C. Topsoil Type S5:

1. Imported borrow.

2. Friable loam.

3. Reasonably free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.

4. Acidity range (pH) of 5.5 to 7.5.

5. Containing a minimum of 4 percent and a maximum of 25 percent organic matter.

2.3 SOURCE QUALITY CONTROL

A. Testing and Analysis of Topsoil Material: Perform testing as referenced in Section 1.4 of 02205.

B. If tests indicate materials do not meet specified requirements, change material and retest.

Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 SOIL REMOVAL

A. Excavate subsoil and topsoil from areas designated.

B. Remove lumped soil, boulders, and rock.

C. Either stockpile or removal soil as required by design plans.

D. Separate differing materials with dividers or stockpile apart to prevent mixing.

E. Prevent intermixing of soil types or contamination.

F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

A. As specified on design plans either direct surface water away from stockpile site to prevent erosion or deterioration of materials or leave unused materials in a neat, compact stockpile.

B. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent freestanding surface.

END OF SECTION

SECTION 02207

AGGREGATE MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aggregate materials.

1.2 RELATED SECTIONS

A. Geotechnical Report (if provided); bore hole locations and findings of subsurface materials.

B. Section 02205 - Soil Materials.

C. Section 02225 - Trenching.

D. Section 02275 - Riprap.

E. Section 02667 - Site Water Lines.

F. Section 02732 - Site Sanitary Sewerage Systems.

1.3 REFERENCES

A. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.

B. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.

D. ASTM D2487 - Classification of Soils for Engineering Purposes.

E. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with all references, Town requirements, and applicable state agency requirements.

PART 2 PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1: Aggregate Base Course (ABC) conforming North Carolina Department of Transportation Standard.

B. Coarse Aggregate Type A2 (Gravel): AASHTO Ml47, 35% or less passing the No. 200.

C. Coarse Aggregate Type A3 (Gravel): Washed stone; free of shale, clay, friable material and debris; graded in accordance with ASTM C136, ASTM D2487 Group Symbol GP.

D. Aggregate Type A4 (Pea Gravel): Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ASTM C136, ASTM D2487 Group Symbol GM.

2.2 FINE AGGREGATE MATERIALS

A. Fine Aggregate Type A5: Conforming to North Carolina Department of Transportation standard.

B. Fine Aggregate Type A6 (Sand): Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM C136, ASTM D2487 Group Symbol SP.

2.3 SOURCE QUALITY CONTROL

A. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557.

B. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557.

C. If tests indicate materials do not meet specified requirements, change material or material source and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 STOCKPILING

A. Stockpile materials on site at locations designated by Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

B. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

END OF SECTION

SECTION 02211

ROUGH GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of topsoil and subsoil.

B. Cutting, grading, filling, rough contouring, and compacting the site for site structures, building pads, and other required grading.

1.2 RELATED SECTIONS

A. Section 02110 - Site Clearing.

B. Section 02205 - Soil Materials.

C. Section 02207 - Aggregate Materials.

D. Section 02229 - Rock Removal.

E. Section 02222 - Excavating.

F. Section 02223 - Backfilling.

G. Section 02225 - Trenching.

H. Section 02923 - Landscape Grading.

1.3 REFERENCES

A. ASTM C136 - Method For Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

D. ASTM D2419 - Test Method For Sand Equivalent Value of Soils and Fine Aggregate.

E. ASTM D2434 - Test Method For Permeability of Granular Soils (Constant Head).

F. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C136, ASTM D2419, ASTM D2434, and any other applicable local standards. Maintain one copy of all required permits on site.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil: Type S3, S4 or S5 as specified in Section 02205.

B. Subsoil Fill: Type S1 or S2 as specified in Section 02205.

C. Structural Fill: Type S1 or S2 as specified in Section 02205.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions conform to site plans.

B. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

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

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect utilities that remain, from damage.

D. Notify applicable utility company to remove and relocate utilities.

E. Protect above and below grade utilities that remain.

F. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

G. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.

B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

C. When excavating through roots, perform work by hand and cut roots with sharp axe.

D. Remove subsoil from site or stockpile in area designated on site to depth not exceeding eight feet and protect from erosion. Remove from site, subsoil not being reused.

E. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key placed fill material to slope to provide firm bearing.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.4 FILLING

A. Install Work in accordance with applicable local standards.

B. Fill areas to contours and elevations with unfrozen materials.

C. Place fill material on continuous layers and compact.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from building minimum 1.5:100 unless noted otherwise.

F. Make grade changes gradual. Blend slope into level areas.

G. Remove surplus fill materials from site.

3.5 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

3.6 FIELD QUALITY CONTROL

A. Testing: In accordance with ASTM D1557.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

i. Frequency of Tests: Perform tests as required by Owner and/or Engineer.

END OF SECTION

SECTION 02222

EXCAVATING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating for site structures.

1.2 RELATED SECTIONS

A. Section 02110 - Site Clearing.

B. Section 02223 - Backfilling.

C. Section 02225 - Trenching.

D. Section 02229 - Rock Removal.

E. Section 02607: Manholes and Covers.

F. Section 02667 - Site Water Lines.

1.3 FIELD MEASUREMENTS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain from damage.

C. Notify utility company to remove and relocate utilities.

D. Protect plant life, lawns, rock outcroppings and other features remaining as a portion of final landscaping.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.2 EXCAVATING

A. Excavate subsoil to accommodate building foundations, slabs-on-grade paving and site structures.

B. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 02223 and 02225.

C. Grade top perimeter of excavating to prevent surface water from draining into excavation.

D. Hand trim excavation. Remove loose matter.

E. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume. Larger material will be removed under Section 02229.

F. Notify Owner of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

G. Correct areas over excavated in accordance with Section 02223.

H. Stockpile excavated material in area designated on site in accordance with Section 02205.

3.3 FIELD QUALITY CONTROL

A. Provide for visual inspection of bearing surfaces.

3.4 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 02223

BACKFILLING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Building perimeter and site structure backfilling to subgrade elevations.

B. Site filling and backfilling.

C. Fill under slabs-on-grade and paving.

D. Fill for over-excavation.

E. Consolidation and compaction as scheduled.

1.2 RELATED SECTIONS.

A. Section 02222 - Excavating.

B. Section 02225 - Trenching.

C. Section 02229 - Rock Removal.

D. Section 02275 - Riprap.

E. Section 2607: Manholes and Covers.

F. Section 02667 - Site Water Lines.

G. Section 02923 - Landscape Grading.

1.3 REFERENCES

A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Fill Type: As specified in Section 02205.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

B. Verify underground tanks and manholes are anchored to their own foundations to avoid flotation after backfilling.

C. Verify structural ability of unsupported walls to support imposed loads by the fill.

3.2 PREPARATION

A. Compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Type A3 fill and compact to density equal to or greater than requirements for subsequent fill material.

C. Scarify and proof roll subgrade surface to identify soft spots. Fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Employ a placement method that does not disturb or damage other work.

D. Place geotextile fabric over Type A2 fill prior to placing next lift of fill.

E. Granular Fill Type A3: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

F. Soil Fill Type S2: Place and compact material in equal continuous layers not exceeding 12 inches compacted depth.

G. Maintain optimum moisture content of backfill materials to attain required compaction density.

H. Remove surplus backfill materials from site.

I. Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.5 inches from required elevations.

B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ASTM D1557.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

C. Proof roll compacted fill surfaces under slabs-on-grade and paving.

3.6 PROTECTION OF FINISHED WORK

A. Protect finished Work.

B. Reshape and re-compact fills subjected to vehicular traffic.

3.7 SCHEDULE

A. All fill and compaction to comply with approved design plans.

END OF SECTION

SECTION 02225

TRENCHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating trenches for utilities from clean out outside building to municipal utilities.

B. Compacted fill from top of utility bedding to subgrade elevations.

C. Backfilling and compaction.

1.2 RELATED SECTIONS

A. Section 02110 - Site Clearing.

B. Section 02205 - Soil Materials.

C. Section 02222 - Excavating.

D. Section 02223 - Backfilling.

E. Section 02229 - Rock Removal.

F. Section 02275 - Riprap.

G. Section 02667 - Site Water Lines.

H. Section 02732 - Site Sanitary Sewerage Systems.

I. Section 02923 - Landscape Grading.

1.3 REFERENCES

A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.5 FIELD MEASUREMENTS

A. Verify that survey bench mark, control point, and intended elevations for the work are as shown on drawings.

1.6 COORDINATION

A. Verify work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Fill Type S2: As specified in Section 02205.

2.2 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable fabric in accordance with plans.

B. Filter Fabric: Non-biodegradable fabric in accordance with plans.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

C. Protect bench marks, existing structures, paving, and curbs from excavating equipment and vehicular traffic.

D. Maintain and protect above and below grade utilities that are to remain.

E. Cut out soft areas of subgrade not capable of compaction in place. Backfill and compact to density equal to or greater than requirements for subsequent backfill material.

3.2 EXCAVATING

A. Excavate subsoil required for municipal utilities.

B. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

C. Do not interfere with 45 degree bearing splay of foundations.

D. In trenches where water is present or where dewatering is required, the trench bottom shall be undercut and stabilized with No. 67 stone, having a minimum depth of 8 inches.

E. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

F. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd, measured by volume. Larger material will be removed under Section 02229.

G. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.3 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place geotextile fabric over Fill Type A2 prior to placing next lift of fill.

D. Granular Fill Type A6: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

E. Soil Fill Type S2: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

F. Employ a placement method that does not disturb or damage foundation perimeter drainage, utilities in trench, or any other existing structures.

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Remove surplus fill materials from site.

I. Leave fill material stockpile areas completely free of excess fill materials.

3.4 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.5 inches from required elevations.

B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ASTM D1557.

B. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

C. Frequency of Tests: Compaction tests will be conducted as required by the Owner's Representative.

3.6 PROTECTION OF FINISHED WORK

A. Protect finished Work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 02229

ROCK REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of discovered rock during excavation.

B. Explosives to assist rock removal.

1.2 RELATED SECTIONS

A. Section 02225 - Trenching: Trenching and backfilling for utilities.

B. Section 02275 - Riprap.

1.3 REFERENCES

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

1.4 DEFINITIONS

A. Rock Excavation: Any material that cannot be excavated with a single tooth ripper drawn by a crawler tractor having a minimum flywheel power rated at not less than 310 horse power (Caterpillar D-8T or equivalent), occupying an original volume of at least one cubic yard or more, and requires blasting.

B. Trench Excavation: Any Material which cannot be excavated with a Caterpillar 345C with flywheel power of 345 horse power or equivalent occupying an original volume of at least ½ cubic yard or more, and which requires blasting or other rock excavation methods.

1.5 SUBMITTALS FOR REVIEW

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

1.6 QUALITY ASSURANCE

A. Seismic Survey Firm: Company specializing in seismic surveys with five years experience or approval by Owner's Representative.

B. Explosives Firm: Company specializing in explosives for disintegration of rock, with five years documented experience or approval by Owner's Representative.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable safety codes for explosive disintegration of rock and to NFPA 495 for handling explosive materials.

B. 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.

C. Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.

1.8 PROJECT CONDITIONS

A. 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.

B. Conduct survey and document conditions of buildings near locations of rock removal, prior to blasting, and photograph existing conditions identifying existing irregularities.

C. Advise owners of adjacent buildings or structures in writing, prior to executing seismographic survey. Explain planned blasting and seismic operations.

D. 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:

1. Date of shot.

2. Time of shot.

3. Foreman's name.

4. Number and depth of holes.

5. Approximate depth of overburden.

6. Amount and type of explosive used in each hole.

7. Type of caps used (instant or delay).

8. The weather.

E. Blasting log shall be made available to the Owner's 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.

F. 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.

G. No blasting shall be allowed unless a galvanometer is employed to check cap circuits.

H. The Owner 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.

1.9 SCHEDULING

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

PART 2 PRODUCTS

2.1 MATERIALS

A. Explosives: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.

B. Delay Device: Type recommended by explosives firm.

C. Blast Mat Materials: Type recommended by explosives firm.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 ROCK REMOVAL BY A MECHANICAL METHOD

A. Excavate and remove rock by the mechanical method.

B. Drill holes and utilize wedges or mechanical disintegration compound to fracture rock.

C. Cut away rock at bottom of excavation to form level bearing.

D. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

E. Remove excavated materials from site or reuse for site landscaping.

F. Correct unauthorized rock removal to directions of Owner's Representative.

3.4 ROCK REMOVAL BY EXPLOSIVE METHODS

A. If rock is uncovered requiring the explosives method for rock disintegration, notify the Owner.

B. Provide seismographic monitoring during progress of blasting operations.

C. Drill blasting holes within 12 feet of finished slope.

D. Disintegrate rock and remove from excavation.

E. Remove rock at excavation bottom to form level bearing.

F. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

G. Remove excavated material from site or reuse for site landscaping.

H. Correct unauthorized rock removal to directions of Owner's Representative.

3.5 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 02231

AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aggregate base course.

1.2 RELATED SECTIONS

A. Section 02207 - Aggregate Materials.

B. Section 02225 - Trenching.

C. Section 02275 - Riprap.

D. Section 02510 - Asphaltic Concrete Paving.

E. Section 02520 - Portland Cement Concrete Paving.

F. Section 02607 - Manholes and Covers.

G. Section 02923 - Landscape Grading.

1.3 REFERENCES

A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb. Rammer and an 18-in. Drop.

B. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and an 18 inch Drop.

PART 2 PRODUCTS

2.1 MATERIALS

A. Coarse Aggregate Fill Type A1: As specified in Section 02207.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate has been inspected, gradients and elevations are correct,

and is dry.

3.2 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

A. Spread aggregate over prepared substrate to a total compacted thickness as indicated on design plans and in accordance with North Carolina Department of Transportation. Requirements.

B. Place aggregate in maximum 6 inch layers and roller compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

A. Flatness: Maximum variation of 1/2 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with AASHTO T180.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.6 SCHEDULES

A. Under Asphalt Pavement:

1. Compact placed aggregate materials to achieve compaction of 95 percent.

B. Under Concrete Pavement:

1. Compact placed aggregate materials to achieve compaction of 95 percent.

END OF SECTION

SECTION 02275

RIPRAP

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Riprap.

1.2 RELATED SECTIONS

A. Section 02225 – Trenching.

PART 2 PRODUCTS

2.1 MATERIALS

A. Riprap: Sized in accordance with design plans.

B. Geotextile fabric.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not place riprap over frozen or spongy subgrade surfaces.

3.2 PLACEMENT

A. Place geotextile fabric over substrate, lap edges and ends.

B. Place riprap at culvert pipe ends and other locations as indicated on design plans.

C. Place riprap into position. Key into grade so that top of riprap is at same grade as surrounding ground.

D. Install to indicated thickness.

E. Place rock evenly and carefully to minimize voids (do not tear fabric) and place in one consistent operation to preclude disturbance or displacement of substrate.

F. After placement, spray with water to moisten the bagged mix. Maintain moist for 24 hour.

END OF SECTION

SECTION 02510

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Asphaltic concrete paving, wearing binder or base course.

B. Surface sealer.

C. Aggregate base course.

1.2 RELATED SECTIONS

A. Section 02231 - Aggregate Base Course.

B. Section 02607 - Manholes and Covers.

1.3 REFERENCES

A. ASTM D946 - Penetration-Graded Asphalt Cement for Use in Pavement Construction.

B. TAI - (The Asphalt Institute) - MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.

1.4 PERFORMANCE REQUIREMENTS

A. Paving: Designed in accordance with Owner Requirements and/or North Carolina Department of Transportation.

B. Patching: Designed in accordance with approved design plans. Patching in Owner streets or DOT roads must meet appropriate requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Owner and/or North Carolina Department of Transportation standard.

B. Mixing Plant: Conform to Owner and/or North Carolina Department of Transportation standard.

C. Obtain materials from same source throughout.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for paving work on public property.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F or surface is wet or frozen.

PART 2 PRODUCTS

2.1 MATERIALS

A. Asphalt Cement: ASTM D946. In accordance with North Carolina Department of Transportation standards.

B. Aggregate for Base Course Mix: In accordance with Section 02207 Type A1.

C. Aggregate for Binder Course Mix: In accordance with North Carolina Department of Transportation standards.

D. Aggregate for Wearing Course Mix: In accordance with North Carolina Department of Transportation standards.

E. Fine Aggregate: In accordance with Section 02207 Type A5.

F. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.

G. Primer: In accordance with North Carolina Department of Transportation standards.

H. Tack Coat: In accordance with North Carolina Department of Transportation standards.

I. Seal Coat: In accordance with North Carolina Department of Transportation standards.

2.2 ASPHALT PAVING MIX

A. Use dry material to avoid foaming. Mix uniformly.

B. Base Course: 3.0 to 6.0 percent of asphalt cement by weight in mixture in accordance with North Carolina Department of Transportation

standards.

C. Binder Course: 4.5 to 6.0 percent of asphalt cement by weight in mixture in accordance with North Carolina Department of Transportation standards.

D. Wearing Course: 5.0 to 7.0 percent of asphalt cement by weight in mixture in accordance with North Carolina Department of Transportation standards.]

2.3 SOURCE QUALITY CONTROL AND TESTS

A. Submit proposed mix design of each class of mix for review prior to beginning of work.

B. Test samples in accordance with TAI MS-2.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify base conditions satisfactory.

B. Verify that compacted granular base is dry and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.2 SUBBASE

A. Section 02231 - Aggregate Base Course forms the base construction for work of this section.

3.3 PREPARATION - PRIMER

A. Apply primer in accordance with North Carolina Department of Transportation standards

3.4 PREPARATION - TACK COAT

A. Apply tack coat in accordance with North Carolina Department of Transportation standards

3.5 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with North Carolina Department of Transportation standards

B. Place asphalt within 24 hours of applying primer or tack coat.

C. Place asphalt to thickness shown on approved design plans.

D. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

E. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.6 SEAL COAT

A. Apply seal coat to surface course in accordance with North Carolina Department of Transportation standards.

3.7 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch .

C. Variation from True Elevation: Within 1/2 inch .

3.8 FIELD QUALITY CONTROL

A. Take samples and perform tests in accordance with TAI MS-2.

3.9 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury until surface temperature is less than 140 degrees F.

END OF SECTION

SECTION 02520

PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete sidewalks and driveways.

B. Aggregate base course.

1.2 RELATED SECTIONS

A. Section 02231 - Aggregate Base Course

B. Section 02510 - Asphaltic Concrete Paving.

C. Section 02607 - Manholes and Covers.

D. Section 02923 - Landscape Grading.

1.3 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

C. ASTM C33 - Concrete Aggregates.

D. ASTM C94 - Ready Mix Concrete.

E. ASTM C150 - Portland Cement

F. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

G. ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain cementitious materials from same source throughout.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F or surface is wet or frozen.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Form Materials: Conform to ACI 301.

2.2 REINFORCEMENT

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150 Portland type, white color.

B. Fine and Coarse Mix Aggregates: ASTM C33.

C. Water: Potable, not detrimental to concrete.

2.4 ACCESSORIES

A. Curing Compound: ASTM C309.

B. Liquid Surface Sealer.

C. Surface Retarder.

D. Joint Sealers.

2.5 CONCRETE MIX - BY PERFORMANCE CRITERIA

A. Mix and deliver concrete in accordance with ASTM C94, Alternative No. 2.

B. Select proportions for normal weight concrete in accordance with ACI 301 Method 1.

C. Provide concrete to the specifications given on the approved design plans.

D. Use accelerating admixtures in cold weather only when approved by Owner. Use of admixtures will not relax cold weather placement requirements.

E. Use calcium chloride only when approved by Owner.

F. Use set retarding admixtures during hot weather only when approved by Owner.

2.6 SOURCE QUALITY CONTROL AND TESTS

A. Submit proposed mix design to Owner for review prior to commencement of work.

B. Tests on cement and aggregates will be performed to ensure conformance with specified requirements.

C. Test samples in accordance with ACI 301.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify compacted stabilized soil is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.2 SUBBASE

A. Section 02231 - Aggregate Base Course forms the base construction for work of this Section.

3.3 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole or catch basin (if applicable) frames with oil to prevent bond with concrete pavement.

C. Notify Owner minimum 24 hours prior to commencement of concreting operations.

3.4 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.5 REINFORCEMENT

A. Place reinforcement as indicated.

B. Interrupt reinforcement at expansion joints.

C. Place reinforcement to achieve pavement and curb alignment as detailed.

3.6 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

3.7 JOINTS

A. Place expansion joints at 20 foot intervals. Align curb, gutter, and sidewalk joints.

B. Place joint filler between paving components and building or other appurtenances.

C. Provide sawn joints at 3 foot intervals, between sidewalks and curbs, and between curbs and pavement.

D. Provide keyed joints as indicated.

3.8 EXPOSED AGGREGATE

A. Wash exposed aggregate surface with clean water and scrub with stiff bristle brush to match sample panel.

3.9 FINISHING

A. Finish as stated on design plans or to match existing surfaces.

3.10 JOINT SEALING

A. Separate pavement from vertical surfaces with 1/4 inch thick joint filler.

B. Place joint filler in pavement pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

C. Extend joint filler from bottom of pavement to within 1/4 inch of finished

surface.

3.11 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/2 inch in 10 ft.

B. Maximum Variation From True Position: 1/2 inch.

3.12 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian or vehicular traffic over pavement for 3 days minimum after finishing.

END OF SECTION

SECTION 02923

LANDSCAPE GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Final grade topsoil for finish landscaping.

1.2 RELATED SECTIONS

A. Section 02205 - Soil Materials.

B. Section 02211 - Rough Grading.

C. Section 02223 - Backfilling.

D. Section 02225 - Trenching.

E. Section 02936 - Seeding.

PART 2 PRODUCTS

2.1 MATERIAL

A. Topsoil: Fill Type S3, S4 or S5 as specified in Section 02205.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify building and trench backfilling have been inspected.

B. Verify substrate base has been contoured and compacted.

3.2 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, stones, in excess of 1 inch in size. Remove subsoil contaminated with petroleum products.

C. Scarify surface to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

A. Place topsoil in areas where seeding is required. Place topsoil during dry weather.

B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

C. Remove roots, weeds, rocks, and foreign material while spreading.

D. Manually spread topsoil close to plant life, buildings, and other structures to prevent damage.

E. Lightly compact placed topsoil.

F. Remove surplus subsoil and topsoil from site.

G. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.4 TOLERANCES

A. Top of Topsoil: Plus or minus 12 inch.

3.5 PROTECTION

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

END OF SECTION

SECTION 02936

SEEDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparation of subsoil.

B. Placing topsoil.

C. Seeding, Hydroseeding, mulching and fertilizer.

D. Maintenance.

1.2 RELATED SECTIONS

A. Section 02205 - Soil Materials: Topsoil material.

B. Section 02223 - Backfilling: Rough grading of site.

C. Section 02225 - Trenching: Rough grading over cut.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Grassed Areas:

1. Basis of Measurement: By the acre.

2. Basis of Payment: Includes preparation of topsoil, and seeding, and maintenance until full growth achieved.

1.4 REFERENCES

A. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.5 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quack grass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambs quarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.6 MAINTENANCE DATA

A. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.7 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.8 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

B. Deliver fertilized in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.10 COORDINATION

A. Coordinate with installation of underground sprinkler system piping and watering heads.

1.11 MAINTENANCE SERVICE

A. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition cuttings.

PART 2 PRODUCTS

2.1 SEED REQUIREMENTS

A.	Tall Fescue:	200 lbs/acre.
B.	Kentucky Blue Grass:	20 lbs/acre.
C.	Rye:	40 lbs/acre.

2.2 SOIL MATERIALS

A. Topsoil: Excavated from site and free of weeds.

2.3 ACCESSORIES

A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable. Use 400 lbs/acre.

B. Fertilizer: Recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil. Use 1200 lbs/acre.

C. Lime: Use 4000 lbs/acre.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this Section.

3.2 PREPARATION OF SUBSOIL

A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.

C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

3.3 PLACING TOPSOIL

A. Spread topsoil to a minimum depth of 8 inches over area to be seeded. Rake until smooth.

B. Place topsoil during dry weather and on dry unfrozen subgrade.

C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.

D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

E. Install edging at periphery of seeded areas in straight lines to consistent depth.

3.4 FERTILIZING

A. Apply fertilizer at a rate of 4000 lbs/acre.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.5 SEEDING

A. Apply seed, at the rates identified in Part 2.2 of this section, in two intersecting directions. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Do not sow immediately following rain, when ground is too dry, or during windy periods.

D. Roll seeded area with roller not exceeding 112 lbs.

E. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.

F. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.6 HYDROSEEDING

A. Apply seeded slurry with a hydraulic seeder at a rate to be approved by Engineer evenly in two intersecting directions.

B. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.

C. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.7 SEED PROTECTION

A. Identify seeded areas with stakes and string around area periphery. Set string height to 6 inches.

B. Cover seeded slopes where grade is 4 inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.

C. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Provide 12 inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.

D. Secure outside edges and overlaps at 36 inch intervals with stakes.

E. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

F. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.8 MAINTENANCE

A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

B. Neatly trim edges and hand clip where necessary.

C. Immediately remove clippings after mowing and trimming.

D. Water to prevent grass and soil from drying out.

E. Roll surface to remove minor depressions or irregularities.

F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

G. Immediately reseed areas which show bare spots.

H. Protect seeded areas with warning signs during maintenance period.

END OF SECTION