 lf rip rap stabilization - No loss
35' POST-CONSTRUCTION BUFFER
30' POST-CONSTRUCTION BUFFER
85' DUKE ENERGY EASEMENT
CLASS B RIP RAP EST 55 TON EST 70 SY
PROPOSED 8' CONNECTION (-Y3-)
MECKLENBURG COUNTY PID: 911119
HOMEOWNERS ASSOCIATION IN HAMPTON AT NORTHCROSS PID: 911244
ALVIN Y WILLIAMS & ANGELA R WILLIAMS PID: 911238
DUKE ENERGY CAROLINAS LLC PID: 911121
DUKE ENERGY CAROLINAS LLC PID: 911135
JHG COMMERCIAL PROPERTIES LLC ET AL PID: 911115
MATCH LINE Y3 STA 1+90 SEE SHEET 11
SEE DETAIL A
PROPOSED BOARDWALK #2 (50 LF) SEE STRUCTURE PLANS
CLASS B RIP RAP (2'-0" DEPTH) EST 92 TON EST 102 SY
END BOARDWALK #2 BEGIN APPROACH SLAB -Y3- STA. 1+07.00
BEGIN FARM FENCE -Y3- STA. 1+17.61 8.00' RT
END APPROACH SLAB BEGIN 12' ASPHALT -Y3- STA. 1+17.00
TRANSITION 12' TO 8' ASPHALT (STA. 1+52.00 TO 1+72.00)
END FARM FENCE -Y3- STA. 1+51.92 8.00' RT
PROPOSED 45 LF OF FARM FENCE SEE SHEET 2B-1 FOR DETAIL
TEMPORARILY INSTALL PORTABLE CONCRETE BARRIERS (7) FOR POLE PROTECTION DURING CONSTRUCTION
BEGIN FARM FENCE -Y3- STA. 3+99.72 6.00' RT
PROPOSED 8" SANITARY SEWER LINE (BY OTHERS)
PROPOSED 130 LF OF FARM FENCE SEE SHEET 2B-1 FOR DETAIL
END FARM FENCE -Y3- STA. 5+64.72 6.00' RT
PT: 3+41.34
PT: 4+94.65
PC: 1+17.61
PC: 4+18.70
PC: 5+79.29
PT: 1+51.72
PT: 2+40.13
PC: 2+76.76
N63° 02' 32.67"W
S38° 40' 15.65"E
S30° 57' 44.00"E
S30° 57' 44.00"W
S30° 57' 44.00"E
S30° 57' 44.00"W
S30° 57' 44.00"E
S30° 57' 44.00"W