TECHNICAL SPECIFICATIONS

4411 HIGHWAY 24 DRIVEWAY
NEWPORT, NORTH CAROLINA

February 17, 2026

Owner:

Carteret County
210 Turner Street
Beaufort, NC 28516

Engineer:

ARENDELL ENGINEERS
CIVIL · COASTAL · ENVIRONMENTAL

1004 Arendell Street
Morehead City, North Carolina 28557
(252) 622-4338
N. C. Certification No. C-1509

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PROJECT MANUAL

TECHNICAL SPECIFICATIONS

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SECTION 01060

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY: This section contains provisions for compliance with local, state and federal jurisdictional regulations and permit conditions affecting the work. Contractor is not relieved from requirements to comply with regulations, applicable permits, laws, codes, ordinances and regulations not identified in this section. It is the responsibility of the Contractor to comply with applicable state, federal and local regulations affecting the work.

1.2 REFERENCES:

A. Owner Procured:
1. N.C. Department of Environmental Quality Erosion & Sedimentation Control plan – Project Identifier CARTE-2025-0118.
2. N.C. Department of Environmental Quality Low Density State Stormwater Management Permit No. SW8250710.
3. N.C Department of Environmental Quality CAMA Permit 58-24.
4. N.C. Department of Transportation Driveway Permit XXX.
5. U.S. Army Corps of Engineers General Permit.

B. Contractor Procured (at his expense):
1. Current business license
2. Building Permits (if applicable)
3. Current contractor's license for operations in the State of North Carolina
4. Permit for hauling and disposal of debris and waste
5. Permit to exceed load limits on certain bridges if they are on haul routes and have low load limits

1.3 SUBMITTALS: Contractor shall provide reports, documents, plans and fees as required for obtaining all contractor procured permits at no additional cost to the Owner.

1.4 QUALITY ASSURANCE: Contractor shall conduct inspections of construction operations to insure compliance and report all violations to the Engineer.

1.5 SITE CONDITIONS:

A. Contractor shall practice and be fully responsible for good housekeeping activities and procedures to prevent oil spills, hazardous waste contamination and spills, unauthorized environmental pollution and safety violations.

B. There are no restroom facilities available to the Contractor on the site. Contractor shall make arrangements for restroom facilities for employees at no additional costs to the Owner. Disposal of waste from portable restroom facilities shall be in accordance with applicable local, state and federal regulations.

C. Contractor shall ensure reasonable access to the site for Owner’s Site Representative, Engineer, and regulatory agency personnel.

1.6 SEQUENCING AND SCHEDULING:

A. Contractor shall provide ample notification to regulatory agencies for scheduled construction activities and inspections, if a regulatory inspector is required for observation.
B. Contractor shall conduct operations in accordance with the sequence of operations indicated in the Contract Documents and as required by the permit conditions. Deviations from the sequence of construction shall be reported to the Engineer.

1.7 COMPLIANCE WITH APPLICABLE PERMITS: Terms and conditions of the applicable permits and regulations listed in 1.2 A of the Section are incorporated into these Contract Documents by reference. Contractor is responsible for adherence to terms and conditions of permits.

END OF SECTION

SECTION 01100

SUMMARY OF WORK

PART 1 - GENERAL

1.1 Work Covered by Contract Documents

Work described in this Project Manual includes the provision of labor, materials, equipment, and services required to complete installation of the asphalt driveway at the Straits 4411 Highway 24 in Newport, North Carolina.

1.2 Construction Contract

A. The project construction will be under a single Lump Sum Contract negotiated with Carteret County Government.

1.3 Type of Work

Work consists of the following:

- Installation of 20’ wide driveway per plans completed by the John R. McAdams, Company, Inc. dated August 21, 2025.
- Rough and fine grading.
- Installation of 8” aggregate base course and 2.5” asphalt surface course.
- Final seeding and stabilization of disturbed areas.
- Installation of three (3) “No Parking Signs” along each side of the driveway within 300’ feet of the entrance secured to 4” x 4” treated timber posts embedded in a concrete footer.

1.4 Owner’s Site Representative

A. The ENGINEER is the Owner’s site representative. The Engineer is responsible to certify to the Owner that the project is constructed in accordance with the Contract Documents. Contractor shall cooperate with Engineer and Engineer’s representative to minimize conflict, and to facilitate the final acceptance by the Owner.

B. Contractor will provide all safety fencing, signage, barricades and other measurers required to ensure protection to public.

PART 2 PRODUCTS - Not Used
PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 SUBMITTALS

1.1.1 Furnish for approval three (3) copies of submittals as called for in the specifications. The Contractor shall check shop drawings prior to submittal, and where items must conform to existing work, he will verify dimensions on the job site. He shall indicate on each copy that he has checked the submittal and has found it to be in proper form and attach his signature. Shop drawings not previously checked by the Contractor will be returned unprocessed.

1.1.2 Work-Related Submittals.

1.1.2.1 Substitution or "Or Equal" Items: Includes material or equipment CONTRACTOR requests ENGINEER to accept, as substitute for items specified or described in Specifications by using name of a proprietary item or name of particular supplier.

1.1.2.2 Shop Drawings. Includes technical data and drawings specially prepared for this Project, including fabrication and installation drawings, diagrams, data sheets, schedules, templates, patterns, reports, instructions, design mix formulas, measurements, and similar information not in standard printed form. Standard information prepared without specific reference to the Project is not considered a Shop Drawing.

1.1.2.1 Product Data. Includes standard printed information on manufactured products, and systems that has not been specially prepared for this Project, including manufacturer's product specifications and installation instructions, catalog cuts, mill reports, and standard color charts.

1.1.2.2 Samples. Includes both fabricated and manufactured physical examples of materials, products, and units of work, partial cuts of manufactured or fabricated work, swatches showing color, texture, and pattern, and units of work to be used for independent inspection and testing

1.1.2.5 Miscellaneous Submittals. Includes work-related submittals that do not fit in the previous categories, such as guarantees, warranties, certifications, experience records, workmanship bonds, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, and similar information, devices, and materials applicable to the Work.

1.1.2.6 Permits and Applications. Furnish one copy of Contractor obtained permits. Contractor shall supply one (1) copy of application documents to the Engineer at the time the permits are applied for.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK: Work to be performed under this section consists of furnishing all, tools, labor, materials, equipment and supplies necessary to complete grading of roads and other site improvements as indicated on the plans.

1.2 RELATED SECTIONS: The specification sections listed below are referenced by this specification or reference this specification in the Contract Documents.

Section 02513, Bituminous Concrete Paving

Section 02900, Seeding & Mulching

Section 02720, Storm Drainage

1.3 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specifications to the extent referenced. The publications are referred to in the text by the basic designation only. References are made to the “Latest Edition” of the cited publications.

1.3.1 American Association of State Highway and Transportation Officials (AASHTO) specifications and tests.

T-99 The Moisture Density Relations of Soils Using a 5.5 lb. [2.5 kg] Rammer and a 12 in. [305 mm] Drop

1.3.2 American Society for Testing and Materials (ASTM) Publications:

D 422 Particle Size Analysis of Soils

D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (24,000 ft. lb.-f / ft.)

D 1140 Amount of Material in Soils Finer than the No. 200 (75-mm) Sieve

D 2487 Classification of Soils for Engineering Purposes

D 4318 1984 Liquid Limit, Plastic Limit and Plasticity Index of Soils

1.3.3 North Carolina Department of Transportation, “Standard Specification for Roads and Structures”, latest version. A copy of the NCDOT Specifications shall be at the project site in the possession of the Contractor. The specifications referenced are incorporated and become a part of this specification.

Section 520 Fine Grading Subgrade, Shoulders, and Ditches

Section 520	Aggregate Base Course
Section 1016	Select Backfill Material

1.4 SUBMITTALS: None.

1.5 DELIVERY, STORAGE, AND HAULING: Perform in a manner to prevent contamination or segregation of materials.

1.6 CRITERIA FOR BIDDING: Base bids on the following criteria:

a. Surface elevations are as indicated.
b. Pipes or other artificial obstructions, except those indicted, will not be encountered.

1.7 PROTECTION:

1.7.1 Site Drainage: Provide for the collection and disposal of surface and subsurface water encountered during construction.

1.7.1.1 Surface Drainage: Completely drain construction site during periods of construction to keep soil materials sufficiently dry to permit construction operations to successfully progress. Provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove the unsuitable material and provide new soil material as specified herein.

1.7.2 Protection of Underground Utilities: The contractor shall verify locations of existing utilities prior to excavation. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

1.7.3 Movement of construction machinery and equipment over any pipes during any stage of construction shall be at the Contractor's risk. Repair or remove and provide new pipe for existing or newly-installed pipe that has been displaced or damaged.

1.7.4 Protection of Existing Facilities: Protect structures, utilities, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.7.5 Protection of Trees and Root Systems: Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dry out to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1” diameter and larger with emulsified asphalt tree paint.

1.7.6 Sedimentation and Erosion Control: Contractor shall install erosion control measures as indicated on the drawings. Graded areas shall be seeded and mulched within 15 days of when final grades are established. No additional payment will be made for placement erosion control measures required in addition to those indicated in the Contract Documents. Contractor shall include these costs in the base bid.

1.7.7 Use of explosives is not permitted.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS: Shall be free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, frozen, deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the location of intended use.

2.1.1 Select Backfill:

2.1.1.1. General Fill: Soil materials meeting requirements of NCDOT Specifications for Class III Select Backfill Material.

2.1.1.2 Subbase Fill Material: Shall be clean material meeting the requirements of NCDOT Specifications for Class II Select Backfill Material.

2.1.1.3 Granular Fill: Shall be clean sand material meeting the requirements NCDOT Specifications for Class I Select Backfill Material.

2.2 Topsoil: Provide in accordance with Section 02900, “Seeding & Mulching.”

PART 3 - EXECUTION

3.1 UNCLASSIFIED EXCAVATION:

3.1.1 All excavation under this section shall be classified as unclassified excavation.

3.1.2 Unauthorized Excavation: Consists of removal of materials beyond indicated subgrade elevations or dimensions without specific indication in the Contract Documents. Unauthorized excavation, as well as remedial work directed by Owner or Engineer, shall be at Contractor’s expense.

3.1.4 Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degree F (1 degree C).

3.2 GRADING:

3.2.1 General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades. Grade areas as shown on the Drawings to prevent ponding.

3.2.2 Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10’ above or below required subgrade elevations.

3.2.3 Pavements, Sidewalks, and Shoulders: Shape surface of areas under pavement and shoulders to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.

3.3 FILLING AND BACKFILLING: Fill and backfill to the contours, elevations, and dimensions indicated as described herein. Compact each lift before the overlaying lift is placed.

3.3.1 Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

3.3.2 Placement of Fill and Backfill: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

3.3.3 Adjacent to Structures: Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

3.3.4 Under Grassed and Landscaped Areas: Use general fill material.

3.3.5 Under Pavements and Shoulders: Use Select Fill Material.

3.4 COMPACTION:

3.4.1 General: Control soil compaction during construction providing minimum percentage of density specified for each area classification as indicated below. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.4.2 Existing Ground Beneath Pavements and Sidewalks: When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

3.4.3 Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density.

3.4.3.1 Pavements & Sidewalks: Compact all material to a depth of 8" below the finished surface of the subgrade to a density equal to at least 100% of that obtained by compacting a sample of the material is accordance with AASHTO T99 as modified by the NC Department

of Transportation, and as directed in section 500-2(C) of the NC Department of Transportation Standard Specifications.

3.4.3.2 Lawn or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 95% density in accordance with ASTM D 698.

3.4.5 Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase material.

3.4.6 Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12" width of shoulder simultaneously with compacting and rolling of each layer of subbase course.

3.5 STABILITY OF EXCAVATIONS: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

3.6 SHORING AND BRACING: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

3.7 DEWATERING: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches. All diverted drainage shall flow through an erosion control device.

3.8 FIELD QUALITY CONTROL:

3.8.1 Quality Control Testing During Construction: When excavation has reached required subgrade elevations before installing concrete sidewalk, contact Engineer for observation. Engineer will determine if compaction testing is necessary for the subgrade. The first compaction test will be conducted at the Owner's expense. If additional compaction tests are required, these tests will be the financial responsibility of the Contractor.

3.9 MAINTENANCE:

3.9.1 Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

3.9.2 Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.9.3 Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.10 DISPOSAL OF EXCESS AND WASTE MATERIALS:

3.10.1 Excess Material: Remove acceptable material to be reused to area on project site designated by the Owner or Engineer. Stockpile soil or spread as directed by Engineer. Unused material shall become the property of the Contractor and shall be disposed of as waste material.

3.10.2 Waste Material: Waste materials shall become the property of the Contractor and disposed of off of project property. Disposal shall be at an approved site meeting applicable local, state and federal regulations. Contractor is responsible for meeting all applicable local, state and federal regulations for transport and disposal of waste materials. Fees for disposal are to be paid by the Contractor.

3.11 FIELD SAMPLING AND TESTING:

3.11.1 Sampling: Take the number and size of samples required to perform the following tests.

3.11.2 Tests: Perform one of each of the required tests for each material used. Provide additional tests for each source change.

3.11.2.1 Existing Subgrade and Select Backfill: ASTM D 422 for conformance to ASTM D 2487 gradation limits; ASTM D 1140 for material finer than the No. 200 sieve; ASTM D 4318 for liquid limit and for plastic limits; ASTM D 698 for moisture density relations.

3.11.2.2 Density and Compaction Test: ASTM D 698 for all fill and backfill areas. Test existing soils in cut and each lift of backfill at randomly selected locations every 2000 square feet for backfill and for subgrade in cut. Test subgrade and backfill in small irregular areas at a minimum of one location for areas smaller than 2000 square feet.

--END OF SECTION--

SECTION 02302

EXCAVATION, BACKFILLING, AND COMPACTION FOR UTILITIES

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK. Work under this Section includes furnishing all materials and equipment for trenching, backfilling, and compacting for utility pipeline installation.

1.2 RELATED SECTIONS: The specification sections listed below are referenced by this specification or reference this specification in the Contract Documents.

Section 02200 Earthwork
Section 02900 Seeding and mulching

1.3 REFERENCES: The publications listed below form a part of this specifications to the extent referenced: The publications are referred to in the text by the basic designation only.

1.3.1 American Society for Testing and Materials (ASTM):

ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN-m/m))
ASTM D 2487	(1993) Classification of Soils for Engineering Purposes (Unified Soil Classification System)

1.3.2 North Carolina Department of Transportation (NCDOT Specs)

Standard Specifications for Roads and Structures, latest version.

North Carolina Department of Transportation Policies and Procedures for Accommodating Utilities on Highway Rights of Way, April 1993.

1.3.3 American Water Works Association (AWWA):

AWWA M23	PVC Pipe - Design and Installation
AWWA C600	Installation of Ductile Iron Water Mains and Their Appurtenances

1.4 SUBMITTALS: Submit the following in accordance with Section entitled “Submittals”

1.4.1 Statements

a. Shoring and sheeting plan

b. Dewatering plan

c. Welder’s qualifications

1.4.1.1 Shoring and Sheeting Plan: Describe materials of shoring system to be used. Indicate whether or not components will remain after filling or backfilling. Provide plans, sketches, or details along with calculations by a professional Engineer registered in North Carolina. Indicate sequence and method of installation and removal.

1.4.1.2 Dewatering Plan: Describe methods for removing collected water from open trenches and diverting surface water or piped flow away from work area. Describe equipment and procedures for installing and operating the dewatering system indicated. Described the basic components of the dewatering system proposed for use and its planned method of operation. Dewatering plan, as a minimum, shall address those requirements outlined in paragraph entitled “Drainage and Dewatering.”

1.4.2 Certificates of Compliance:

a. Pipe bedding material tests

1.4.3 Field Test Reports

a. Density and Moisture Tests: Submit within 14 days of test date.

1.5 DELIVERY, STORAGE AND HANDLING: Deliver and store materials in a manner to prevent contamination, segregation, freezing, and other damage.

1.6 CRITERIA FOR BIDDING: Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Buried pipes and other manmade obstructions will be encountered.

c. Hard material shall not be considered as rock and removal of such material shall not give cause for a claim for additional compensation regardless of hardness or difficulty in removing. Rock or hard material will not be encountered.

d. Groundwater elevations are 2 feet or less below the surface in the project area.

e. Blasting will not be permitted.

1.7 PROTECTION

1.7.1 Dewatering Plan: Base on site surface and subsurface conditions, soil and hydrological data obtained by the Contractor.

1.7.2 Utilities: Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor’s risk. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS: Provide soil materials as specified below free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, ice, or other deleterious and objectionable materials.

2.1.1 Backfill: Bring trenches to grade indicated on the drawings using material excavated on the site of this project. This material will be considered unclassified and no testing other than for compaction will be required before use as backfill classified as GS, GM, SM, SC, SP, SW by ASTM D 2487.

2.1.2 Gravel: Clean, coarsely graded natural gravel, crushed stone or a combination thereof identified as #67 in accordance with Section 1000 of NCDOT Specifications. Maximum particle size shall not exceed 0.75 inches.

2.1.3 Sand: Clean, coarse-grained sand classified as 1S, 2S, 2MS, or 4X in accordance with Section 1008, NCDOT Specifications or having classification SW, SP in accordance with ASTM D 2487.

2.1.4 Topsoil Material: Salvaged topsoil from stockpile. Furnish additional topsoil from approved sources off the site if stockpiled material is insufficient to complete work indicated. Topsoil shall be free of subsoil, stumps, and rocks larger than 3/4 inch in diameter. Topsoil shall be a natural, friable soil representative of productive soils in the vicinity.

2.1.5 Borrow: Provide materials meeting requirement for sand and gravel.

2.1.6 Pipe Bedding: As required.

Table 02302-1 Utility Earthwork References

Pipe Materials	Soil Materials Reference	Installation Reference
Polyvinyl Chloride (PVC) Nonpressure/Pressure Pipe	Sand or Gravel	ASTM D 2321 AWWA M23
Ductile Iron Pressure/ Nonpressure Pipe	Sand or Gravel Bedding, Gravel for Fill of Overcut	AWWA C600

2.1.7 Aggregate Base Coarse (ABC) : Coarse aggregate meeting the requirements of NCDOT Specifications, Section 1005.

2.2 BURIED WARNING AND IDENTIFICATION TAPE: Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted on bold black letters continuously over the entire tape length.

Warning and identification to read, “CAUTION, BURIED (intended service) LINE BELOW” or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.
PART 3 - EXECUTION

3.1 PROTECTION

3.1.1 Shoring and Sheeting: Provide shoring, bracing, cribbing, trench boxes, underpinning, and sheeting where required. Include provisions in the shoring and sheeting plan that will accomplish the following:

a. Prevent undermining of pavements, foundations and slabs.

b. Prevent slippage or movement in banks or slopes adjacent to the excavation.

3.1.2 Drainage and Dewatering: Plan for and provide the structures, equipment, and construction for the collection and disposal of surface and subsurface water encountered in the course of construction.

3.1.2.1 Drainage: Surface water shall be directed away from excavation and construction sites so as to prevent erosion and undermining of foundations. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.1.3 Dewatering: Groundwater flow toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Sumps, ditches or trenches will not be permitted within 3 feet of any pavement. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. Operation the dewatering system until construction work below existing water levels is complete.

3.1.4 Underground Utilities: Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall contact the North Carolina 811 at 1-800-632-4949 for assistance in locating existing utilities.

3.1.5 Structures and Surfaces: Protect newly backfilled areas and adjacent structures and pavements, slopes, or grades from traffic, erosion settlement, or any other damage. Repair and re-establish damaged or eroded grades and slopes and restore surface construction within 48 hours of completion of each section of pipe installation. Protect existing streams, ditches, and storm drain inlets from water-borne soil as indicated on the contract drawings.

3.1.5.1 Disposal of Excavated Material: Dispose of excavated material so that it will not enter obstruct the flow of runoff, streams, endanger a partly finished structure, impair the efficiency or appearance of any facilities, or be detrimental to the completed work. Excess excavated material shall become the property of the Contractor and disposed of in a manner meeting all local, state and federal regulations.

3.2 SURFACE PREPARATION

3.2.1 Stockpiling Topsoil: Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be wasted. Locate top soil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

3.2.2 Pipe Installation Beneath Pavements, Curbs, and Gutters: Open trenching of concrete and asphalt pavements inside the NCDOT rights-of-way is not permitted. Pipe installation beneath pavements shall be by trenchless construction methods in accordance with Section 02310 “Jack and Bore.” Alternative trenchless construction methods are permitted subject to approval by the Engineer.

3.3 GENERAL EXCAVATION AND TRENCHING: Keep excavations free from water while construction is in progress. Notify the Engineer immediately if it becomes necessary to remove rock or bad, unstable, or otherwise unsatisfactory material to a depth greater than indicated. Make trench sides as nearly vertical as practicable except where sloping of sides is allowed. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the pipe. Blasting will not be permitted. Over-excavate soft, weak, or wet excavations as indicated. Use gravel placed in 6 inch maximum layers to refill overdepths to the proper grade. At the Contractor’s option, the excavations may be cut to an overdepth of not less than 4 inches and refilled to required grade as specified. Grade bottom of trenches accurately to provide uniform bearing and support for each section of pipe on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for bell holes and for making proper joints. Dig bell holes and depressions for joints after trench has been graded. Dimension of bell holes shall be as required for properly making the particular type of joint to ensure that the bell does not bear on the bottom of the excavation. Trench dimensions shall be as indicated. **No trenches shall be left open overnight.**

3.3.1 Shoring and Sheeting: Shore and sheet excavations as described in the plan submitted with various member sized arranged to prevent injury to persons and damage to structures. Arrange shoring and sheeting to preclude injurious caving during removal.

3.4 BURIED WARNINGS AND IDENTIFICATION TAPE: Install tape in accordance with manufacturer’s recommendations except as modified herein. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.5 BACKFILLING: Construct backfill in two operations (initial and final) as indicated and specified in this section. Place initial backfill in 6 inch maximum loose lifts to one foot above pipe unless otherwise specified. Ensure that initially placed material is tamped firmly under pipe haunches. Bring up evenly on each side and along the full length of the pipe. Ensure that no damage is done to the pipe or its protective coating. Place the remainder of the backfill (final backfill) in 9 inch maximum loose lifts unless otherwise specified. Compact each loose lift as specified in the paragraph entitled “General Compaction” before placing the next lift. Do not backfill in freezing weather or where the material in the trench is already frozen or is muddy, except as authorized. Provide a minimum cover from final grade of 3 feet for water piping and sewer force mains. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to

rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation. Coordinate backfilling with testing of utilities. Provide buried warning and identification tape installed in accordance with the manufacturer's recommendation

3.6 COMPACTION: Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging pipes and protective pipe coatings. Compact material in accordance with the following unless otherwise specified. If necessary, alter, change, or modify selected equipment or compaction methods to meet specified compaction requirements.

3.6.1 Compaction of Material in Subcuts or Over-Excavations: In soft, weak, or wet soils, tamp refill material to consolidate to density of adjacent material in trench wall. In stable soils, compact to 90 percent of ASTM D 1557 maximum relative density.

3.6.2 Compaction of Pipe and Conduit Bedding: Compact to 90 percent of ASTM D 1557 maximum density.

3.6.3 Compaction of Backfill: Compact initial backfill material surrounding pipes to 90 percent of ASTM D 1557 maximum density except where bedding and backfill are the same material. Where bedding and backfill are the same material, compact initial backfill to the density of the bedding. Under areas to be seeded or sodded, compact succeeding layers of final backfill to 85 percent of ASTM D 1557 maximum density.

3.7 SPECIAL EARTHWORK INSTALLATION REQUIREMENTS

3.7.1 Manholes and Other Appurtenances: Provide at least 12 inches clear from outer surfaces to the embankment or shoring. Remove unstable soil that is incapable of supporting the structure to an overdepth of one foot and refill with gravel or sand to the proper elevation. Stabilize soft, weak, or wet excavations as indicated. Refill overdepths with gravel to the required grade and compact to 90 percent of ASTM D 1557 maximum density.

3.7.2 Cleaning: Clean inside of the pipeline casing of dirt, weld splatters, and other foreign matter which would interfere with insertion of the piped utilities by attaching a pipe cleaning plug to the boring rig and passing it through the pipe.

3.8 GRAVEL DRIVEWAY RESTORATION: Where it is necessary to cut a pipe trench across an existing gravel driveway, Contractor shall replace driveway with 4" ABC (Compacted depth). Prior to placement of ABC, compact trench subgrade in accordance with paragraph 3.6. Place ABC on compacted subgrade and compact depth and width of the gravel to a density equal to a least 98% of that obtained by compacting a sample of the material in accordance with AASHTO T 99.

3.9 FINISH OPERATIONS

3.9.1 Finish to grades indicated within one-tenth of a foot. Provide sod or topsoil in areas to be seeded or sodded and in accordance with requirements specified in Section 02900 "Seeding & Mulching." Grade areas to drain water away from structures and to provide suitable surfaces for mowing machines. Grade existing grades that are to remain but have been disturbed by the Contractor's operations.

3.9.2 Spreading Topsoil: Clear areas to receive topsoil for the finished surface of materials that would interfere with planting and maintenance operations. Scarify subgrade to a depth of 2 inches. Do not place topsoil when the subgrade is frozen, extremely wet or dry, or in other conditions detrimental to seeding, planting, or grading. Comply with the requirements of Section 02900, “Seeding and Mulching.”

3.9.3 Pavement Repair: Repair pavement, curbs, and gutters as indicated. Do not repair pavements until trench or pit has been backfilled and compacted as specified herein.

3.10 FIELD QUALITY CONTROL: Test gravel bedding for conformance to specified requirements. Perform at least one of each of the required test for each material provided. Perform sufficiently in advance of construction so as not be delay work. Provide additional tests as specified above for each change of source.

a. Bedding and Backfill in Trenches Under Pavements: One test per 1000 linear feet in each lift.

END OF SECTION

SECTION 02513

BITUMINOUS CONCRETE PAVING

PART 1 –GENERAL

1.1 DESCRIPTION OF WORK: Work to be performed under this section consists of furnishing all, tools, labor, materials, equipment, supplies and other things necessary to construct road pavement and aggregate base.

1.2 RELATED SECTIONS: The specification sections listed below are referenced by this specification or reference this specification in the Contract Documents.

Section 02200, Earthwork:

Section 02720, Storm Drainage

1.2 REFERENCE DOCUMENTS:

1.2.1 American Association of State Highway and Transportation Officials (AASHTO) specifications and tests.

M301	Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements
T-99	The Moisture Density Relations of Soils Using a 5.5 lb. [2.5 kg] Rammer and a 12 in. [305 mm] Drop

1.2.2 North Carolina Department of Transportation, “Standard Specification for Roads and Structures”, latest version. A copy of the NCDOT Specifications shall be at the project site in the possession of the Contractor. The specifications referenced are incorporated and become a part of this specification.

Section 520	Aggregate Base Course
Section 605	Bituminous Tack Coat
Section 650	Open Graded Asphalt Friction Course, Types FC-1, FC-1 Modified, and FC-2 Modified
Section 1028	Joint Materials

1.2.3 American Society for Testing and Materials (ASTM) publications.

D36	Softening Point of Bitumen (Ring-and-Ball Apparatus)
D70-82	Specific Gravity and Density of Semi-Solid Bituminous Materials
D146-90	Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
D412-87	Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension
D517-92	Asphalt Plank

1.2.4 Manufacturers Instructions: Where installation, handling or storage of a material is to be in accordance with the manufacturer's instructions, a copy of the instructions for the particular product shall be at the project site in the possession of the Contractor. The instructions as provided by the manufacturer are incorporated and become a part of this specification.

1.3 DESCRIPTION OF WORK:

The extent of work under this item includes the placement of tack coat, aggregate base course and bituminous concrete pavement for the pavement areas described in the Contract Documents. Bituminous concrete paving shall also mean bituminous paving, asphalt, or asphalt concrete as may be used in other sections of the specifications or drawings.

1.4 SUBMITTALS:

1.4.1 Material Certificates:

A. Bituminous Concrete Paving: Provide 2 copies of materials certificates signed by the material producer and the Contractor, and notarized, certifying that each material item complies with, or exceeds, specified requirements.

B. Job Mix Formula: Provide 2 copies of the proposed job mix formula at least 15 days prior to beginning work. If this formula has not been previously approved by N.C. D.O.T. for the type of pavement specified, Contractor shall, at his own expense take whatever measures are necessary in order to obtain said approval prior to beginning work or have a mix design prepared by an approved Testing Lab.

C. Tack Coat: Provide 2 copies of materials certificates signed by the material producer and the Contractor, and notarized, certifying that each material item complies with, or exceeds, specified requirements.

PART 2 - PRODUCTS

2.1 Aggregate for Aggregate Base Course: Aggregate meeting the requirements of NCDOT Specifications, Section 520.

2.2 Bituminous Surface Course, Materials meeting the requirements of NCDOT Specifications, Section 650.

2.3 Bituminous Base Course, Material meeting the requirements of NCDOT Specifications, Section 650.

2.4 Tack Coat: Material meeting the requirements of NCDOT Specifications, Section 605.

PART 3 - EXECUTION

3.1 GENERAL:

3.1.1 Weather Limitations: Construction operations shall be conducted in accordance with the weather limitations given in the applicable sections of “Standard Specifications for Roads and Structures” as issued by N. C. Department of Transportation. No asphalt concrete shall be placed when the ambient temperature is less than 40 degrees F in the shade away from artificial heat.

3.1.2 Grade Control: Establish and maintain required lines and elevations as necessary to match existing grades and/or proposed grades on the drawings. In areas where pavement overlay is to be placed, Contractor shall, in the presence of the Engineer, identify bird bath areas (small localized depressions in the pavement surface where water ponds) in the existing pavement. Care shall be taken in placement of new pavement to shape new pavement surface to eliminate bird bath areas from the existing pavement areas and prevent bird bath areas in any new pavement surfaces. Bird bath areas existing after placement of final pavement surface shall be identified and corrected at no additional costs to the Owner.

3.1.3 Subgrade: Shape surface of areas under base course to line, grade and cross-section shown on drawings, with finish surface not more than 1/2” above or below the required subgrade elevation. Prepare soil subgrade in accordance with Section 02200, “Excavation,” of these specifications.

3.1.4 Patches; Patches in driveways and roadways shall be graded to depth required to match existing pavement or to provide minimum pavement specified.

3.2 Aggregate Base Course: Place base course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations. When a compacted base course is shown to be 6” thick or less, place material in a single layer. When shown to be more than 6” thick, place material in equal layers, except no single layer more than 6” or less than 3” in thickness when compacted. Grade the base course evenly to thickness indicated on drawings and compact to 100%. AASHTO T 99. Maintain a uniform surface on the base course until the placement of the bituminous surface course is complete.

3.2.1 Proof Rolling of Aggregate Base Course: Provide proof rolling of the compacted aggregate base course with a heavy roller or loaded dump truck (+25 tons) in the presence of the Engineer. The proof rolling shall be covered by the wheels of the proof roller operating at a speed between 2-1/2 and 3-1/2 miles per hour. Any areas that rut or pump excessively shall be allowed to dry or shall be undercut and backfilled with select backfill or coarse aggregate base course as directed by the Engineer. After undercut and backfill operations are complete, a final proof rolling of the undercut areas will be performed in the presence of the Engineer's Representative. Areas too small or irregular in shape for effective proof rolling shall tested for compaction in accordance with these specifications.

3.3 Tack Coat: Tack coat shall be applied to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. All application of tack coat shall be in conformance with NCDOT Specifications, Section 605. Tack coat shall be uniformly applied at a rate 0.02 to 0.05 gallons per square yard. No more tack coat material shall be applied than can be covered with base, binder or surface course during the day's operations. No base, binder or surface mixture shall be deposited thereon until the tack coat has sufficiently cured to properly receive paving. All exposed surfaces, not intended to contact paving, shall be protected sufficiently to prevent tack coat from being tracked or splattered on said surfaces. After the tack coat has been applied, it shall be protected until it has cured for a sufficient length of time to prevent it from being picked up by traffic.

3.4 Placing Bituminous Concrete Pavement: Place bituminous concrete pavement in as continuous an operation as possible. The Contractor shall spread the materials to uniform density and strike a smooth finish true to cross-section and free from inequalities. Spread mixture at minimum temperature of 225 degrees F. Place each course in the required amounts, so that when compacted, they will conform to the indicated grade, cross section, and thickness. Asphalt shall be put down in one course. Provide joints between old and new pavements and between successive days' work for continuous bond between adjoining work. Clean contact surfaces and apply tack coat.

3.4.1 Rolling: Begin rolling when bituminous concrete mixture will bear roller weight without excessive displacement. Repair surface defects with hot bituminous concrete material as rolling progresses. Cut out and patch defective areas and roll to blend with adjacent satisfactory paving. Continue rolling until maximum density is attained and roller marks eliminated.

3.4.2 Protection of Pavements: Protect paving from damage and vehicular traffic until bituminous concrete mixture has cooled and attained its maximum degree of hardness.

3.5 FIELD QUALITY CONTROL:

3.5.1 Pavements: Test the in-place bituminous concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by the Engineer.

3.5.1.1 Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

A. Course Aggregate Base Course: 1/2", plus or minus

B. Bituminous Concrete Course: 1/4”, plus or minus

3.5.1.2 Surface Smoothness: Test finished surface of each bituminous concrete course for smoothness, using 10” straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:

A. Base Course Surface: 1/4”

B. Wearing Course Surface: 1/8”

Check surfaced areas at intervals as directed by the Engineer.

END OF SECTION

SECTION 02720

STORM DRAINAGE

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 RELATED SECTIONS: The specification sections listed below are referenced by this specification or reference this specification in the Contract Documents.

A. Section 02200, Earthwork
B. Section 02302, Excavation, Backfilling, and Compacting for Utilities

1.1.2 North Carolina Department of Transportation, “Standard Specifications for Roads and Structures”, latest version (NCDOT Specifications). A copy of the NCDOT Specifications shall be at the project site in the possession of the Contractor. The specifications referenced are incorporated and become a part of this specification.

Section 1005	General Requirements for Aggregates
Section 1016	Select Backfill Material
Section 1032	Culvert Pipe

1.1.3 American Association of State Highway and Transportation Officials (AASHTO) specifications and tests.

T-99	The Moisture Density Relations of Soils Using a 5.5 lb. [2.5 kg] Rammer and a 12 in. [305 mm] Drop
M-170	Reinforced Concrete Culvert, Storm Drainage, and Sewer Pipe

1.1.4 American Society for Testing and Materials (ASTM):

A 48	Gray Iron Castings
A 185	Specification for Welded Steel Wire Fabric for Concrete Reinforcement
A 615	Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
A 706	Standard Specification for Low-Alloy Steel Deformed Bars for Reinforcement

C 32	Sewer and Manhole Brick (Made from Clay or Shale)
C33	Standard Specifications for Concrete Aggregate
C 55	Concrete Brick
C 90	Load Bearing Concrete Masonry Units
C150	Portland Cement
C 260	Standard Specification for Air Entraining Admixtures for Concrete
C 270	Mortar for Unit Masonry
C 309	Liquid Membrane-Forming Compounds for Curing Concrete
C 330	Lightweight Aggregates for Structural Concrete
C 387	Packaged, Dry, Combined Materials for Mortar and Concrete
C 494	Chemical Admixtures for Concrete
D 698	Laboratory Compaction Characteristics of Soil Using Standard Effort (24,000 ft. lb.-f / ft.)
E 329	Agencies Engaged in the Testing and/or Inspection of Materials Used in Concrete

1.1.5. American Concrete Institute (ACI):

ACI 301	Specified for Structural Concrete for Buildings

1.1.6 American Welding Society (AWS):

AWS D1.4	Structural Welding Code for Reinforcing Steel

1.1.7 Concrete Reinforcing and Steel Institute (CRSI):

Manual of Standard Practice

1.2 DESCRIPTION OF WORK: The work includes new storm drainage systems and related work. The storm drainage system consists of storm drainage piping, inlets and manholes. Provide each system complete and ready for operation. Provide the storm drainage complete including equipment, materials, installation and workmanship as specified herein. Pre-cast concrete or unit masonry drainage structures meeting the requirements of the Contract Documents may be used at the discretion of the Contractor.

1.3 SUBMITTALS:

1.3.1 Manufacturer's Catalog Cuts and Test Reports

a. Reinforced Concrete Pipe
b. Gaskets
c. Trench Backfill Material
d. Pipe Bedding Stone

1.3.2 Shop Drawings: Submit detailed shop drawings for pre-cast concrete drainage structures including frames, grates, covers and steps. Shop drawings shall contain complete information in detail to show compliance with material requirements of this specification.

1.4 DELIVERY, STORAGE, AND HANDLING OF MATERIALS:

1.4.1 Delivery and Storage:

1.4.1.1 Pipe: Inspect materials delivered to site for damage. Store materials on site in enclosures or under protective coverings. Store rubber gaskets under cover, out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fitting clean and free of dirt and debris.

1.4.2 Handling: Handle pipe, fittings and other accessories in such a manner as to ensure delivery to the trench in sound, undamaged condition.

PART 2 - PRODUCTS

2.1 PIPE:

2.1.2 Reinforced Concrete Pipe (RCP) Class III and Fitting: RCP Class III pipe in accordance with AASHTO M170

2.2 PRECAST CONCRETE STRUCTURES:

2.2.1 CONCRETE: See Division 10 of the North Carolina Department of Transportation Standard Specifications, latest version.

2.2.2 REINFORCEMENT: See Division 10 of the North Carolina Department of Transportation Standard Specifications, latest version.

2.2.3 BEDDING STONE: See Division 10 of the North Carolina Department of Transportation Standard Specifications, latest version.

2.2.4 MORTAR: See Division 10 of the North Carolina Department of Transportation 2018 Standard Specifications.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION:

3.1.1 General: Each section of pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Proper equipment shall be provided for lowering sections of pipe into proper position. No pipe shall be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Pipe shall be laid true to the grades indicated and shall rest upon the pipe bed for the full length of each section. Pipe having its grade and/or joint disturbed after laying shall be taken up, cleaned, and re-laid. Where pipes connect to drainage structures, exposed ends of pipe shall be cut flush with the face of the structure unless otherwise indicated. Cut ends of pipe shall be ground smooth of rough edges and metal spurs. All pipe shall be laid with markings on top. Inner surfaces shall abut neatly, tightly and smoothly. All pipe in place shall be approved by the Engineer before being covered and concealed. Rejected pipe shall become the property of the Contractor and promptly removed from the site.

3.1.2 Pipe Laying and Jointing: Inspect pipe and fittings before and after installation; defective pipe shall be replaced with new materials. Provide equipment for lowering pipe sections into trenches. Lay pipe with the bell ends in the upgrade direction. Adjust spigots in bells to give a uniform space all around. Blocking or wedging between bells and spigots will not be permitted. Replace pipe or fittings that do not allow sufficient space for proper caulking or installation of joint material with new pipe or fittings of correct dimensions. At the end of each days work, close ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards spaced not more than 26 feet apart along the trench or use the laser beam method for ensuring proper slope and elevation. Pipe grades or joints that are disturbed after laying shall be removed, cleaned and reinstalled.

3.2 SPECIAL REQUIREMENTS FOR INSTALLATION OF STORM DRAINAGE SYSTEM:

3.2.1 Concrete Pipe: ACPA “Concrete Pipe Installation Manual” or ACPA “Concrete Pipe Handbook,” Chapter 9. Clean and dry surfaces receiving lubricants, adhesives or cements. Affix gaskets to pipe not more than 24 hours prior to installation of the pipe. Protect gaskets from sun, blowing dust, and other deleterious agents. Remove loose or improperly affixed gaskets and provide new gaskets before installation of the pipe. Align each pipe section with the previously installed section and pull the joint together. If the gasket becomes looses and can be seen through the exterior joint recess when the pipe is pulled up to within 1. 0 inch of closure, remove the pipe and remake the joint.

3.2.2 Bedding Requirements: Over excavate soft weak or wet material as required. Use bedding material for foundation conditioning meeting NCDOT Specifications Article 1016-2 for Class I select backfill material placed in a maximum 6 inch thick layer and compacted to density equal to at least 85 percent of that obtained by compacting a sample in accordance with AASHTO T99. Grade bottom of trench to provide uniform bedding for at least 10 percent of pipe outside diameter on undisturbed soil or prepared bedding material.

3.2.3 Connection to Existing Structures: Pipe connections to existing structures shall be made in such manner that the finished work will conform as nearly as practicable to the essential applicable requirements specified for new structures, including all necessary concrete work, cutting, and shaping.

3.3 BACKFILLING AND COMPACTION: Construct backfill in two operations, initial and final, as indicated and specified in this section. Initial backfilling shall be careful hand tamping of 6 inch

loose lifts of granular fill placed under the pipe haunches and progressing evenly on each side and along the full length of the pipe. Ensure that material is tamped firmly under the pipe haunches. Backfilling shall continue equally on both sides of the pipe in 6 inch thick loose lifts. Final compaction shall be uniform over the entire length of the pipe and shall be to 98 percent of the maximum density in accordance with ASTM D 698. No backfilling shall be started until drainage system is inspected and approved by the Engineer. No aggregate base course shall be placed in pavement areas until backfill and compaction are approved by the Engineer.

3.4 DRAINAGE STRUCTURES:

3.4.1 General: Manholes may be precast manhole sections or constructed with concrete masonry units (manhole block), manhole brick or concrete brick masonry as specified under Part 2 - Products unless otherwise noted.

Drop inlets or curb inlets may be constructed with concrete brick or manhole brick masonry as specified under Part 2 - Products. Construct all drainage structures with a grouted invert to channel flow through structure from inlet pipes to outlet pipe. Where pipes are skewed, the grouted channel shall form a smooth radius. Backfilling around structures shall not begin until structures inspected and approved by the Engineer.

3.4.2 Precast Manholes: Construct cast in place concrete bases where shown on the drawings, otherwise use precast bases. Place precast concrete sections plumb with steps in vertical alignment. Joints between manhole sections shall be made with O-ring gasket or flexible mastic rope. Where manholes occur in pavements, set frame and cover flush with finish surface. Elsewhere, set top elevation 9” above finish surface grade, unless otherwise indicated. Frame and cover shall be solid, unless shown on the plans as solid or watertight.

3.4.2.1 Manhole Steps: Manhole steps shall be spaced uniformly approximately 16 inches apart. Use epoxy bonding compound where steps are mortared into manhole walls.

3.4.2.2 Gravel Foundation: Compacted stone base under manholes is required for suitable foundation as indicated. Compact bedding material to 95 percent of AASHTO T99 maximum density.

3.4.3 Masonry Construction Manholes: At Contractor’s option, use either manhole brick, concrete brick or concrete masonry (manhole block) units to construct masonry manholes.

3.4.3.1 Mortar: Mix mortar with only enough water for workability. Retempering of mortar will not be permitted. Keep mortar mixing and conveying equipment clean. Do not deposit mortar upon, or permit contact with, the ground.

Lay masonry in mortar so as to form full bed with ends and side joints in one operation, and with full bed and vertical joints, not more than 3/8” wide on the inside. Protect fresh masonry from freezing and from too rapid drying.

3.4.4 Curb Inlet and Drop Inlets: Construct curb inlet or drop inlet to the sizes and shapes as shown on the drawings and as specified for masonry manholes. Set cast iron frames and gratings to the elevations indicated. Field revisions may be necessary for manholes and catch basins constructed on existing lines, as directed by the Engineer.

3.4.5 Installation: Provide base slab of cast-in-place concrete or precast concrete base sections. Make inverts in cast-in-place concrete and precast concrete bases with a smooth-surfaced semicircular bottom conforming to the inside contour of the adjacent pipe sections. For cast-in-place concrete construction, either pour bottom slabs and walls integrally or key and bond walls to bottom slab. Provide a smooth finish to inside joints of precast structures.

3.5 GENERAL EXCAVATION AND TRENCHING: Fill in areas adjacent to area of pipe installation shall be backfilled and compacted at same time as pipe and as indicated in Section 02200, entitled “Earthwork” of these specifications

3.5.1 Excavation: Remove unsuitable material that is incapable of supporting concrete structure for a depth of 12 inches and replace with a foundation of bedding stone as specified in paragraph 3.2.2 of this specification. Compact bedding material to 95 percent of AASHTO T99 maximum density. No structure shall be constructed in water or when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

END OF SECTION

SECTION 02900

SEEDING AND MULCHING

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

1.2 DESCRIPTION OF WORK: The work includes seedbed preparation, seeding, mulching and irrigation for temporary stabilization, permanent stabilization and temporary grassed swale lining and stabilization where indicated on the plans of all newly graded finished earth surfaces, and all areas inside or outside the limits of construction that are disturbed by the Contractor

1.3 RELATED SECTIONS: The specification sections listed below are referenced by this specification or reference this specification in the Construction Documents.

Section 02200, Earthwork
Section 02513, Bituminous Concrete Pavement

1.4 REFERENCES: 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

1.4.1 North Carolina Department of Transportation, “Standard Specifications for Roads and Structures”, January 2018, (NCDOT Specifications):

Section 1060-3	Seed
Section 1060-1	Fertilizer
Section 1060-2	Limestone
Section 1060-4	Mulch for Erosion Control

1.5 SUBMITTALS:

1.5.1 Certificates of Compliance:

a. Seed
b. Fertilizer
c. Topsoil
d. Lime
e. Mulch

1.6 DELIVERY:

1.6.1 Fertilizer and Lime: Deliver materials to the site in original unopened containers bearing the manufacturers chemical analysis, name, trade name, trademark and indication of conformance to state and federal laws. In lieu of containers, furnish fertilizer and lime in bulk with a certificate indicating the above information accompanying each delivery.

1.6.2 Seed: Deliver seed to the site in original sealed packages bearing the products guaranteed analysis for percentages of mixtures, purity, germination, weedseed content, and inert material. Label in accordance with USDA Federal Seed Act and applicable state seed laws. Weeds, moldy, or otherwise damaged seed will be rejected.

1.7 STORAGE AND HANDLING: Store lime, fertilizer and seed in dry locations away from contaminants. Protect seed from drying out. Do not drop or dump materials from vehicles.

PART 2 - PRODUCTS

2.1 SEED: State certified seed of the latest season's crop in conformance with NCDOT specifications, Section 1060-3. Variety of seed shall be as indicated.

2.2 TOPSOIL: Natural friable soil representative of productive well-drained soils in the project area; free of subsoil, stumps, rocks larger than 1 inch diameter, brush, weeds, toxic substances and other material detrimental to plant growth.

2.3 LIME: Commercial agricultural limestone in accordance with NCDOT Specifications, Section 1060-2.

2.4 FERTILIZER: Granular fertilizer conforming to NCDOT Specifications, Section 1060-1. Granular fertilizer shall contain a minimum percentage by weight of 10 percent nitrogen, 10 percent available phosphoric acid, and 10 percent potash (10-10-10).

2.5 MULCH: Meeting NCDOT Specifications, Section 1060-4. Provide wood cellulose fiber mulch when hydroseeding.

2.6 EMULSIFIED ASPHALT: Meeting NCDOT Specifications, Section 1020-4, Grade RS-1. Use with straw mulch

2.7 WATER: Fresh water suitable for irrigation free of salts, acids, oil and other substances otherwise harmful to vegetation.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Final Grade: Immediately prior to placing topsoil, scarify the subgrade to 2 inch depth for bonding of topsoil to subsoil. Spread topsoil evenly to a minimum depth of 3 inches. Do not spread topsoil when excessively wet or frozen.

3.1.1.1 Correct irregularities in finished surfaces to eliminate depressions. Protect finished topsoil areas from damage from vehicular and pedestrian traffic.

3.1.2 Apply fertilizer, lime and asphalt tack at rates as follows:

Lime – 2 tons/ acre
10-10-10 – 1000 pounds per acre
0-20-0 – 500 pounds per acre (after seeding)
Asphalt tack – 200 gallons per ton of mulch

Soils with pH of 6 or greater should not be limed.

3.1.2.1 Drill Seeding, Broadcast Seeding, and Drop Seeding: Incorporate fertilizer and lime into the soil to a minimum of 6 inches. Application may be performed as a part of the subgrade tillage operations.

3.1.2.2 Hydroseeding: Apply liquid fertilizer in amount s sufficient to promote the specified stand of turf. Apply lime manually during subgrade preparation.

3.2 SEEDING:

3.2.1 Seeding Conditions: Immediately before seeding, restore soil to proper grade. Do not sow seed when ground is muddy, frozen or in an unsatisfactory condition for seeding.

3.2.2 Seeding Mixture: The following mixtures of seed are permitted for the uses and seasons indicated.

<u>February 1 to April 30</u>	
Tall Fescue	50 lbs. / ac.
Pensacola Bahiagrass	10 lbs. / ac.
Korean or Kobe lespedeza (scarified)	50 lbs. / ac.
<u>May 1 to August 31</u>	
Tall Fescue	50 lbs. / ac.
Weeping Lovegrass	5 lbs. / ac.
Korean or Kobe lespedeza (scarified)	50 lbs. / ac.
Browntop Millet	25 lbs. / ac.
<u>September 1 to January 31</u>	
Tall Fescue	60 lbs. / ac.
Korean or Kobe lespedeza (unscarified)	60 lbs. / ac.

Rye (Grain)	25 lbs. / ac.

For slopes 2:2 or steeper, add 30 lbs./ ac. Sericea Lespedeza
And 15 lbs. of weeping lovegrass.

LANDSCAPE MIXTURE

<u>January 1 to March 31</u>	
Common Bermudagrass (unhulled)	20 lbs. / ac.
<u>April 1 to July 31</u>	
Common Bermudagrass (hulled)	12 lbs. / ac.

Hybrid bermudagrass sprigs or centipede sod may be used for landscaped areas.

3.2.3 Seeding Method: Apply seed within 24 hours of seedbed preparation. Sow seed with approved sowing equipment sowing at the rates indicated above. Sow half the seed in one direction, the remainder in a direction at right angles to the first sowing.

3.2.3.1 Drill Seeding: Use cultipacker seeders or grass seed drills. Drill seed uniformly to a maximum depth of 1/4 inch in clayey soils, 1/2 inch in sandy soils. Cover seed by spike-tooth harrow, cultipacker or other approved devices.
3.2.3.2 Hydroseeding: Mix seed, fertilizer, and wood cellulose fiber in required amount of water to produce a homogeneous slurry. After seed, water, and fertilizer have been thoroughly mixed, add 200 pounds of wood cellulose fiber per acre (dry weight) and apply the slurry. Seed shall not remain in water containing fertilizer more than one hour prior to application. Keep liquid fertilizer agitated during application.

3.2.3.3 Broadcast Seeding and Drop Seeding: Use broadcast or drop seeders. Cover seed uniformly to a maximum depth of 1/4 inch in clayey soils, 1/2 inch in sandy soils. Cover seed by spike-tooth harrow, cultipacker or other approved devices.

3.2.4 Rolling: immediately after seeding, firm entire area, except for slopes in excess of 3 to 1, with a roller not exceeding 90 pounds for each foot of roller width. If seeding is performed with cultipacker-type seeder or by hydroseeding, rolling may be omitted.

3.2.5 Mulch: Except with hydroseeding, spread straw mulch evenly at the rates indicated above.. Anchor by crimping mulch with serrated disk or by spraying asphalt emulsion at the rate indicated above. Take precautions to prevent asphalt materials from marking or defacing structures, pavements, utilities or plantings.

3.2.6 Erosion Control Material: Install in accordance with manufacturer’s instructions.

3.3 PROTECTION OF SEEDED AREAS: Immediately after seeding, protect seeded areas against traffic or by otherwise erecting barricades and posting signs until final acceptance.

3.4 RESTORATION: restore to original condition existing turf areas which were damaged during turfing operations.

3.5 TURF ESTABLISHMENT PERIOD:

3.5.1 Turf Establishment: Turf shall be established immediately following grading activities. Maintenance of turf areas shall continue until established turf is accepted by the Owner.

3.5.1 Maintenance: During turf establishment period, mow the seeded area to an average height of 2.5 to 3.5 inches whenever the grass reaches a height of 5 inches. Remove excess clippings, eradicate weeds, fertilize overseed and perform other operations necessary to promote turf growth. Reseed, fertilize and mulch damaged areas immediately.

3.5.2 Duration: The turf establishment period will be in effect until the seeded areas are mowed three times.

3.6 FINAL ACCEPTANCE:

3.6.1 Final Inspection and Acceptance: Final Acceptance will be based on a satisfactory stand of turf defined as 95 percent ground cover for the established species.

- END OF SECTION -