

DIVISION 00

ADDENDUM #2
ISSUED: February 21, 2026

SECTION 00 91 15: SUPPLEMENTAL SHEETS

Rosewood Elementary School Project – Addition Goldsboro, North Carolina

00 91 15.01: GENERAL

1. These supplemental sheets are a part of the Specifications and are intended to give additional information on items which may or may not be noted in the specifications or on the drawings. It is suggested that the Contractor carefully read these sheets and note changes, additions, etc., in the corresponding section of these specifications.
2. The specifications are typical and only those parts applicable to this project will be considered.
3. All items in prior Addenda are still pertinent unless said item has been modified or changed in this Addendum.
4. Material testing/Special Inspections will be provided by the Owner
5. Temporary Construction Fencing will be required for construction.
6. Light-duty paving- 2 ½" asphalt 6" stone base. Refer to Sections 32 11 16 & 32 12 16.

00 91 15.02: MODIFICATION

RESERVED FOR FUTURE MODIFICATIONS

00 91 15 03: ADDITIONAL SPECIFICATION

Add the following:

- A. 00 91 15- Supplemental Sheets -Addendum #2, dated February 21, 2026
- B. 31 20 00 – Earth Moving -Addendum #2, dated February 21, 2026
- C. 31 22 19 – Finish Grading - Addendum #2, dated February 21, 2026
- D. 31 23 00 – Backfilling and Compacting - Addendum #2, dated February 21, 2026
- E. 31 23 16.16 – Excavating & Backfilling Manholes, Inlets, Etc. – Addendum #2, dated February 21, 2026
- F. 31 23 16.26 – Rock Removal – Addendum #2, dated February 21, 2026
- G. 31 23 16 – Excavation & Backfill- Pipelines – Addendum #2, dated February 21, 2026
- H. 31 31 16 – Soil Treatment – Addendum #2, dated February 21, 2026

- I. 32 11 16 – Aggregate Base Course - Addendum #2, dated February 21, 2026
- J. 32 12 16 – Asphalt Paving - Addendum #2, dated February 21, 2026
- K. 32 13 73 – Concrete Paving Joint Sealants – Addendum #2, dated February 21, 2026
- L. 32 92 00 – Turf and Grasses – Addendum #2, dated February 21, 2026
- N. 33 41 00- Storm Utility Drainage Piping – Addendum #2, dated February 21, 2026

00 91 15.04: DRAWINGS

RESERVED FOR FUTURE MODIFICATIONS AND CLARIFICATIONS PER ADDENDUM

00 91 15.05: PRIOR APPROVAL

RESERVED FOR FUTURE MODIFICATIONS AND CLARIFICATIONS PER ADDENDUM

End of Addendum #2

Issued: February 21, 2026

DIVISION 31

SECTION 31 20 00 – EARTH MOVING

PART 1 – GENERAL

DESCRIPTION OF WORK:

This Section includes the following: Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings, Excavating and backfilling for buildings, structures and embankment slopes, Drainage course for slabs-on-grade, Subbase course for concrete walks and pavements, Base course for asphalt paving, Subsurface drainage backfill for walls and trenches, Excavating and backfilling trenches within building lines, Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

DEFINITIONS:

Backfill: Soil materials used to fill an excavation.

Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

Final Backfill: Backfill placed over initial backfill to fill a trench.

Base Asphalt Course: Initial layer of asphalt pavement placed on the aggregate base course.

Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

Borrow Soil: Satisfactory soil imported from on-site locations for use as fill or backfill. All borrow soil required shall be taken from on-site locations and shall be incidental to the cost of the work.

Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

Excavation: Removal of material encountered above subgrade elevations.

Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

Fill: Soil materials used to raise existing grades.

Rock: 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: Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, maximum, short-tip-radius rock bucket; rated

at not less than 210-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 48,510 lbf; measured according to SAE J-1179.

Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.

Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

Aggregate Base Course: Layer placed between the subgrade and base asphalt course, or layer placed between the subgrade and a concrete pavement or walk.

Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

Topsoil: For contractor's purposes, shall be considered to be the top 6 inches of soil on the site.

Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

JOB CONDITIONS:

Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated: Notify Architect not less than two days in advance of proposed utility interruptions. Do not proceed with utility interruptions without Architect's written permission. Contact utility-locator service for area where Project is located before excavating.

Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

Subsurface Data: Subsurface soil boring logs and subsurface investigation reports (if provided) are included in Section 02 06 00 "Subsurface Investigation" of these Specifications. The data represents the subsurface information available; however, variations may exist in the subsurface between boring locations. This information is offered without warranty of accuracy.

PART 2 – MATERIALS

SOILS:

General: Provide borrow soil materials, including topsoil, when sufficient satisfactory soil materials are not available from excavations. All borrow materials to be used for backfill and fill shall be from on-site and shall be laboratory tested for moisture density and approved by Geotechnical Engineer or Architect prior to use.

Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, GC, SW, SC, SP, SM, ML, and CL or a combination of these group symbols; free of rock or gravel larger than 2 1/2 inches

in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Material shall have plastic index of 15 or less.

Unsatisfactory Soils: Materials that do not comply with the requirements for satisfactory materials are unsatisfactory. Materials classified in ASTM D2487 as OL, MH, CH, OH, and PT are unsatisfactory. Unsatisfactory materials also include refuse, organic matter (including but not limited to trees and shrubs) and frozen material. Unsatisfactory materials may also include soil that is disturbed by Contractor's operations

Backfill and Fill: Satisfactory soil materials.

Aggregate Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

Drainage Course: Narrowly graded mixture of washed, crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

GEOTEXTILES:

Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

- Grab Tensile Strength: 157 lbf; ASTM D 4632.
- Sewn Seam Strength: 142 lbf; ASTM D 4632.
- Tear Strength: 56 lbf; ASTM D 4533.
- Puncture Strength: 56 lbf; ASTM D 4833.
- Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
- Permittivity: 0.5 per second, minimum; ASTM D 4491.
- UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

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:

- Survivability: Class 2; AASHTO M 288.
- Grab Tensile Strength: 247 lbf; ASTM D 4632.
- Sewn Seam Strength: 222 lbf; ASTM D 4632.
- Tear Strength: 90 lbf; ASTM D 4533.

- Puncture Strength: 90 lbf; ASTM D 4833.
- Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
- Permittivity: 0.02 per second, minimum; ASTM D 4491.
- UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

PART 3 – EXECUTION

PREPARATION:

Protect structures, utilities, sidewalks, pavements, and other facilities indicated to remain from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soilbearing water runoff or airborne dust to adjacent properties and walkways.

DEWATERING:

Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation. 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. Install a dewatering system Section 31 23 19-Dewatering to keep Subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

EXPLOSIVES:

Obtain written permission from the Owner and authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site. Perform blasting without damaging adjacent structures, property, or site improvements. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain. The General Contractor shall prepare a "Pre-Blast" Survey of structures on immediately adjacent property prior to the use of any explosives.

EXCAVATION:

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 Owner's Testing Agency. The Contract Sum will be based on a quantity of rock excavation stipulated in Section 01 21 00 – Allowances and the unit price quoted in the General Contractors Form of Proposal. Changes in the Contract time may be authorized for a greater quantity of rock excavation stipulated by Allowance. Changes in the Contract Amount may be changed based on a lesser or greater quantity of rock excavation than stipulated by the Allowance. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of weathered rock not classified as rock excavation is earth excavation.

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: 24 inches outside of concrete forms other than at footings. 12 inches outside of concrete forms at footings. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments. 6 inches beneath bottom of concrete slabs on grade. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than inside diameter of pipe. Excavated mass rock shall be wasted on the site and shall be covered with soil from the site placed in a controlled manner.

Excavate for Structures: indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work. Tamp final bottom of excavation with vibratory tamp prior to placement of reinforcing steel.

Excavation for Underground Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended for bearing surface.

Satisfactory excavation material shall be transported to and placed in fill areas within the limits of the work, or if necessary, spread and dried until the moisture content is within plus or minus 3 percent of optimum moisture content as determined from laboratory tests specified in Subsurface Data. All unsatisfactory material, including any soil that is disturbed by the Contractor's operations or softened due to exposure to the elements, shall be disposed of on the site at no additional cost to the Owner.

Excavation for Walks and Pavements: Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

Excavation for Utility Trenches: Excavate trenches to indicated gradients, lines, depths, and elevations. Excavate trenches to uniform widths to provide a working 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.

Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

Unauthorized Excavation: 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 may be used when approved by Architect. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

INSPECTION:

Notify Architect when excavations have reached required subgrade. If Architect or Owner's Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

Proof-roll subgrade below the building slabs and pavements with 25-ton, four-wheeled, rubber-tired roller, a loaded dump truck, or similar approved equipment to identify soft pockets and

areas of excess yielding. Proofrolling operations shall be monitored by the Owner's Testing Agency. Do not proof-roll wet or saturated subgrades. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons, a minimum 15-ton smooth drum roller, or pneumatic tire roller. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect or Owner's Testing Agency, and replace with compacted backfill or fill as directed.

Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

STORAGE OF SOIL MATERIALS:

Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

BACKFILL:

Place and compact backfill in excavations promptly, but not before completing the following:

- Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
- Surveying locations of underground utilities for record documents.
- Inspecting and testing underground utilities.
- Removing concrete formwork.
- Removing trash and debris.
- Removing temporary shoring and bracing, and sheeting.

Place backfill on subgrades free of mud, frost, snow, or ice.

Utility Trench Backfill: Place backfill on subgrades free of mud, frost, snow, or ice. 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. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 3, Section 03 30 00 "Cast-in-Place Concrete." 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. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system. Coordinate backfilling with utilities testing. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed. Place and compact final backfill of satisfactory soil material to final subgrade.

SOIL FILL:

Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material. Place and compact satisfactory soil material fill in layers to required elevations. Place soil fill on subgrades free of mud, frost, snow, or ice.

SOIL MOISTURE CONTROL:

Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 3 percent of optimum moisture content.

Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

COMPACTION OF SOIL BACKFILLS AND FILLS:

Place backfill and fill materials in layers not more than 8 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. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Compact backfill and fill to not less than the following percentages of maximum dry unit weight according to ASTM D 698: Under structures, building slabs, steps, and pavements, compact top 12 inches of existing subgrade and each layer of backfill or fill material at 100 percent, and at 95 percent below 12-inch depth. Under walkways, compact top 6 inches below existing subgrade and each layer of backfill or fill material at 100 percent and at 95 percent below 6-inch depth. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.

GRADING:

General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Provide a smooth transition between adjacent existing grades and new grades. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

- Lawn or Unpaved Areas: Plus or minus 0.1 foot.
- Walks: Plus or minus 0.1 foot.
- Pavements: Plus or minus 1/2 inch.

Grading Inside Building Lines: Finish subgrade to a tolerance of 1/4 inch when tested with a 10-foot straightedge.

SUBSURFACE DRAINAGE:

Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a pipe directly on drainage fabric at bottom of trench. Encase drainage pipe in granular fill material in dimensional cross section as shown on the Drawings, 12 inches minimum, and wrap in drainage fabric, overlapping sides and ends at least 6 inches.

Drainage Backfill: Place granular fill material over subsurface drain, in width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches.

SUBBASE AND BASE COURSE:

Place subbase and base course on subgrades free of mud, frost, snow, or ice.

On prepared subgrade, place subbase and base course under pavements and walks as follows: Shape subbase and base course to required crown elevations and cross-slope grades. Place subbase and base course 6 inches or less in compacted thickness in a single layer. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick. Compact subbase and base course within 2 percent of optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

DRAINAGE COURSE:

Under slabs-on-grade, place drainage course on prepared subgrade and as follows:

- Compact drainage course by a minimum of two passes with a vibratory compaction equipment.
- When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.
- When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

Place drainage course on subgrades free of mud, frost, snow, or ice.

FIELD QUALITY CONTROL:

Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies: Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 5,000-sq. ft. or less of building slab, but in no case fewer than five tests.

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 to depth required; recompact and retest until specified compaction is obtained.

SPREADING TOPSOIL:

On areas to receive topsoil, the compacted subgrade soil shall be scarified to a depth of 4" for bonding of topsoil with subsoil. Topsoil then shall be spread evenly to a thickness of 4" and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry. Material required for topsoil in excess of that stockpiled on site shall be obtained at Contractor's expense from off-site areas.

PROTECTION:

Protecting Graded Areas: Protect newly graded areas from disturbance by traffic, freezing, ponding of water and erosion. Keep free of trash and debris.

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. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

DISPOSAL:

Waste materials, including trash, and debris, shall be removed from the Owner's property and legally disposed of in accordance with all local, state, and federal regulations. Unsatisfactory soils (not containing organic materials) may be disposed of onsite within the fill slopes provided that are placed 10 feet beyond the footprint of any structure, parking or storage area.

END OF SECTION

DIVISION 31

SECTION 31 22 19: FINISH GRADING

31 22 19.01: GENERAL

A. SCOPE

1. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerance, compact and with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

31 22 19.02: EXECUTION

1. Grade areas adjacent to building lines to drain away from structure and to prevent ponding. Finish surfaces free from irregular surface changes.
2. Finish areas to receive topsoil to within not more than 0.10 feet above or below the required subgrade elevations.
3. Grading surface of fill under building slabs shall be smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/4 inch when tested with a 10 foot straightedge.
4. Protect newly graded areas from traffic and erosion, and keep free of trash and debris.
5. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
6. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.

DIVISION 31

SECTION 31 23 00: BACKFILLING AND COMPACTING

31 23 00.01: GENERAL

1. The work of this section includes but is not limited to structural fill, foundation preparation, formation of embankments and preparation of subgrade for base, paving and concrete appurtenances.
2. Do not commence backfilling until construction below finish grade has been approved, underground utility systems have been inspected and tested, forms have been removed, and the excavation has been cleaned of trash and debris. Backfill over drain lines shall consist of a granular fill.
3. Clean earth of trash and foreign matter and fill the backfill as necessary. Provide approved material as required if material at the site is not sufficient for this work.
4. Flush backfill, except under slabs on earth and footings, with water and tamp every 8" (203mm) in depth. After backfill has settled, bring shallow places up to grade.

31 23 00.02: PRODUCTS

1. Provide acceptable soil materials for backfill and fill, free of rock or gravel larger than 4" (102mm) in any dimension, debris, waste, frozen materials, vegetable matter, and other deleterious matter. Provide select borrow material from an off-site source as required to perform the grading to the lines and grades shown on drawings. Select borrow material shall be a low plasticity, inorganic, granular soil capable of being compacted to 95 percent of the Modified Proctor maximum dry density as determined by Method "A" of ASTM D 1557. Fill soils shall have a maximum of 30% fines (material passing the No. 200 Sieve), a maximum dry density (modified Proctor ASTM D-1577) of at least 100 pcf, and shall have a liquid limit of less than 40 and a plasticity index of less than 15.
2. Provide four inches granular drainage fill beneath floor slabs.
3. In excavations, use or borrow material that has been tested and approved.
4. Under grassed areas, use excavated or borrow material that has been tested and approved.
5. Backfill consists of placement of acceptable soil material in layers and in excavations to required subgrade elevations, for each area classification listed.
6. Fill consists of placement of acceptable soil materials, in layers, over ground surface to required elevations, for each area classification listed.
7. Provide methods employed in performing the work and equipment, tools, and machinery used for handling materials and executing the work approved by the Architect before the work is started.

8. The Owner may provide for periodic density testing and proofrolling by a testing laboratory at his expense. Any retesting due to failure of tests shall be the responsibility of the Contractor. Improperly compacted areas shall be excavated and re-compacted as required below.

31 23 00.03: EXECUTION

1. The Owner may provide for periodic inspections from a qualified soils engineering firm approved by the Architect during the stripping and compacting operation for subgrade.
2. Prior to placing fill, constructing foundations or excavating, strip entire building and paved areas of vegetation, topsoil, roots and other unsuitable material to the depth necessary. The stripped area shall be examined and approved by the inspector.
3. The building area and entire areas to be paved shall be proofrolled with a fully loaded tandem axle truck or similar equipment and approved by the on-site inspector. Soft or yielding subgrades shall be removed and replaced with suitable material approved by the Soils Engineer and Architect or scarified and densified in place if possible.
4. If the materials excavated on the site do not produce the necessary amount of material satisfactory for the formation of the subgrade, as specified, suitable materials from off-site shall be obtained upon the approval of the Engineer and Architect.
5. Topsoil stripped to the depth encountered shall be spread on areas previously graded and prepared for topsoil. Stockpile sufficient amounts as required to cover areas to be landscaped with a minimum of six inches (152mm) of material, unless otherwise indicated on the plans.
6. Unsuitable material may be used to flatten slopes and in general embankments where loads from traffic or structures will not occur. Excess unsuitable material shall be disposed of off-site at Contractor's expense.
7. Approved embankment material shall be placed in horizontal layers of 6 compacted inches (152mm) maximum. Compaction shall be performed by approved equipment. Compact to 95 percent of the maximum dry density when tested per the Modified Proctor Density Test ASTM D-1577. Bottom of footing excavations shall also be compacted to this same density.

Material shall be moistened or aerated as necessary to provide the moisture content that will permit the specified compaction.

8. The bottom of footing excavations shall be compacted to 95% of modified Proctor maximum dry density.
9. Backfill excavations as promptly as work permits, but not until completion of the following:

- a. Acceptance by Architect of construction below finish grade is contingent upon certification of specified installation by testing laboratory.
 - b. Inspection, testing, approval, and recording locations of underground utilities.
 - c. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
 - d. Removal of trash and debris.
- 10. Contractor shall be responsible for and maintain embankment areas under completion and final acceptance of the project by the Engineer.
 - 11. No silting or washing of material will be allowed to extend beyond the limits of the property. Should such silting or washing occur, construct and maintain a sedimentary basin at no expense to the Owner.
 - 12. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
 - 13. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread where directed by Engineer and permitted to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests. When accepted by Engineer soil material may be used in compacted backfill or fill.

DIVISION 31

SECTION 31 23 16.16: EXCAVATING AND BACKFILLING: MANHOLES, INLETS ETC.

31 23 16.16.01: GENERAL

1. Section 31 23 00 will enhance and modify this section. The more stringent requirement will govern unless approved in writing by the Architect.
2. Visit the site and become familiar with existing ground conditions.
3. Protect, remove, seal, or relocate existing utilities and service lines as shown or specified. Refer to the Drawings and to other agencies for the location of active utilities. Cooperate with those installing new site utility and service lines.
4. Preserve bench marks, monuments and reference points.
5. Provide adequate protection measures to protect workmen and passersby on the site. Fully protect streets and adjacent property throughout operations.
6. Provide shoring, sheeting and bracing to prevent caving, erosion, or gullyng of sides of excavation as necessary.
7. Provide for surface drainage during the period of construction in a manner to avoid creating a nuisance to adjacent areas. Keep excavations free of water during the entire progress of the work, regardless of the cause, source, or nature of the water.
8. Trees will be left undisturbed, insofar as possible, as shown on drawings.
9. Compact fill to meet standards for 95 percent compaction per modified proctor.

31 23 16.16.02: PRODUCTS

1. Excavated material approved for use as backfill shall be free of stones larger than 2 inches in longest dimension, roots, organic material and other deleterious material.
2. Where suitable backfill material is not available, approved granular material shall be used from an offsite source.

31 23 16.16.03: EXECUTION

1. Perform excavation to lines and grade shown on the Drawings.
2. Excavate and include trenching for utilities not specified in other sections of the Specifications and foundation drainage as shown on the Drawings.

Extend excavations a sufficient distance from the walls and footings to allow for placement and removal of forms. Where excavation is to lower levels or greater depths than required for foundation construction shown, or where unsatisfactory material is removed, replace the excess material with suitable backfill material.

3. Do not commence backfilling until construction below finish grade has been approved, underground utility systems have been inspected and tested, forms have been removed, and the excavation has been cleaned of trash and debris.
4. The Owner may provide for periodic density testing by a testing laboratory at his expense. Any retesting due to failure of tests shall be the responsibility of the Contractor. All areas improperly compacted shall be excavated and compacted by the Contractor at no additional cost to the Owner.
5. Clean earth of trash and foreign matter and backfill as necessary. Provide approved material as required if material at the site is not sufficient for this work.
6. Flush backfill, except under slabs on earth and footings, with water and tamp every 8" in depth. After backfill has settled, bring shallow places up to grade.
7. Exercise special care in backfilling around pipes and for a depth of one foot above it. Deposit material for a depth of one foot above pipe in uniform layers not exceeding 4" in thickness. Tamp or ram solidly with proper tools. Do not injure or disturb the pipe. Backfill the remainder of the trench in layers of not more than 8". Thoroughly tamp each layer with mechanical tamper. Clear excavated material from adjacent street surfaces, ditches, gutters, sidewalks, parkways, grass plots and like areas and leave in a tidy and acceptable condition. Reseed right-of-way or neutral ground where trenches are excavated in these locations. Remove surplus material from the site.

DIVISION 31

SECTION 31 23 16.26: ROCK REMOVAL

31 23 16.26.01: GENERAL

A. SECTION INCLUDES

1. Removal of discovered rock during excavation.
2. Explosives to assist rock removal.

B. RELATED SECTIONS

1. Section 31 23 16.13 - Trenching: Trenching and backfilling for utilities.
2. Section 31 37 00 - Riprap.

C. REFERENCES

1. NFPA 495 - Code for Manufacture, Transportation, Storage, and Use of Explosive Materials.

D. DEFINITIONS

1. For purpose of determining Rock Removal quotations, rock shall be defined as follows:
 - a. General Site Rock-Any subsurface material (except abandoned concrete foundations and pavements) encountered during mass site excavation and grading operations which cannot be excavated by a crawler type tractor capable of producing 50,000 lb. of draw bar pull with a single shank ripper attachment and loaded out by a 3-1/4 cubic yard capacity front end loader.
 - b. Pit and Trench Rock-Any subsurface material (except abandoned concrete foundations and pavement) encountered during pad and/or footing excavation operations which cannot be excavated and loaded out by a ¾ cubic yard heavy duty trenching bucket mounted on a hydraulic backhoe capable of lifting 7,500 pounds at a trench dept of ten feet.
2. The Contractor shall include in the Proposal the cost of providing the above listed equipment whenever said Contractor encounters any subsurface material for which he or she intends to claim as rock. If said equipment can successfully remove the material in question, there will be no rock removal allowed. Contractor shall notify the Owner's Representative prior to commencement of any rock removal.

E. SUBMITTALS FOR REVIEW

1. Shop Drawings: Indicate the proposed method of blasting, delay pattern, explosive types, type of blasting mat or cover, and intended rock removal method. Local governing agency's Engineering Representative must approve prior to any blasting.

F. QUALITY ASSURANCE

1. Seismic Survey Firm: Company specializing in seismic surveys with five years' experience or approval by local governing agency's Engineering Representative.
2. Explosives Firm: Company specializing in explosives for disintegration of rock, with five years documented experience or approval by local governing agency's Engineering Representative.

G. REGULATORY REQUIREMENTS

1. Conform to applicable safety codes for explosive disintegration of rock and to NFPA 495 for handling explosive materials.
2. Blasting Procedures shall conform to all applicable local, state, and Federal laws and ordinances. The Contractor shall take all necessary precautions to protect life and property, including the use of an approved blasting mat where there exists the danger of throwing rock or overburden.
3. Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.

H. PROJECT CONDITIONS

1. The Contractor shall keep explosive materials that are needed on the job site in specially constructed boxes provided with locks. These boxes shall be painted red and plainly identified as to their contents. After working hours, the boxes containing explosive materials shall be removed from the job site. Failure to comply with this specification shall be grounds for suspension of blasting operations until full compliance is made.
2. Conduct survey and document conditions of buildings near locations of rock removal, prior to blasting, and photograph existing conditions identifying existing irregularities.
3. Advise owners of adjacent buildings or structures in writing, prior to executing seismographic survey. Explain planned blasting and seismic operations.
4. Where blasting takes place within 500 feet of a utility, structure, or property which could be damaged by vibration, concussion, or falling rock, the Contractor shall be required to keep a blasting log containing the following information for each and every shot:
 - a. Date of shot.
 - b. Time of shot.
 - c. Foreman's name.
 - d. Number and depth of holes.
 - e. Approximate depth of overburden.
 - f. Amount and type of explosive used in each hole.
 - g. Type of caps used (instant or delay).
 - h. The weather.

5. Blasting log shall be made available to the local governing agency's Engineering Representative upon request and shall be kept in an orderly manner. Compliance by the Contractor with these specifications does in no way relieve him of legal liabilities relative to blasting operations.
6. Obtain a seismic survey prior to rock excavation to determine maximum charges that can be used at different locations in area of excavation without damaging adjacent properties or other work.
7. No blasting shall be allowed unless a galvanometer is employed to check cap circuits.
8. The local governing agency reserves the right to require removal of rock by means other than blasting where any utility, residence, structure, etc. is either too close to, or so situated with respect to the blasting as to make blasting hazardous.

I. SCHEDULING

1. Schedule Work to avoid disruption to occupied buildings nearby.

31 23 16.26.02: PRODUCTS

A. MATERIALS

1. Explosives: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.
2. Delay Device: Type recommended by explosives firm.
3. Blast Mat Materials: Type recommended by explosives firm.

31 23 16.26.03: EXECUTION

A. EXAMINATION

1. Verify site conditions and note subsurface irregularities affecting work of this section.

B. PREPARATION

1. Identify required lines, levels, contours, and datum.

C. ROCK REMOVAL BY A MECHANICAL METHOD

1. Excavate and remove rock by the mechanical method.
2. Drill holes and utilize wedges or mechanical disintegration compound to fracture rock.
3. Cut away rock at bottom of excavation to form level bearing.
4. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24

inches wider than pipe diameter.

5. Remove excavated materials from site or reuse for site landscaping.
6. Correct unauthorized rock removal to directions of Owner's Representative.

D. ROCK REMOVAL BY EXPLOSIVE METHODS

1. If rock is uncovered requiring the explosives method for rock disintegration, notify the local governing agency.
2. Provide seismographic monitoring during progress of blasting operations.
3. Drill blasting holes within 12 feet of finished slope.
4. Disintegrate rock and remove from excavation.
5. Remove rock at excavation bottom to form level bearing.
6. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
7. Remove excavated material from site or reuse for site landscaping.
8. Correct unauthorized rock removal to directions of local governing agency's Engineering Representative.

E. FIELD QUALITY CONTROL

1. Provide for visual inspection of foundation bearing surfaces and cavities formed by removed rock.

DIVISION 31

SECTION 31 23 16: EXCAVATION AND BACKFILL - PIPELINES

31 23 16.01: GENERAL

1. Section 31 23 00 will enhance and modify this section. The more stringent requirement will govern unless approved in writing by the Architect.
2. The Contractor shall perform all required excavation and backfilling for the installation of the water and sewer lines and other appurtenances under this contract. Excavation shall be carried to the depths indicated on the Drawings or as necessary to permit the installation of pipe, bedding, structures or appurtenances. Care shall be taken to provide a firm, undisturbed, uniform surface in the bottoms of trenches and excavations for structures. Where the excavation exceeds the required depth the Contractor shall bring the excavation to proper grade through the use of an approved backfill material.
3. Backfilling shall be carried out as expeditiously as possible, but shall not be undertaken until the Engineer has been given the opportunity to inspect the work. The Contractor must carry out all backfilling operations with due regard to the protection of pipes, structures and appurtenances and to the use of prescribed backfill materials and procedures to obtain the desired degree of compaction.
4. The Contractor shall be responsible for storage of excavated material, disposal of surplus excavated material, trench dewatering, demucking and other operations incidental to excavation and backfilling operations.
5. Water and sewer installation shall be in accordance with applicable provisions of the "10 States Standards."

31 23 16.02: PRODUCTS

1. Where earth backfill is specified, material taken during trench excavation may be used except where unsuitable material is encountered.

31 23 16.03: EXECUTION

1. Trenches shall be neatly excavated to the alignment and depth required for the proper installation of pipe, bedding material and appurtenances. Trenches shall be opened up far enough ahead of pipe laying to reveal obstructions, but the Engineer reserves the right to control the length of trench opened in advance of pipe installation and backfill if in his opinion the laying and testing of pipe is not preceding fast enough to complete the installation and backfilling within a reasonable length of time.
2. The trench shall be excavated to sufficient depth to permit a minimum of 30" of cover to be maintained over the top of water mains unless noted otherwise on the Plans.

3. Trench width shall be held to a minimum, consistent with proper working space for assembly of pipe. Maximum trench width up to a point one foot above top of pipe shall be limited to the outside pipe diameter plus 16".
4. Boulders, large stone, shale and rock, if encountered, shall be removed to provide clearance of 6" below and on each side of the pipe.
5. Trench walls shall be kept as nearly vertical as possible with due consideration to soil conditions encountered and when necessary, sheeting or bracing shall be provided to protect life and property.
6. In general, backfilling of trenches will proceed as pipe laying progresses so that the trench will be filled in as rapidly as possible after the pipe has been assembled and inspected. The Contractor shall, however, afford the inspector ample opportunity for observing the assembled pipe line before placing the backfill and, if requested by the inspector, shall delay the backfilling operation when the inspector is not present at the site.
7. Backfill under streets or highways having permanent type pavement shall consist of suitable granular material compacted for the entire trench depth. The granular material shall be carefully placed by hand around and under the pipe in layers not to exceed 9" in depth and shall be compacted by means of hand tamps or other approved tamping procedure. The granular backfill shall be placed by hand up to a point 12" above the top of the pipe and above this point shall be placed in layers not exceeding 9" and shall then be compacted by suitable means approved by the Engineer.
8. The Owner may provide for periodic density testing by a testing laboratory at his expense. Any retesting due to failure of tests shall be the responsibility of the Contractor. All trenches improperly compacted shall be excavated and re-compacted by the Contractor at no additional cost to the Owner.
9. The backfill for areas not ordinarily subjected to traffic, may consist of suitable excavated material placed by machine after the tamped backfill reaches a depth of 12" over the top of the pipe, and the backfill shall be compacted by means of a suitable wheeled vehicle such as a tractor or front end loader running longitudinally along the trench. After the backfill has been compacted in this manner additional fill material shall be placed in the trench to restore the original grade and provide a slight mound over the trench. This material shall again be compacted by means of a suitable wheeled vehicle. No rock larger than 6" in any dimension may be used in the backfill over the pipe and no rock larger than 1-1/2" may be used in the top 6" of the backfill.

DIVISION 31

SECTION 31 31 16: SOIL TREATMENT

31 31 16.01: GENERAL

A. SCOPE

1. Provide complete protection against subterranean insect infestation with a soil poisoning treatment under slabs, adjacent areas, and where directed.
2. All work shall be performed by a NC licensed and bonded operator whose principal business is treatment of soil and eradication of insects and plant growth. Before acceptance of work, provide in writing and in acceptable form, warranty for a period of one year (five years at locations noted), warranting the treated areas against re-infestation. Upon notice by the Owner during warranty period, promptly provide such treatment as may be necessary for elimination of infestation.

31 31 16.02: PRODUCTS

A. MATERIALS

1. Use an emulsible concentrate insecticide for dilution with water, specially formulated to prevent infestation by termites such as BASF Termidor® termiticide concentrate. Fuel oil will not be permitted as a diluent.
2. Other solutions may be used as recommended by Applicator and if acceptable to E.P.A. and local governing authorities. Use only soil treatment solutions which are not injurious to planting.

31 31 16.03: EXECUTION

1. At the time soil treatment is applied, soil shall be in friable condition with a sufficiently low moisture content to allow uniform distribution of chemical throughout soil adjacent to walls and other structures.
2. BASF Termidor® shall be applied according to manufacturer's recommendation to the building footing. No solution should be applied above the elevation of the bottom of the footing. Apply along complete building perimeter, all interior wall footings, and all expansion joints or construction joints in the floor slab.

DIVISION 32

SECTION 32 11 16: AGGREGATE BASE COURSE

32 11 16.01: GENERAL

A. DESCRIPTION OF WORK

1. Work of this Section includes all aggregate used in the construction of bituminous roadways, parking lots, building pads, and other areas as shown or scheduled on drawings. Provide to the limits and according to details as shown on the drawings.

B. REFERENCES

1. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1556	Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 698	Laboratory Compaction Characteristics of Soil Using Modified Effort (12,4ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 2167	Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	Classification of Soils for Architecting Purposes (Unified Soil Classification System)
ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM E 548	General Criteria Used for Evaluating Laboratory Competence

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT)

NCDOT (2018) Standard Specifications for Roads and Structures

C. DEGREE OF COMPACTION

1. Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 698. This will be abbreviated herein as percent of laboratory maximum density.

2. Approval

All plant, equipment, and tools used in the performance of the work shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

3. Weather Limitation

Base courses shall be placed when the atmospheric temperature is above 35 degrees F. Areas of completed base course that are damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirement.

D. TESTING

1. The General Contractor shall be responsible for coordinating all testing. Testing shall be performed by an approved commercial testing laboratory.

2. Tests

Testing shall be performed by an independent commercial testing laboratory. The testing laboratory shall be selected by the Architect/Owner. All testing shall be at the Owner's expense. The following tests shall be performed in conformance with the applicable standards listed.

3. Density Tests

Density shall be measured in the field in accordance with ASTM D 1556, ASTM D 2167 or ASTM D 2922. For the method presented in ASTM D 1556 the base plate as shown in the drawing shall be used. For the method presented in ASTM D 2922 the calibration curves shall be checked and adjusted if necessary, using only the sand cone method as described in paragraph Calibration of the ASTM publication. Tests performed in accordance with ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration of ASTM D 2922, on each different type of material being tested at the beginning of a job and at intervals as directed.

32 11 16.02: PRODUCTS

All materials for aggregate base course, Gradation ABC, shall conform to NCDOT Section 520 and Section 1006 and 1010 in Materials.

32 11 16.03: EXECUTION

All work shall conform to NCDOT Section 520.

A. PREPARATION OF UNDERLYING COURSE

1. Prior to constructing the crushed-aggregate base course, the underlying course shall be cleaned of all foreign substances. At the time of construction of the base course, the underlying course shall contain no frozen material. The underlying course shall conform to Section 31 22 13 - ROUGH GRADING. Ruts or soft, yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels as defined in ASTM D 2487 the surface shall be stabilized prior to placement of the graded-crushed-aggregate base course. Stabilization shall be accomplished by mixing graded-crushed-aggregate base material into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other

operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

B. GRADE CONTROL

1. During construction, the lines and grades including crown and cross slope indicated for the base course shall be maintained by means of line and grade stakes placed by the Contractor.

C. PLACING

1. The mixed material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 6 inches is required, the material shall be placed in layers of equal thickness. No layer shall exceed 6 inches or be less than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

D. COMPACTION

1. Requirements: Each layer of base course including shoulders shall be compacted as specified to produce an average field-measured density, through the full depth, of at least 100 percent of laboratory maximum density obtained in the laboratory. Water content shall be maintained during the compaction procedure and subsequent proof rolling of designated areas such that the water content is within plus or minus 3 percent of optimum water content as determined from laboratory tests as specified in density test procedures listed in paragraph TESTING. In all places not accessible to the rollers, the base course material shall be compacted with mechanical tampers.
2. Finishing: The surface of top layer of base course shall be finished after final compaction, and proof rolled, where required, by cutting any overbuild to grade and rolling with a steel-wheeled roller. In no case will thin layers of material be added to the top layer of base course to meet grade. If the elevation of top layer of base course is $\frac{1}{2}$ inch or more below the grade, the top layer of base shall be scarified to a depth of at least 3 inches, new material shall be added, and the layer shall be blended and recompacted to bring to grade. Adjustments in rolling and finishing procedures shall be made as may be directed to obtain grades, to minimize segregation and degradation of base course material, to adjust the water content, and to insure an acceptable base course. Material found unacceptable shall be removed and replaced, as directed, with acceptable material.

E. PROOF ROLLING

1. Proof rolling of the areas designated shall be in addition to compaction specified above and shall consist of application of 30 coverages with a heavy pneumatic-tired roller having four tires abreast, with each tire loaded to 30,000 pounds and tires inflated to 150 psi. In the areas designated, proof rolling shall be applied to the top lift of layer on which the base course is laid and to each layer of the base course. Water content of the lift of the layer on which the base course is placed, and of each layer of the base course, shall be maintained at optimum, or at the percentage directed from the start of compaction to the completion of proof rolling. Materials in the base course or underlying materials indicated unacceptable by the proof rolling shall be removed and replaced, as directed, with acceptable materials.

F. EDGES OF BASE COURSE

1. Acceptable material shall be placed along the edges of the base course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 1-foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the base course, as directed.

G. SMOOTHNESS TEST

1. The surface of the top layer shall not deviate more than 3/8 inch when tested with a 10-foot straightedge applied parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding 3/8 inch shall be corrected as directed.

H. THICKNESS CONTROL

1. The completed thickness of the base course shall be within 1/2 inch of the thickness indicated. The thickness of the base course shall be measured at intervals providing at least one measurement for at least each 500 square yards of base course. The depth measurement shall be made by test holes at least 3 inches in diameter. Where the measured thickness of the base course is more than 1/2 inch deficient, such areas shall be corrected by excavating to the required depth and replacing with new material. Where the measured thickness of the base course is 1/2 inch more than indicated, it will be considered as conforming with the requirements plus 1/2 inch, provided the surface of the base course is within 1/2 inch of established grade. The average job thickness shall be the average of the job measurements as specified above but within 1/4 inch of the thickness indicated.

I. MAINTENANCE

1. The base course shall be maintained in a condition that will meet all specification requirements until accepted.

END OF SECTION 32 11 16

DIVISION 32

SECTION 32 12 16: ASPHALT PAVING

32 12 16.01: GENERAL

A. DESCRIPTION OF WORK:

1. The type of work in this section include: proof rolling of prepared subbase provided under Section 32 11 16, furnishing, placing, and compacting asphaltic paving for patching areas affected by installation of new work as indicated on the drawings and as required by the scope of work.

B. RELATED SECTIONS:

Section 32 11 16 - Aggregate Base Course
Section 32 13 13 - Concrete Paving
Section 32 16 13 - Cast-In-Place Curbs and Gutters

C. REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3515 Hot-Mixed, Hot-Laid Bituminous Paving Mixtures – Current Edition

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT)

NCDOT Standard Specifications for Roads and Structures – Current Edition

D. EQUIPMENT

1. General

The bituminous plant shall be of such capacity to produce the quantities of bituminous mixtures required. Hauling equipment, paving machines, rollers, miscellaneous equipment, and tools shall be provided in sufficient numbers and capacity and in proper working condition to place the bituminous paving mixtures at a rate equal to the plant output.

2. Mixing Plants

Mixing plants shall conform to the requirements of NCDOT Section 610-5.

E. WEATHER LIMITATIONS

1. Unless otherwise directed, bituminous courses shall not be constructed when temperature of the surface of the existing pavement or base course is below 40 degrees F.

F. PROTECTION OF PAVEMENT

1. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until the pavement has cooled to 140 degrees F.

G. GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS

1. Finished surface of bituminous courses, when tested as specified below and in paragraph ACCEPTABILITY OF WORK, shall conform to gradeline and elevations shown and to surface-smoothness requirements specified.

2. Plan Grade

The grade of the completed surface shall not deviate more than 0.05 foot from the plan grade.

3. Surface Smoothness

When a 12-foot straightedge is laid on the surface parallel with the centerline of the paved area or transverse from crown to pavement edge, the surface shall vary not more than 1/4 inch from the straightedge.

H. GRADE CONTROL

1. Lines and grades shall be established and maintained by means of line and grade stakes placed at site of work by the Contractor. Elevations of bench marks used by the Contractor for controlling pavement operations at the site of work will be designated on the plans. Finished pavement elevations shall be established and controlled at the site of work by the Contractor in accordance with bench mark elevations furnished on the plans.

I. SUBMITTALS:

1. Material Certificates:

- a. Provide copies of material certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

2. Test Reports:

- a. Within 10 days of taking specimens, submit notarized reports documenting thickness and density of base and surface courses as specified herein. Reports shall conform to the requirements of the specified test standards.

32 12 16.02: PRODUCTS

- A. MATERIALS: The following products and specifications are intended to suggest quality requirements of products to be utilized in the construction of bituminous paving surfaces. Provide equal materials and specifications of products of State having jurisdiction.

1. Herbicide Treatment: Amino Triazone or approved equal shall be mixed with water in a concentration sufficient to prevent growth of grass and weeds for a period of two years.

B. BITUMINOUS HOT MIX

1. Shall consist of coarse aggregate, fine aggregate, mineral filler, bituminous material, and approved additives, if required, of the qualities and in the proportions specified in all applicable sections of NCDOT "Standard Specifications for Roads and Structures", and by the American Association of State Highway Transportation Officials (AASHTO).
2. Prime Coating: Surfaces of previously constructed base course shall be sprayed with a coat of bituminous material conforming to Grade MC-30 or RC-30 of NCDOT Section 600.
3. Tack Coat: Comply with NCDOT, Section 605-8 hot laid asphalt concrete surface course. Asphalt grade shall be RS-1H. Asphalt for tack coat shall be at not less than 90°F nor more than 145°F during application.

C. BITUMINOUS CONCRETE MIXES FOR ROADS AND PARKING

1. Bituminous concrete binder course shall be NCDOT Type 119.0C, conforming to NCDOT Section 640. Bituminous concrete surface course shall be NCDOT Type S-9.5C, conforming to NCDOT Section 645.

32 12 16.03: EXECUTION

A. BASE COURSE CONDITIONING

1. The surface of the base course will be inspected for adequate compaction and surface tolerances specified in Section 32 11 16 AGGREGATE BASE COURSE.

B. PREPARATION OF BITUMINOUS CONCRETE SURFACE COURSE, ROADS AND PARKING

1. Bituminous concrete surface course shall be NCDOT Type S-9.5C, conforming to NCDOT Section 645. Bituminous concrete binder course shall be NCDOT Type I-19.0C, conforming to NCDOT Section 640.

C. STORAGE OF BITUMINOUS PAVING MIXTURE

1. Storage shall conform to the applicable requirements of ASTM D 3515; however, in no case shall the mixture be stored for more than 4 hours.

D. TRANSPORTATION OF BITUMINOUS MIXTURE

1. Transportation from paving plant to site shall be in trucks having tight, clean, smooth beds lightly coated with an approved releasing agent to prevent adhesion of the mixture to the truck bodies. Excessive releasing agent shall be drained prior to loading. Each load shall be covered with canvas or other approved material of ample size to protect mixture from weather and to prevent loss of heat. Loads that have crusts of cold, unworkable material or that have become wet will be rejected. Hauling over freshly placed material will not be permitted.

E. PRIME COATING

1. Surfaces of previously constructed base course shall be sprayed with a coat of bituminous material conforming to Grade MC-30 or RC-30 of NCDOT Section 600.

F. PLACING

1. Bituminous courses shall be constructed only when the base course or existing pavement has no free water on the surface. Bituminous mixtures shall not be placed without ample time to complete spreading and rolling during daylight hours, unless approved satisfactory artificial lighting is provided.

G. COMPACTION OF MIXTURE

1. Rolling shall begin as soon after placing as the mixture will bear a roller without undue displacement. Delays in rolling freshly spread mixture will not be permitted. After initial rolling, preliminary tests of crown, grade, and smoothness shall be made by the Contractor. Deficiencies shall be corrected so that the finished course will conform to requirements for grade and smoothness specified herein. Places inaccessible to rollers shall be thoroughly compacted with hot hand tampers.
2. Surface Requirements: The finished surface shall be such that it will not vary more than 1/4 inch in 10 feet from the levels indicated. Any irregularity of the surface exceeding the above limits shall be corrected. Depressions which may develop after the initial rolling shall be remedied by loosening or removing the mixture and adding new material to bring the areas to a true surface. No skin patching shall be done. Such portions of the completed pavement as are defective in surface compaction or in composition, or that do not comply with all other requirements of these specifications, shall be taken up and replaced with suitable mixture, properly laid in accordance with these specifications and at the expense of the Contractor.
3. Correcting Deficient Areas
Mixtures that become contaminated or are defective shall be removed to the full thickness of the course. Edges of the area to be removed shall be cut so that sides are perpendicular and parallel to the direction of traffic and so that the edges are vertical. Edges shall be sprayed with bituminous materials conforming to NCDOT Section 605. Fresh paving mixture shall be placed in the excavated areas in sufficient quantity so that the finished surface will conform to grade and smoothness requirements. Paving mixture shall be compacted as specified in NCDOT Sections 635, 640 and 645. Skin patching of an area that has been rolled shall not be permitted.

H. JOINTS

1. General
Joints between old and new pavements, between successive work days, or joints that have become cold (less than 175 degrees F) shall be made to insure continuous bond between the old and new sections of the course. All joints shall have the same texture and smoothness as other sections of the course. Contact surfaces of previously constructed pavements coated by dust, sand, or other objec-

tionable material shall be cleaned by brushing or shall be cut back as directed. The surface against which new material is placed shall be sprayed with a thin, uniform coat of bituminous material conforming to NCDOT Section 605. Material shall be applied far enough in advance of placement of a fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of the sprayed surface.

I. FIELD QUALITY CONTROL:

1. General: Test in -place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Architect.
2. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

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

Surface Course: 1/4", plus or minus.

3. Check surface areas at intervals as directed by Architect.

J. PROTECTION:

1. Protection of Pavements: After completion of the pavement, no vehicular traffic of any kind shall be permitted on the pavement until it has set sufficiently to prevent rutting or other distortion. Damaged areas shall be repaired at no cost to the Owner.

END OF SECTION 32 12 16

DIVISION 32

SECTION 32 13 73 – CONCRETE PAVING JOINT SEALANTS

PART I – GENERAL

DESCRIPTION OF WORK:

This Section includes the following: expansion and contraction joints within cement concrete pavement and joints between cement concrete and asphalt pavement.

DEFINITIONS:

Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

QUALITY ASSURANCE:

Comply with NCDOT Standard Specifications for Roads and Structures, latest edition.

DELIVERY, STORAGE AND HANDLING:

Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

JOB CONDITIONS:

Do not proceed with installation of joint sealants under the following conditions:

- When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
- When joint substrates are wet or covered with frost.
- Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
- Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

SUBMITTALS:

Product Data: For each joint-sealant product indicated.

Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

PART 2 – MATERIALS

GENERAL:

Compatibility: Provide joint sealants, backing 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.

Cold Applied Joint Sealants: Multicomponent Low-Modulus Sealant for Concrete and Asphalt: Proprietary formulation consisting of reactive petropolymer* and activator components producing a pourable, self-leveling sealant.

Joint Sealant Backer Materials: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 – EXECUTION

EXAMINATION:

Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance. Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION:

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

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.

INSTALLATION:

General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated. Install backer materials of type indicated to support 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. Do not leave gaps between ends of backer materials. Do not stretch, twist, puncture, or tear backer materials. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

Install sealants using proven techniques that comply with the following and at the same time backings are installed:

- Place sealants so they directly contact and fully wet joint substrates.
- Completely fill recesses provided for each joint configuration.
- Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

PROTECTION AND CLEANING:

Protection: If damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

Cleaning: Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION

DIVISION 32

SECTION 32 92 00 – TURF AND GRASSES

PART I – GENERAL

DEFINITIONS:

Finish Grade: Elevation of finished surface of planting soil.

Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

QUALITY ASSURANCE:

Lawn installations shall meet the following criteria as determined by Architect: Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches. Use specified materials to reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

DELIVERY, STORAGE AND HANDLING:

Deliver seed in original sealed, labeled, and undamaged containers.

JOB CONDITIONS:

Planting Restrictions - All planting shall be done within the following dates: October 15 – April 15, unless exceptions are made in writing by the Architect

Schedule Change: If special conditions exist which may warrant a change in the planting dates mentioned above, a written request shall be submitted to the Owner's representative stating the special conditions and the proposed schedule change. Permission for schedule change will be given if warranted in the opinion of the Owner's representative.

MAINTENANCE SERVICE:

Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

- Seeded Lawns: Until Substantial Completion
- When initial maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

PART 2 – MATERIALS

SEEDS:

Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

Seed Species: Seed of grass species as follows, with not less than 95 percent purity, not less than 85 percent germination, and free of noxious weed seed: Sun and Partial Shade: Proportioned by weight as follows: 100 percent Rebel II (Falcon Fescue)

TOPSOIL:

Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

FERTILIZER:

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: Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

PART 3 – EXECUTION

EXAMINATION:

Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION:

Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations. Protect grade stakes set by others until directed to remove them. Provide 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.

Lawn Preparation: Limit lawn subgrade preparation to areas to be planted. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property. Apply fertilizer directly to subgrade before loosening. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer

on surface, and thoroughly blend planting soil mix. Delay mixing fertilizer with planting soil if planting will not proceed within a few days. Mix lime with dry soil before mixing fertilizer.

INSTALLATION:

Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other. Do not use wet seed or seed that is moldy or otherwise damaged. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer. Sow seed at a total rate of 5 to 8 lb/1000 sq. ft. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket [-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment. Protect seeded areas from hot, dry weather or drying winds by applying topsoil within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a depth of 3/16 inch, and roll surface smooth.

RENOVATION:

Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles. Reestablish lawn where settlement or washouts occur or where minor regrading is required. Provide new topsoil as required. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil. Mow, dethatch, core aerate, and rake existing lawn. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades. Apply seed and protect with straw mulch as required for new lawns. Water newly planted areas and keep moist until new lawn is established.

MAINTENANCE:

Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn. Provide materials and installation the same as those used in the original installation. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas. Water lawn with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 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: Mow grass to a height of 1-1/2 to 2 inches. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

CLEANUP AND PROTECTION:

Promptly remove soil and debris, created by lawn work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas. 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 lawn is established. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION

DIVISION 33

SECTION 33 41 00 – UTILITY STORM DRAINAGE PIPING

PART 1 – GENERAL

DESCRIPTION OF WORK:

This Section includes gravity flow, non-pressure storm drainage outside the building.

DEFINITIONS:

ABS: Acrylonitrile-butadiene-styrene plastic.

EPDM: Ethylene-propylene-diene-monomer rubber.

FRP: Fiberglass-reinforced plastic.

LLDPE: Linear low-density, polyethylene plastic.

PE: Polyethylene plastic.

PP: Polypropylene plastic.

PVC: Polyvinyl chloride plastic.

RTRF: Glass-fiber-reinforced, thermosetting-resin fitting.

RTRP: Glass-fiber-reinforced, thermosetting-resin pipe.

RCP: Reinforced Concrete Pipe.

QUALITY ASSURANCE:

Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: Pipe joints shall be at least silt tight, unless otherwise indicated. Comply with NCDOT Standard Specifications for Roads and Structures, latest edition. Comply with local design Standards and Specifications. Comply with NCDEQ Design Standards and Specifications, latest revision.

SUBMITTALS:

Shop Drawings: For the following:

- Manholes: Include plans, elevations, sections, details, and frames and covers.
- Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
- Field quality-control test reports.

DELIVERY, STORAGE, AND HANDLING:

Do not store plastic structures, pipe, and fittings in direct sunlight. Protect pipe, pipe fittings, and seals from dirt and damage. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

JOB CONDITIONS:

Site Information: Perform site survey, research public utility records, and verify existing utility locations. Locate existing structures and piping to be closed and abandoned.

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: Notify Architect not less than three days in advance of proposed utility interruptions.

PART 2 - MATERIALS

PVC PIPE AND FITTINGS

PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 80 pipe, with plain ends for solvent cemented joints with ASTM D 2467, Schedule 80, socket-type fittings.

CONCRETE PIPE AND FITTINGS:

Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, with bell-and-spigot ends and sealant joints with ASTM C 990, bitumen or butyl-rubber sealant.

NON-PRESSURE TYPE PIPE COUPLINGS

General: Comply with ASTM C 1173, 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.

Sleeve Materials:

- For Concrete Pipes: ASTM C 443, rubber.
- For Cast-Iron Soil Pipes: ASTM C 564, rubber.
- For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
- For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

Unshielded Flexible Couplings: Elastomeric sleeve with corrosion-resistant-metal tension band and tightening mechanism on each end. Manufacturers: Dallas Specialty & Mfg. Co., Fernco Inc., NDS Inc., Plastic Oddities, Inc.

Nonpressure: Type Rigid Couplings: ASTM C 1461, sleeve-type reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.

CLEANOUTS:

PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping. Manufacturers: IPS Corporation., NDS Inc., Plastic Oddities, Inc., Zurn Industries, Inc.; Zurn Light Commercial Specialty Plumbing Products.

MANHOLES:

Standard Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints. Diameter: 48 inches minimum, unless otherwise indicated.

Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.

Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section and having separate base slab or base section with integral floor.

Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.

Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.

Joint Sealant: ASTM C 990, bitumen or butyl rubber.

Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.

Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.

Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.

Manhole Frames and Covers: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."

Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.

CATCH BASINS:

Standard Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.

Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section and having separate base slab or base section with integral floor.

Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.

Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.

Joint Sealant: ASTM C 990, bitumen or butyl rubber.

Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.

Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 48 inches.

Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

BEDDING:

Stone bedding shall be required in installation of all storm sewers unless deemed not required before construction by engineer. Stone shall be #57 or #67 and shall be placed a minimum of 6 inches thick along the trench bottom the entire length of pipe.

PIPE OUTLETS:

Riprap Basins: Broken, irregular size and shape, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."

Average Size: NSSGA No. R-4, screen opening 3 inches.

Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size, graded stone.

Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

PART 3 – EXECUTION

GENERAL:

Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

- Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
- Unshielded flexible couplings for same or minor difference OD pipes.
- Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.

Gravity-Flow, Nonpressure Sewer Piping: Use the following pipe materials as indicated on the Drawings:

- PVC water-service pipe; PVC Schedule 80, water-service-pipe fittings; and solvent-cemented joints.
- Reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.

PIPE JOINT CONSTRUCTION:

Basic pipe joint construction is specified in Division 2 Section 02080 "Piped Utilities - Basic Materials and Methods." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

Join gravity-flow, nonpressure drainage piping according to the following:

- Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.

- Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
- Join dissimilar pipe materials with nonpressure-type flexible couplings.

INSTALLATION:

Piping Installation: 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 design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions. 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 according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated. 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.

Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

Install gravity-flow, nonpressure drainage piping according to the following:

- Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
- Install piping below frost line.
- Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
- Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

Cleanout Installation: Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas. Use extra-heavy-duty, top-loading classification cleanouts in roads and other areas subject to vehicular traffic. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

Manhole Installation: Install manholes, complete with appurtenances and accessories indicated. Install precast concrete manhole sections according to ASTM C 891. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

Stormwater Inlet and Outlet Installation: Construct riprap of broken stone, as indicated. Install outlets that spill onto grade, anchored with concrete, where indicated. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated. Construct energy dissipaters at outlets, as indicated.

CLOSING ABANDONED STORM DRAINAGE SYSTEMS:

Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below: Close open ends of piping

with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:

- Remove manhole or structure and close open ends of remaining piping.
- Backfill to grade according to Division 31 Section 31 20 00 "Earth Moving."

PROTECTIONS AND CLEANING:

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. Submit separate reports for each system inspection.

Defects requiring correction include the following:

- Alignment: Less than full diameter of inside of pipe is visible between structures.
- Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
- Crushed, broken, cracked, or otherwise damaged piping.
- Infiltration: Water leakage into piping.
- Exfiltration: Water leakage from or around piping.

Replace defective piping using new materials, and repeat inspections until defects are within allowances specified. Reinspect and repeat procedure until results are satisfactory. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects. Do not enclose, cover, or put into service before inspection and approval. Test completed piping systems according to authorities having jurisdiction. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice. Submit separate report for each test.

Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

- Exception: Piping with soil tight joints unless required by authorities having jurisdiction.
- Option: Test plastic piping according to ASTM F 1417.
- Option: Test concrete piping according to ASTM C 924.

Leaks and loss in test pressure constitute defects that must be repaired. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

Cleaning: Clean interior of piping of dirt and superfluous materials.

END OF SECTION